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Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, JANUARY 13, 1923 | No. 1

ACT ON NEW RADIO LAW

MANUFACTURERS TO FIGHT R.C.A. TO END

INDEPENDENTS ALL TO GET UNDER ONE FLAG

Victors Over Radio Corporation Subsidiary Consider Joining in New Battle —Licensees Hold Meeting

(Special to RADIO DIGEST)

NEW YORK.—Organization of the independent Radio manufacturers for a fight to the finish against the Radio Corporation of America, has proceeded to the stage that many such manufacturers not holding Armstrong licenses are expected to join forces with the group for self defense. The latest group to consider joining in the fight on the side of A. H. Grebe and the Bunnell companies, is the Independent Radio Manufacturers, an organization which recently won a decisive victory over the Wireless Specialty Apparatus Company of Boston, Massachusetts, a subsidiary of the Radio Corporation of America.

It will be remembered by those who followed the last mentioned suit, that the Wireless Specialty Apparatus Company was enjoined by the courts not to practice further advertising of a nature harmful to the characters of the manufacturers of crystal detector receiving sets who were not infringing certain patents said to be owned by the Wireless Specialty Apparatus Company.

Fighting Body Meets

On Thursday, December 28, the Associated Radio Manufacturers, composed of Armstrong patent licensees, had a meeting for the pur-

(Continued on page 2)

Little Fred C. Shearer, Jr., the world's tiniest Radio announcer, is a regular star on programs broadcast by WSB, The Atlanta Journal's Radiophone broadcasting station. He is seen holding his homemade banjo, on which he sometimes accompanies himself. The murderous musical weapon to the left belongs to Ernest Rogers, the WSB star shown below. Master Shearer tickled the nation's funny bone when he recently gave an imitation of Mr. Roger's famous "Willie the Weeper"

Vaudeville and Radio were first linked up when Ernest Rogers, Radio singing star, was introduced from the stage of Loew's Grand Theater, Atlanta, Ga., to his audience by a Radio message from WSB, "The Voice of the South"

COMMITTEE HEARS OPINIONS ON BILL

No Serious Objections Raised—Measure Starts Regular Course

(Special to RADIO DIGEST)

WASHINGTON.—Actual hearings on the important White Radio bill were commenced January 2 before the merchant marine committee of the House of Representatives. The main opposition to the bill came from the army and navy officials who oppose having their operators and stations licensed by another (the commerce) department. However, on all other points the war and navy departments favored the bill. Secretary of Commerce Hoover said that his department favored the bill and had immediate need for its enactment. R. P. Maximum, representing the American Radio Relay League, said that he spoke for the 16,000 licensed Radio amateurs who are members of the league and that he supported the bill in general. Secretary Hoover, Admiral Zigemeier, chief of naval communications; Major L. B. Vender, army signal corps; Eugene Sibley, postoffice department; W. A. Wheeler, department of agriculture; Alfred H.

(Continued on page 2)

TWO NEW OPERAS GO ON ETHER FROM KYW

"Barber of Seville" and "Samson and Delilah" Heard

CHICAGO.—"The Barber of Seville" January 3 and "Samson and Delilah" on January 5 were the Chicago Opera productions broadcast by Westinghouse Station KYW during the opening week of the new year. Both operas were given for the first time during the season and afforded an unexpected treat for Radiophans.

The cast for "The Barber of Seville"

(Continued on page 2)

COPS USE KOP PLANT TO "COP" CRIMINALS

DETROIT.—KOP is the Detroit police department Radio station. KOP is a very good call number —particularly for a police department. The station is used strictly for business purposes, no programs being broadcast. It is brought into use for hunting criminals, locating stolen automobiles and other official police business. It has proven its worth in [illegible] of a eral recent criminal hunts. [illegible]ary of [illegible], which on [illegible]mplete Radio [illegible]ded world war [illegible] the National [illegible] ton. The [illegible] ard are those suffering fr[illegible] shell shock as a [illegible] produce sound [illegible]

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ACT ON NEW RADIO LAW

(Continued from page 1)

Thom, American Railway Association; Mr. Maximum and others all appeared in favor of the bill. Several of them, however, offered minor amendments. It is believed that the bill will have speedy and favorably action by the House of Representatives when reported by the merchant marine committee.

Will Be New Year's Gift

Literally, the final passage of the White bill, seeking to re-allocate Radio waves, minimize interference and provide for the adequate regulation of national Radio transmission, will be a New Year's gift to practically every amateur in the country and to every Radiophan. To be sure, its benefits will not be realized at once, but they will last for years to come.

The bills presented in both the Senate and House last June, lay dormant at the Capitol until Secretary Hoover returned from a protracted trip to the West Coast, where he was busy with another national project. Immediately upon his return, he took up the question of the desired Radio legislation with Representative W. H. White, Jr., of Maine, the House champion of Radio, with the result that it was announced that hearings would be started before the House Merchant Marine and Fisheries Committee on Tuesday, January 2.

TO FIGHT R.C.A. TO END

(Continued from page 1)

pose of discussing further organization. Ten licensees were present and all subscribed to support A. H. Grebe in the Radio Corporation of America monopoly suit. The spirit of the meeting was indicative of a high morale, and while it could not be definitely ascertained, it is said that two important legal points, sufficient to block the patent monopoly efforts of the Radio Corporation, were disclosed.

The officials of the organization are: A. H. Grebe of the A. H. Grebe Company, president; Edward Weston of the Radiocraft Company, vice president; Fulton Cutting of Cutting & Washington, treasurer; Francis P. Pace, lawyer, secretary.

De Forest Corrects Rumor

Dr. Lee De Forest and Charles Gilbert, president of the De Forest Radio Telephone and Telegraph Company, are righteously indignered at recent misstatements regarding the De Forest patents. In order to have the public understand the truth an interview with the two obtained the following statement:

"Rumors have been circulated throughout the trade and statements have been published that the Radio Corporation of America, or the American Telephone and Telegraph Company, or both, are the owners of the De Forest patents. In the interest of fairness and to prevent those unfamiliar with patent matters from being imposed upon or being misled by misrepresented facts, we wish to advise that the De Forest Company is, and at all times has been, the owner of the De Forest patents, and any statements to the contrary by anyone are untrue.

"The Radio Corporation of American and its associated companies are operating under a license acquired from the DeForest Company through the A. T. & T. Company and the Western Electric Company who are licensees under the De Forest patents. This license which the De Forest company granted is open to public inspection, and is recorded in the U. S. Patent Office.

"Nevertheless, pursuant to its attitude and policy of fairness, it cannot permit a misrepresentation of facts to accomplish what can be accomplished by fair legal methods. The apparatus manufactured and sold by the De Forest company is free from infringement of any existing valid patent of the United States owned by anyone other than the De Forest company, and frees the purchaser of such apparatus from any litigation."

NEW OPERAS ON AIR

(Continued from page 1)

included the familiar array of former seasons; Mmes. Galli-Curci, Claessens, Messrs. Schipa, Rimini, Lazzari and Trevisan. Cimini conducted.

"Samson and Delilah" was interesting from the standpoint of debuts, as Louise Homer as Delilah and Charles Marshall as Samson were heard for the first time in these roles with the Chicago Opera. Polacco conducted.

Radio Comes to Rescue of Lonely, Historic Island

SYDNEY, AUSTRALIA. — Radio has come to the rescue of lonely Polynesian Pitcairn Island, which loomed large in fiction and history as the refuge of the mutineers of the British sloop Bounty, years ago.

Until now the 200 islanders have been compelled to depend for their news of the outside world upon the occasional visits of ships. Radio equipment has just been installed, however, and will do much to relieve the isolation of the island residents. Some of the young men of the [illegible] been learning the International code.

FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close January 27 at midnight. Awards will be announced in the February 24 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $25.00; Second, $15.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded both contestants.

5. Judges will be the Technical Staff of Radio Digest, Illustrated.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The contestant must build this set and test it before entering the contest. The article must tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Seven New 360-Meter Plants

CHICAGO.—Seven new plants managed to get the date 1922 on their 360-meter broadcasting licenses by obtaining their licenses during the last week of December. Station WCAE, Pittsburgh, Pa., was also granted a Class B license, carrying with it the use of a 400-meter wave length. The new plants on 360 meters are:

WRAM, R. E. Compton and Carthage College, Carthage, Ill.; WQAC, E. B. Gish, Amarillo, Tex.; WPAW, Radio Installation Co., Wilmington, Del.; KFCM, Richmond Radio Shop, Richmond, Calif.; WPAX, S—W Radio Co., J. R. Shumate, Jr., Thomasville, Ga.; WPAV, Paul Tinetti & Sons, Laurium, Mich.; KFAZ, C. H. Weatherell, Reedley, Calif.

The Government station at Estevan, Canada, recently established communication with Raratonga, New Zealand, 6,500 miles distant.

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Radio Digest, Illustrated, Volume 4, Number 1, published Chicago, Illinois, January 13, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

More About Reflex Circuits, is a feature by Harry J. Marx in the next issue, January 20, of Radio Digest. Mr. Marx has uncovered some interesting new data regarding these "trick" circuits, and will show and tell about three more hook-ups for the home experimenter to try out. Making one tube "work overtime" is always an interesting subject. Buy the next issue and learn more about this type of receiving circuit.

A-B-C Lessons for Radio Beginners, Chapter III, will appear in next issue. The "green" novice should not miss any of these simple explanatory articles by Arthur G. Mohaupt. His next chapter will take up the subject of oscillating circuits and the high frequency currents established in them. As these form the real basis of Radio operation, no novice should miss the next chapter.

Radio Receiving Sets in Photo Diagram, one of the popular original features of the Digest, will illustrate the new Federal Radio frequency receiving set. This will appear in the January 20 issue. Place your order with the newsstand dealer today.

The Effect of Religious Broadcasting, is the subject of an article by Vera Brady Shipman to appear in an early number of the Digest. Will Radio aid in the propagation of Christianity? Does the broadcasting of various denominations' services have a unifying effect? See what this interesting article discloses.

The State, City—Station Index, to the Radiophone Broadcasting Station Directory, together with the third and last part of the station schedules, will appear in the Digest. Imitation is the sincerest form of flattery. This service is original with Radio Digest, and is the best directory of such stations that anyone can secure.

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NEW YORK'S SHOW DRAWS BIG CROWD

MANY ATTRACTED BY ENTERTAINMENT FEATURES

David W. Griffith, Wm. J. Burns, Chauncey Depew and E. H. Armstrong Keep Interest Alive

NEW YORK.— Closing with exhibitors leaving late Saturday night, December 30, the American Radio Exposition at Grand Central Palace here broke all previous records for previous Radio shows. The great crowds, growing every day of the ten days, were literally jammed about the booths and entertainment features on the last night.

One feature which held the interest of all was the standard 500-watt broadcasting station which was located on the main floor. Hundreds of well-known persons were accorded the honor of broadcasting from the show's station.

Show Program Excellent

The excellent character of the program arranged for the show undoubtedly caused many persons to attend who might not have done so otherwise. The entertainment was not confined to Radio, but included motion pictures, crime detection and other distinct fields in its scope.

On the day following Christmas, Richard Barthelmess was awarded a photo-play medal for his acting in "Tol'able David." Later during the same evening, David Wark Griffith broadcast from the show's station on the subject, "The Type That Need Apply." His talk described the best type of person adaptable to a motion picture career.

William J. Burns Talks

On Wednesday night, December 27, William J. Burns told the crowd attending how Radio was being used in the detection and capture of criminals. On the same evening Julius Tanner, vaudeville star, and "Uncle Dave" Cory, famed writer of children's stories, contributed to the show's popularity.

On the next night Chauncey Depew attempted to break some broadcasting records. A great many years ago when the wired telegraph first reached around the world, Mr. Depew gave an exhibition of fast sending and his message circled the globe in twenty-eight seconds. Then Thomas A. Edison cut two seconds from Mr. Depew's time. When the new mark was recorded Mr. Depew contended he was the best amateur, as the great inventor was a professional.

"The Major" Shows 'Em How

One of the daily features of the exposition was a demonstration of Radio receiving by Major Edwin H. Armstrong, under the auspices of the Radio Club of America. Special apparatus using 99 vacuum tubes was constructed and used for this purpose and an extraordinary system of amplification was used so that the receiving programs could be heard distinctly and clearly by the crowd.

Armstrong worked at the show in a special glass enclosed room on the mezzanine floor.

Radio Takes Role as Show Booster

Broadcasts Effective in Calling Wide Public Attention to Los Angeles Pageant of Progress

LOS ANGELES, CALIF.—Radio was recently presented to the world in the role of "A Messenger," by the Los Angeles Chamber of Commerce, when they decided to broadcast information concerning the Pageant of Progress and Industrial Exposition, which they were to present to Southern California and the world.

For several weeks before the opening and during the two weeks of the Exposition which was held a short time ago, Stations KHJ, the Los Angeles Times; KOG, the Evening Herald, and KWH, the Los Angeles Examiner, included Pageant of Progress news, information and programs in the broadcasting of their news bulletins.

This was the first time that Radio has been brought into play in connection with an exposition of any kind on the Pacific Coast, and in which the information was broadcast by the newspaper stations. The news matter, broadcast from an educational standpoint, proved from late reports to have been more than the success expected.

An experimental twenty kilowatt vacuum tube at Rocky Point, Long Island, transmitting on a wave length of 19,000 meters, recently handled commercial trans-Atlantic Radio traffic with Great Britain and Germany.

Instead of the usual picture or piece of statuary, the graduating class in a Western high school presented to its alma mater an expensive Radio receiving outfit.

START 'HOOK NIGHTS' FOR ENTERTAINERS

BUT NO RADIO CABBAGES FOR THESE AMATEURS

Everyone Gets Chance to Broadcast "Act" from New York Plant for Weekly Prize

NEW YORK.—The Society Radio of Radio Artists and Audiences, established some months ago to effect a closer relationship between the audiences of Station WHN and the artists who entertain them, held the first of a series of amateur nights on Thursday evening, January 4th. This amateur night was comparable in every way with an amateur night which one might see in a vaudeville theater, and it marked the first opportunity that has been afforded to novice, amateur entertainers to broadcast from an eastern station.

Anyone and everyone is eligible to compete for the prizes which are offered at WHN each Thursday evening. There is no entrance fee. All that is required of a would-be prize winner is that he write to the station, telling the nature of his act and the length of time it will take to broadcast it. As the time for amateur broadcasting is limited to one hour and a half, no one person will be allowed more than five minutes, nor will it be possible to admit everyone who asks for a place on the program at any one night. However, letters will be answered in the order in which they are received and each person will be advised when he is to appear at Station WHN to try for a prize.

Listeners-in are the sole judges of the winners, and they cast their votes by telephoning to the station at the conclusion of the program or by writing their decisions in a letter so that they will reach the station before Thursday of the following week. The correct address of the station for those who wish to enter the contests or vote for winners is: Ridgewood Radiophone Station WHN, Ridgewood, Long Island, N. Y.

NEW HONDURAS PLANT WORKS NEW ORLEANS

WNU Handles Traffic of Fruit Firm's Tropical Station

NEW ORLEANS, LA.—Another lap toward New Orleans' goal as a Radio center is the opening at Tegucigalpa, Honduras, of the first of a number of Radio stations under the auspices of the United Fruit Company. The formal opening took place December 1, and traffic was handled by WNU, the company's New Orleans station, for several hours.

The Honduras station is among the first to generate the high frequency current by means of a 20-kilowatt triode tube. According to Crawford H. Ellis of the United Fruit Company office at New Orleans, virtually no trouble with static, usually bothersome in the tropics, was experienced between WNU and the new station. Five new stations are being built in the tropics by the concern. At New Orleans the 50-kilowatt transmitter is to be replaced by tube of 20-kilowatts, and greater range is expected.

Two New Tacoma Plants; City Sets Mark for Size

TACOMA, WASH.—Two more new broadcasting stations have brought the number in Tacoma up to five, considered a record for a city of 100,000. KFEJ, the Tacoma Radio News Service station, opened up in December with records, news bulletins and advertising material. The idea is a new one, the station broadcasting the names and lines of various firms who sign with them, advising auditors to call the office of the broadcasting station for prices.

The other new station is BE1, the Third Signal Company station at Camp Lewis, on the outskirts of Tacoma. The army station operates on 400 meters, sending music and lectures five nights a week.

BRITISH LICENSES GO TO NEW HIGH MARK

WASHINGTON.—Between March and November the number of experimental Radio licenses in England, which are granted only to those competent to make useful contribution to Radio research, increased from 8,000 to 18,000. An even greater growth is expected with the recent opening of several broadcasting stations throughout the isle.

MASSACHUSETTS HIGH IN CROSS OCEAN WORK

BOSTON, MASS.—Stations in Massachusetts form a large percentage of those heard across the Atlantic in the amateur transatlantic ten day test. Over 52 New England stations were heard. Among the most notable achievements was that of S. S. Heap of Atlantic, Mass., who got his call across with only a 5-watt transmitter.

LEARNING WHAT TO COOK TODAY

The old problem, "What shall I cook today?" no longer bothers modern housewives who have found a ready solution in the Radiophone. Many recipes and menus are broadcast daily from various large stations over the country by leading chefs and cooking experts. The Mrs. Newlywed believes it a great help. © K. & H.

Radio Helps in Columbus Charity Drive for Kiddies

COLUMBUS, O.—One of the most touching events connected with the annual charity "newsie" drive for the poor kiddies of Columbus, held each year by prominent business and professional men of Columbus, who sell special editions of The Ohio State Journal for charity, was the Radio appeal broadcast by Attorney General John G. Price, of Ohio. Mr. Price sought the co-operation of Station WPAL, of the Superior Radio & Telegraph Equipment Company, and was given a place on the weekly program before the charity drive.

The smallest Radio set in the world contained in a ten-grain capsule, was recently exhibited in New York city.

DAY-LONG SABBATH SERVICES AT KYW

MORNING UNTIL EVENING CHURCH BROADCASTS

"Old Central Church," Spiritual Haven of Strangers, and Sunday Evening Club Co-operate

CHICAGO.—Sunday, December 24, Station KYW introduced its latest broadcasting feature, church services continuing intermittently from 11 A. M. to 9 P. M. This was accomplished by arrangement with the board of directors of the Sunday Evening Club, which gave permission for the installation of a special telephone wire connecting Orchestra Hall with the station. This now makes possible the broadcasting of the Central Church and Sunday Evening Club's services in addition to the regular chapel services conducted by the leading pastors of Chicago churches in KYW's studio at 3:30 p. m., Central time.

Central Church Known to Transients

If there is such a thing as a heart-throb or flash of sentiment in the life of a great city, that spark flashes in Chicago when mention is made of "Old Central Church" which has been the spiritual resting place for years for strangers within the walls of the city. The services of Central Church are conducted by Dr. Frederick F. Shannon. For seven years before coming to Chicago Dr. Shannon was pastor of the Reformed Church of the Heights in Brooklyn.

The feature of the Sunday Evening Club's services is the musical program furnished by a choir of 100 voices under the direction of Edgar Nelson, who was decorated by the King of Sweden. The sermons are delivered by men of national repute, and the entire order of service has long been popular with Chicago residents.

POEMS BY LONGFELLOW GO ON ETHER AT WOR

Lecturer Honors Poet in Broadcast from Newark Plant

NEWARK, N. J.—Oscar I. Lamberger, Ph. D., author and lecturer, broadcast a most interesting talk from L. Bamberger Station WOR recently, entitled "Longfellow," illustrated by Longfellow's poems.

Dr. Lamberger is a graduate of Leipzig University and was assistant professor of comparative literature at Leipzig University, 1899-1901. He is well known in Germany and England, chiefly for his translations of English and American classics into German.

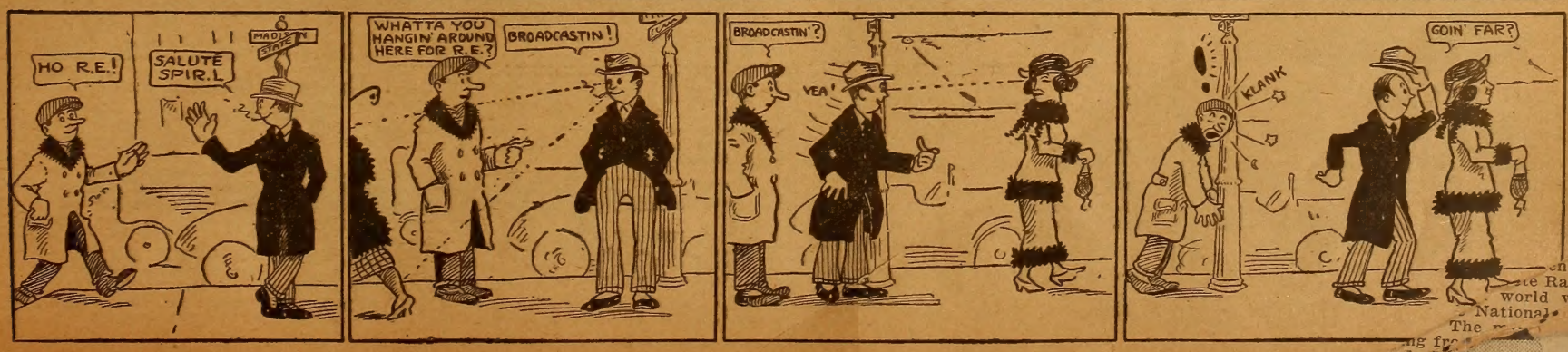
In conjunction with the late professor, Charles Sprague Smith, of the Peoples Institute, N. Y., and John Collier, he organized "The National Board of Review," an organization which on account of its powerful influence has done much towards the making of high grade motion-pictures, educational and otherwise. Dr. Lamberger is now President of the Longfellow Literary Society with headquarters in Brooklyn, N. Y.

Plane, Storm Victim, Calls for Repair Squad by Radio

LONDON, ENG.—How Radio can speed ahead and tell of trouble has been illustrated in a recent incident in the airplane service between France and England. A plane in the London-Paris run was damaged in a storm over the English Channel, the damage making it necessary to stop as soon as land was in sight. The pilot realized this, and phoned the extent of the damage and the repairs believed necessary.

Upon his landing near Calais, he found the mechanics ready to work to replace the damaged parts. Fifteen minutes later, the plane was in condition to continue its trip with its twelve passengers. The plane was only ten minutes late in its schedule when it arrived in Paris.

THE ANTENNA BROTHERS — Spir L. and Lew P. — She Heard His Call



REBUILDING OF WBZ STRENGTHENS VOICE

SURMOUNTS ETHER BAR TO ALL NEW ENGLAND

Improved Springfield Station Uses Two Oscillators and Three Modulators of 250 Watts Each

By R. P. King

Many Radiophans have doubtless noticed that the voice of WBZ, the Westinghouse station at Springfield, Mass., is considerably louder and clearer than it was last winter. There is a good reason for this improvement. The station was entirely rebuilt during the summer and is now one of the finest in the country.

The original station was opened in September, 1921, and was one of the pioneers in the broadcasting field. Only two or three stations now in operation have a longer period of operation record. WBZ was designed to serve New England only, so that its power was limited. But, though it was found to have a consistent range of about 500 miles south and west under good atmospheric conditions, it did not entirely fulfill its purpose.

All New England Hard to Reach

New England is peculiar from a Radio standpoint, and for some unknown reason there were several areas in this section that WBZ could not reach. The new station, however, has remedied this situation and now can be heard clearly on a detector tube alone all over the northeastern part of the country.

The new transmitting apparatus is of the same type as that used by Stations KDKA, KYW, and WJZ, although somewhat smaller. It has two oscillating tubes and three modulator tubes, each rated at 250 watts. Ten-volt alternating current for the filaments is supplied by a transformer from a 110-volt circuit, and 2000-volt direct current for the plates is supplied by a motor-generator set located outside of the station and remotely controlled from the transmitter. The tubes are kept cooled by a fan mounted behind the transmitter.

Antenna on 142-Foot Towers

The transmitting antenna is supported by two structural steel towers, 142 feet high. These towers are located on the roof of the company's Radio factory so that the height of the antenna above the ground is 200 feet. The antenna is made up of six phosphor-bronze cables spaced five feet apart and is 220 feet long between insulators. A counterpoise, of similar dimensions, is suspended 130 feet below the antenna. Special arrangements have been made to prevent breakage of the antenna and counterpoise by ice, and a heavy current can be circulated through the antenna wires and down leads to prevent accumulations during ice storms.

Shirred Monk Cloth Cuts Out Echoes

The studio, which is located on the third floor of the building, is a room of 20 by 23 feet. Heavy carpets on the floor and shirred monk cloth on the walls and ceilings eliminate all echoes. Among the musical instruments used are a Knabe-Ampico reproducing grand piano, a Victrola, and a Brunswick talking machine.

The condenser type microphone, which is standard at present, is hung from a movable and adjustable stand. Its output passes through three stages of amplification before it goes to the transmitting room, where three more stages of amplification are provided. The studio amplifiers are housed in a cabinet padded with felt. A small receiver with a loop aerial is used to check the character of the performances broadcast.

Schedule of Operation

WBZ operates every night from 7:30 to 9 P. M. Eastern time. Its regular weekly program includes children's stories, agricultural reports, addresses, and music. On Sunday, chapel services are broadcast at 2 P. M. and church services at 8 P. M. A number of well-known people have addressed the Radio audience from WBZ, including the governor of every New England state, and Dr. Charles P. Steinmetz.

It is stated that more than 2,000 hours of operating time, conservatively estimated to be worth $150,000, has been saved to navigation interests in the Great Lakes in a single season by Radio advice as to weather conditions.

Growth in Radio Interest Keeps Uncle Sam's "Lab" Staff on Jump

Information Service Installed for Fans, Experimental Investigations Conducted, Radio Relay Perfected, Improvement Made in Various Outfits as Part of Bureau of Standards Work

WASHINGTON.—During the past year there has been a remarkable increase in popular interest in Radio communication, according to Dr. S. W. Stratton, former chief of the Bureau of Standards. Dr. Stratton continues in part:

"This has been greatly stimulated by the fact that there has become available Radiophone apparatus of satisfactory performance, by means of which market and crop reports and other news, music, and entertainments have been transmitted broadcast and received by many persons. This general interest has resulted in a large increase in the bureau's correspondence on Radio subjects. Dozens of letters asking for Radio information are received each day, and many of these are of considerable importance.

Radio Information Service Required

"In order to answer such inquiries, as well as to keep the bureau's staff informed on current developments, it has been necessary to devote much time to the maintenance of a Radio information service. An unusually large number of visitors have called at the Radio laboratory, and in order to avoid continual interruption of the regular work in progress special arrangements have been made for demonstrating the exhibits of most general interest. Members of the bureau have delivered a number of lectures on Radio subjects.

Electron-Tube Generator Research

"Theoretical and experimental investigations were conducted on the power output of electron-tube generators. A paper was prepared for publication on methods of testing and rating electron-tube generators. A special form of electron-tube generator was developed for producing sparks of high frequency for use with recording apparatus for recording the pressure cycle in a gas engine cylinder.

Work on Radio and Audio Amplifiers

"Special amplifiers, using both Radio frequency and audio frequency amplification, were developed for particular purposes, including direction finding, Radiophone communication with surfboats of the Coast Guard service and reception of material sent broadcast by Radiophony.

"A 5-stage amplifier was developed which used 60-cycle alternating current to supply power for the filaments and plates, instead of the usual storage and dry batteries. Both Radio frequency and audio-frequency amplification are used in connection with a crystal detector. This amplifier has aroused considerable interest, and is described in a paper which has been published. A special amplifier was developed for amplifying variations in direct current, or low-frequency alternating currents.

Radio Relay Perfected

"A Radio-operated relay has been developed which employs audio frequency tuning and has been found effective for operating other mechanisms. Such a relay can be used for the remote control of mechanisms by Radio. The relay is rugged and highly selective, and is very useful when moderate strays or considerable interference exists. By proper audio frequency tuning it has made clear tape records of messages when interference was so severe that an experienced operator could not copy the message at all by the use of his phones. It can be used for reception at fairly high speeds. Relays of this type have been constructed for various applications in the Signal Corps and other branches of the Government service.

Equip Surfboat; Communicate Five Miles

"At the request of the Coast Guard, Radiophone transmitting and receiving equipment was installed on a 36-foot motor-driven surfboat, and successful communication in both directions was maintained during a demonstration over a distance of about 5 miles from shore.

"The antenna used on the boat was a single-turn coil antenna, of which the hull of the boat formed a part. A special multistage amplifier was constructed for use in this work.

Find Better Alcohol for Arcs

"An investigation was conducted to determine the most satisfactory denaturing formula for alcohol used to supply hydrogen in the arc chamber of small arcs, and several kinds of denatured alcohol were found which gave more satisfactory operation than ethyl alcohol, which was used as a comparison standard. Preliminary developments were made on a short-wave arc using electrodes submerged in alcohol.

"Improvements were made in a method of locating an airplane in flight transmitting Radio signals. Two trucks equipped with crossed-coil direction finders were used, and results of satisfactory accuracy were obtained. Other work has been done on direction finding and related problems for the Air Service.

Test Makes of Receiving Sets

"A comprehensive investigation has been made on the construction, design, and performance of representative types of Radio receiving sets. Methods of testing and standards of performance have been developed for receiving sets, and publications covering various classes of sets are in preparation. Some of this work has been conducted in co-operation with commercial testing laboratories and retail trade organizations.

"The bureau has co-operated with the National Fire Protection Association in the preparation of a revised rule for Radio installations for the National Electrical code."

Makes Music on Glasses with Fingers for WEAF

NEW YORK.—One outstanding musical novely of the present season broadcast from Station WEAF, of the American Telephone and Telegraph Company, was that of recent date when Charles Wold, famous for his work on musical glasses, gave a special program. For many years Mr. Wold has toured the country with these musical glasses, fifty-two in all. Mr. Wold wets his fingers and by rubbing over the edges of the glasses, which contain no water, the skill of his touch produces music of exquisite sweetness.

Isaak Newlin, an Alaskan Eskimo, in his early twenties, is a Radio operator of marked ability.

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—said Confucius.

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with 18-inch horn
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R-3 Magnavox Radio
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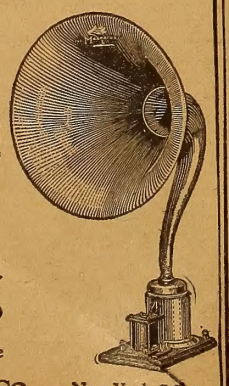
$45.00



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take two head sets and all types cord tip terminals. Price $1.50. Write for Bulletin on Carter "HOLD-TITE" Jacks and other products.
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THE ONLY KNOB and DIAL
WITHOUT A SET SCREW
ASK YOUR DEALER
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KNOB & DIAL CO., Inc.
eet NEW YORK CITY

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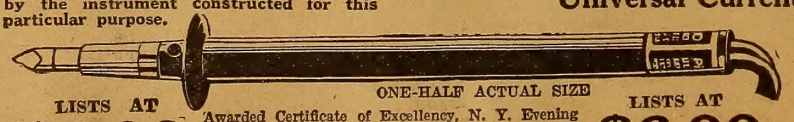
Both the manufacturer's and amateur's problem on all fine work is readily solved by the instrument constructed for this particular purpose.

The Post Soldering Iron
Platinum Heating Unit
Interchangeable Tip
Universal Current



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HOW THEY DO IT AT WDAP'S PLANT

Shown at the left is the concert ensemble of WDAP, the Drake Hotel station, Chicago, in the broadcasting studio. Henry Sellinger, standing at the extreme left of the group, is director of the orchestra. Below is Vice-President Coolidge, in Washington, delivering an address into the new Pallophotophone, which later broadcast his voice, recorded on a film, from WGY, Schenectady. The results were so natural that many listeners in believed the voice to be "first hand."

"Jazz Nomads" Send Wicked Tunes Into "Doughnut" as Lady Visitor Looks On

Reporter Gets "Inside"

Tells How Drake Hotel Plant, Chicago, Puts Sunday Evening Program on Air

By Vera Brady Shipman

"Say, fellows, aren't you going to play 'Three o'Clock in the Morning?' You've been on fifteen minutes and we've had twenty requests." And the jocular voice which the "Drake Radio Family" knows so well announces——

"By special request the Campus Nomads will play——"

I visited the Drake broadcasting Station WDAP Sunday evening. The broadcasting room is not so privately enclosed as many, and the chance guest can get a wonderful idea of how they do it at WDAP. ("We do Atlantic Pacific," as the announcer adds.)

Microphone Resembles Doughnut

The room is heavily hung with draperies on three sides with the fourth side open. Before a microphone which looks like a large black doughnut with smaller doughnuts around the outer edge, the orchestra plays, the soloist sings and the speaker talks to the great unseen, as though the audience were hidden in that doughnut.

A red electric light bulb flashes on when the microphone is open, when the operator in the adjoining room opens the switch which opens the air to the broadcasters. Intense silence drops at the moment the light flashes on. The orchestra if not ready, quickly assembles itself, and instantly the opening chords are sounded. When the number is finished, silence until the red bulb goes out. Then the hubbub resumes until the next red flash.

Glimpse at Musicians

The Sunday night program I heard was given by the Campus Nomads, a group of five Northwestern University students who are jazzing their way to knowledge, and the Drake Hotel Orchestral Ensemble of five soloists under the direction of Henry Sellinger. Also pianologues by Jean King Leighton with Anne Mortensen Herre at the piano, were sent forth over the air in Miss Leighton's regular fashion of interesting dialect.

Two grand pianos in the broadcasting room are used for every kind of musical entertainment, all of which are under the personal direction of Mrs. Saida Ballentine.

The Drake station, which unlike others in Chicago, is privately owned, began its existence atop the Wrigley building a year or so ago and is owned by two Chicago men, Thorne Donnelley and J. Elliott Jenkins.

Goes to Transmitter Room

By the courtesy of the announcer-operator (oh, how he hated to let a woman in, and I can't blame him), Ralph Shukart, otherwise called "The Sheik of the Drake," I was allowed to go silently into the operating room. Here the operator broadcasts his announcements through the same kind of a "doughnut" microphone, which catches every room sound as well as long-distance wire telephone interference. Here the operator listens in on the musical program and times his announcements accordingly. The second operator, M. L. Green, courteously gave me some of the data needed for this story.

Pine Peeling Pervades Plant

I meant to stay just a short time, but I found upon leaving that I had been there nearly two hours. The time flew and the informality, the courtesy from the owner on down to each assisting operator, and the comradeship which exists throughout this station strengthened the feeling that the listener in always obtains of the "Drake family."

As I left the top floor of the Drake, the boys at the telephone were still answering——

"Oh, yes, Madam, they have played 'Three o'Clock' and I am sure they will play it again before the evening is over, Yes, Madam, glad you called."

Close Large Business Deal by Air; 'Bugs' Aid

COLUMBUS, O.—Except for the customary written confirmation and acceptance, a business deal involving several hundred dollars brought to a successful close by Radio recently by the Columbus State Company, it has been announced by H. W. Webb, secretary and treasurer of the company. Amateur operators were the exclusive "agents" in this matter.

Frank Hahne, tin and sheet iron worker of Savannah, Georgia, is an old customer of the Columbus Slate company and also is a code Radio enthusiast. On Thanksgiving morning, he sat down to his transmitting set and sent a message to the Columbus firm. It was picked up by an amateur in Cincinnati, who in turn relayed it. R. C. Bohannan, with the Erner & Hopkins company, Station WBAV, received the message at his home and called Mr. Webb on the telephone. Mr. Webb at once quoted by telegraph the price on sea green slate, according to the amount wanted. The next day, Hahne sent the written confirmation and also a Radio confirmation. A return telegram acknowledged the order and the deal was closed.

This is believed to be the first time in the Radio history of Ohio that business has been negotiated through amateur Radio stations.

Device Photographs Voice on Film Reproducing Message for Broadcast

Flickers of Tiny Mirror Record Speech on Pallophotophone Film—Developed Strip Gives Natural Tones—Weeks', Denby's and Coolidge's Speeches Reach All Corners of U. S. at Once by Means of Instrument

By B. S. Beach

Christmas greetings and messages to the people of the United States from Vice President Coolidge, Secretary of War Weeks and from Secretary of Navy Denby were broadcast on Christmas eve from Station WGY, the General Electric transmitter at Schenectady, N. Y., without their being present, or speaking, in fact. This was the first time that three leading executives of the country ever attempted to extend their greetings in a way that reached the four corners of the country simultaneously. The feat was made possible by use of the Pallophotophone, a new device for photographing the voice and later reproducing it with perfect clearness.

How It Was Done

The machine was set up in a hotel in Washington ten days before. The vice president and the war and navy secretaries spoke into a small recording horn. As they did, their voices caused a small diaphragm to vibrate to which is attached a tiny mirror, scarcely smaller than the head of a pin. This oscillation or flickering of the mirror reflected a beam of light upon a moving photographic film, thus recording the human voice accurately with the overtones, the delicate shadings of speech, and all other characteristics which make one voice sound different from another.

Develop Film, Reproduce Messages

The film was then taken to Schenectady and was broadcast twice on Christmas eve from the WGY studio, the first time at 7:30 o'clock Eastern time, during the regular Christmas program and then again at 10:30 o'clock for Radiophans in the western states.

In reproducing, the film is passed before a strong ray of light and the zigzag markings photographed on it by the sound waves create electric waves which pass through an arrangement of vacuum tubes and produce sound waves again which are sent directly into the Radio broadcasting apparatus without the use of a microphone or any sort of a pickup device ordinarily used.

Value of Device

The feat of recording the speech of a person in a distant city is believed to have introduced an entirely new element in Radio broadcasting—the possibility of making a master record and then broadcasting it days or weeks later from any Radio station in the country.

The reality of the characteristics of the reproduced and broadcast voices was evinced by thousands of complimentary letters received by WGY from fans who praised the feat. The following is to WGY from W. C. Crews, who listened in on a single tube, non-regenerating set, 500 miles away from Schnectady, N. Y.:

"Calvin Coolidge, Weeks and Denby came in just grand, almost as though they were in the next room—sounded as though it was the real thing. Had you not said something about Photophone I never would have known the difference. To me it seemed marvelous.

"I am sure thousands of fans throughout the country would be interested in knowing the outcome of the experiment, as it related to Europe as well as knowing something in detail about the Photophone, and it is suggested that when results are definitely known that they be given to RADIO DIGEST for a story."

Give Set to Wounded Vets

SPRINGFIELD, O.—Mrs. Albert A. Wright, of this city, is the chairman of a committee of the Woman's Auxiliary of the Springfield American Legion, which on Christmas Day presented a complete Radio receiving set to the wounded world war veterans of Ward 27 at the National Soldiers' Home in Dayton. The [illegible] ward are those suffering fr[illegible] shell shock and wound[illegible] overseas.

SERVICE OF BRITISH RANKS BELOW U. S.

ENGLAND TRIES NEW PLAN IN LICENSING

Canadian Radio Official Declares American Standards Are Models in Britain

OTTAWA, CAN.—Lieut. Com. C. P. Edwards, director of Radio in the department of marine at Ottawa, Ontario, has just arrived back from a visit to Great Britain, where he went as technical advisor to the Hon. Ernest Lapointe, minister of marine, in connection with the imperial Radio scheme.

Interviewed by a representative of RADIO DIGEST, Commander Edwards declined to make any statement about the imperial Radio project until Mr. Lapointe returns. The matter was still under discussion when Mr. Edwards left and consequently he has no knowledge of the decision finally reached.

Consents to Cross-Examinatoin

He consented, however, to undergo a cross-examination at the hands of RADIO DIGEST on the subject of Radio development in Great Britain.

"What actual progress," he was asked, "is broadcasting making in the British Isles?"

"The first broadcasting station was opened while I was there," replied Commander Edwards. "An entirely different scheme from ours and that in the United States is being followed. In Britain the principle of granting licenses to different people has been rejected. Licenses are granted to a specially established broadcasting company which is authorized to establish stations in each territorial area until the whole of the British Isles is covered. Seven or eight stations are contemplated, London, Birmingham and Manchester being among the centers chosen for the location.

Britain Not Up on Quality

"In the matter of quality of transmission and also in the matter of programs the British stations have not yet achieved the high standards attained by the first-class stations in the United States. They would appear to be about where your stations were twelve months ago, but there is little doubt that when they enjoy the same experience in broadcasting as the stations in America and Canada they will approximate to the same standards."

Hold American Standards as Models

"Is public interest in Radio keen?" he was asked.

"Decidedly so, and it is growing by leaps and bounds every day. The Prince of Wales, for instance, has already spoken via the London station several times."

"What reputation does the stations in the United States enjoy in Great Britain?" asked the RADIO DIGEST representative.

"I was surprised and delighted to find the reputation for reliability and accuracy held by the American direction finding stations stood very high. In fact, they are regarded more or less as models whose standards should be emulated as far as possible."

Official Books Give Data on Simple Sets

Uncle Sam's Circulars Describe Crystal and Electron Outfits

WASHINGTON.—To meet the great popular interest in the use of Radio receiving apparatus, the Bureau of Standards is publishing a series of circulars descriptive of simple receiving sets. The first two of this series are Bureau of Standards Circulars 120 and 121. These two circulars describe the receiving sets which use crystal detectors.

The third paper of this series is Bureau of Standards Circular 133. This circular is a description of an electron tube detector and gives instructions for its operation. A receiving set employing an electron tube detector is more sensitive than a set employing a crystal detector and may be expected to give more satisfactory results. The tuning devices, antenna, lightning switch, ground connection, and telephone receivers with which this electron tube detector is used may be those previously described in Circulars 120 and 121.

This paper describes in detail the various parts which constitute the electron tube detector unit and gives illustrations showing the arrangement of these parts in the complete assembled unit. Detailed instructions for operating this set are also given.

WGI Studio Gets Organ

MEDFORD HILLSIDE, MASS.—A motor-driven reed organ has been installed in the Station WGI studio in a specially prepared room, and regular [illegible] recitals by the best organists in [illegible] will be given frequently. The [illegible] specially built for the Amrad [illegible] lists of two manuals, [illegible] stops.

Book Reviews

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur that desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

Elements of Radio Telephony. By William C. Ballard, Jr., M. E. A reliable, authoritative discussion, in simple form, of the essential principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, $1.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic, and informative work on Radio. Fully illustrated. Price, $1.50.

Radio Receivers for Beginners. By Snodgrass and Gamp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Huffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity, it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

"SANTA" NOTES IN AIR BRING CHEER TO KIDS

Goodfellows, Hearing Youngsters' Letters, Lend Hand

MEDFORD HILLSIDE, MASS. — Tangible evidence that the Santa Claus letters read over the Radiophone from Station WGI made a hit, not only with old Santa but with other Radiophans who listened in, is shown in several cases that came to the attention of the Amrad Station management. One letter from four little children of Italian parentage to Santa, sent to WGI and broadcast, asked Santa for a "good reading book and some games, with a choo-choo train for little brother and a sleeping Mama doll for little sister, because there would be no Christmas at their house, since papa had had to spend all his savings for big sister's funeral."

Within five minutes after this letter was broadcast, a representative of the Somerville, Mass., lodge of Elks telephoned for confirmation of the name and address so that they might help the unlucky youngsters with a Christmas dinner. A second telephone message came from a Cambridge business man who wanted to see that Santa brought them a basket of toys and playthings. Over 1,000 letters to Santa Claus were received by WGI and broadcast.

Fraternities Have "Nights"

MEDFORD, MASS.—The first of a series of fraternity and club nights was held at Station WGI recently, when the Boston Masonic Club had a night, with a special program under the direction of Pres. W. L. Terhune of the club.

A card was recently received at Schenectady, N. Y., from Mauli, Hawaii, saying that signals from WGY had been clear.

"ALL-AMERICAN"
Amplifying Transformers
Two years of successful use all over the world guarantees permanent satisfaction. Radio and Audio Frequency.
SEND FOR CIRCULARS
RAULAND MANUFACTURING CO.
35 South Dearborn Street Chicago

RECEIVING RECORDS? SEND 'EM IN—

IN the last issue of RADIO DIGEST the complete, verified list of receiving records to date was published. During the week, the following new and superseding records were made. In order to inform new readers, the rules of the contest can be found in the last issue. The complete list of records, revised and with rules, will appear in the February 10 issue.

Station—Miles Away—Holder and Location

CFAC—1650, R. A. Deger, Dayton, O.
CFCN—1650, H. R. Wunder, Cheviot, O.
CJCG—1375, D. J. Morris, Weir, Tex.
CKCK—1450, D. J. Morris, Weir, Tex.
KDYW—1025, C. B. Martin, Springfield, S. D.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFCF—1300, R. Talbott, Grinnell, Ia.
KFCK—1100, R. A. Deger, Cheviot, O.
KFDB—2025, H. R. Wunder, Cheviot, O.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFV—1125, C. B. Martin, Springfield, S. D.
KJJ—1325, C. B. Martin, Springfield, S. D.
KJR—1500, W. M. K. Young, Kansas City, Mo.
KNI—2075, R. A. Deger, Dayton, O.
KON—1900, F. Brinnon, Urbana, O.
KOP—1175, D. J. Morris, Weir, Tex.
KPO—1400, L. Snider, Sioux Falls, S. D.
KSD—1700, N. E. Parr, Albany, Ore.
NOF—1100, C. B. Martin, Springfield, S. D.
WCAH—1075, D. J. Morris, Weir, Tex.
WCAY—1050, D. J. Morris, Weir, Tex.
WCN—1200, W. M. K. Young, Kansas City, Mo.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAR—1175, C. B. Martin, Springfield, S. D.
WEAF—2450, N. E. Parr, Albany, Ore.
WFO—1000, D. J. Morris, Weir, Tex.
WGAY—1000, D. J. Morris, Weir, Tex.
WGR—2175, N. E. Parr, Albany, Ore.
WIAO—1050, D. J. Morris, Weir, Tex.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAZ—1200, C. B. Martin, Springfield, S. D.
WMAT—1500, N. E. Parr, Albany, Ore.
WOAA—1525, G. F. Cory, New Bedford, Mass.
WOAC—1050, D. J. Morris, Weir, Tex.
WRL—1100, W. M. K. Young, Kansas City, Mo.

$866,000 TO REPAIR NAVY RADIO PLANTS

Congress Hears Heating and Lighting of Station Costs $956,000 in Year

WASHINGTON.—Some very interesting facts regarding naval Radio activities have been brought out during recent hearings on the naval appropriation bill by Congress. The statement was made during the hearings that $866,300 was spent during the past year for repairs to worn out parts of Radio stations and that $956,000 was spent for heating, light and power in naval Radio stations. There are at present 100 naval Radio stations operating, which is a reduction from last year of 37, of which number 62 are Radio compass stations.

Answering a question by one of the congressmen, the expert who was on the stand stated that in 1922 the Navy Department has spent $2,510,421 on Radio apparatus, while it is asking for $1,823,255 for next year. The maintenance costs have been reduced, it is said, and they are now lower than they have been for many years. During the course of the hearings, the statement was made that the Navy Department is allowing commercial concerns to take over such stations as the Navy does not need.

In response to a question as to the amount spent in 1922, the expert said that it was roughly $3,000,000, but the Navy Department desires to cut this considerably and the request for the appropriation was reduced to approximately $150,000 per month for 1923. With ship work it is running about $250,000 a month gross for all Radio work. It was said that there has been a great increase in non-commercial traffic.

In Canada the Royal Canadian horse artillery has met with great success in its maneuvers by directing artillery fire from an airplane by means of Radio communications.

IMPROVED REINARTZ CIRCUIT
My highly improved circuit brings in all important stations on both coasts and the Mexican border without any distortion or other noises.
We dance to music from Atlanta received on one loud Baldwin unit.
Build one of these supersensitive sets from my blueprints and specifications. Price 50c or with a perfect and complete double wound spiderweb coil $3.00 by mail.
No other windings used.
Photo of my set on a glass panel with every order.
Everything clearly shown. Cheap and easy to build.
Easy to operate.
S. A. TWITCHELL, 1925 Western Av., Minneapolis, Minn.

Tell Us Your Radio Troubles
OUR ADVICE MAY HELP YOU
Give full particulars, make of instrument, local conditions, type and length of aerial. No circular letter proposition. Each case is individual.
Enclose 25c and addressed stamped envelope to
Radio Information Bureau
627 First Avenue North, MINNEAPOLIS, MINNESOTA

"SPARK PLUG" HITS ON ALL CYLINDERS

CHARITY DOLLARS ROLL IN AS FANS CHUCKLE

KFC Announcer with Novel Scheme and Bits of Comedy Swells Fund for Poor

By A. M. Ottenheimer

SEATTLE, WASH.—A new phase of Radio broadcasting presents itself almost every day, but one of the latest to come to light is of a nature entirely different from any previously revealed.

The Seattle Post-Intelligencer, operators of KFC, a 100-watt station, during the Christmas season every year conducts a campaign for funds for the needy of Seattle. This year, however, Radio, through KFC, was put in use and when the drive was finished, the Seattle station had the assistance of a station in San Francisco, one in Calgary and another in Denver.

The announcer at KFC, who has dubbed himself "Spark Plug," devised a system whereby the dollars literally rolled into the fund. He explained that for $5, which was to be turned into the fund, KFC would play any record requested. Each request was acknowledged and the announcer, a man with a keen sense of humor, had fans for hundreds of miles around rocking in laugher at his remarks. A small triangle, which he tinkled upon the receipt of each call, he explained as the clank of the cash register. His remarks were novel and the affair created much comment.

Frisco Plant Joins in Scheme

The campaign began early in December and on December 8 the operators at KFDB, the Mercantile Trust Company station on Telegraph Hill, San Francisco, heard "Spark Plug" explain his plan. The plan was simple: upon the promise of $5 from any auditor, KFC was playing any record requested. The operator at KFC was struck with the idea that he might find some customers in San Francisco. So he called KFDB and offered to play any record for Californians—with the same $5 poor fund proviso.

The idea took instantly. Customers began to come. Then a new phase was added. A Seattle fan would call for a record. KFC would transmit the call to KFDB, and the latter would play the record. The strength of the San Francisco station made it possible for Seattle contributors to the fund actually to dance to San Francisco music.

CFCN and KFAF Recruited

CFCN, the W. W. Grant Radio, Ltd., station in Calgary, Alberta, Canada, then joined in and the $5 contributions from Canadian listeners were obtained in the same manner. KFAF, the Western Radio Corporation outfit in Denver, Colo., also took part in the performance for one night.

KFC made an appeal to President Harding to contribute $10 to the fund. KFDB picked it up and relayed it on. Other stations across the continent relayed it to Washington, D. C., stations. KFDB also broadcasted a call for contributions to every governor in the United States, asking other stations to relay the message on to its proper destination.

The triangular conversations between Seattle, Calgary and San Francisco were carried on late at night, the San Francisco station operating under its experimental license call of 6XB, but hundreds of Radiophans stayed up late at night just for that purpose. Several hundreds of dollars were "Radioly" raised for the fund.

For the first time in history, airplane races have been reported by Radio.

FRESHMAN
Variable Grid Leak and Micon Condenser Combined

Clarifies Signals, Lowers Filament Current, Increases Battery Life, Eliminates Hissing.
Unbroken range—zero to 5 Megohms; all intermediate points.
Fixed capacity, .00025 M. F.
Price Only **$1.00**
At your dealers — otherwise send purchase price and you will be supplied without further charge.
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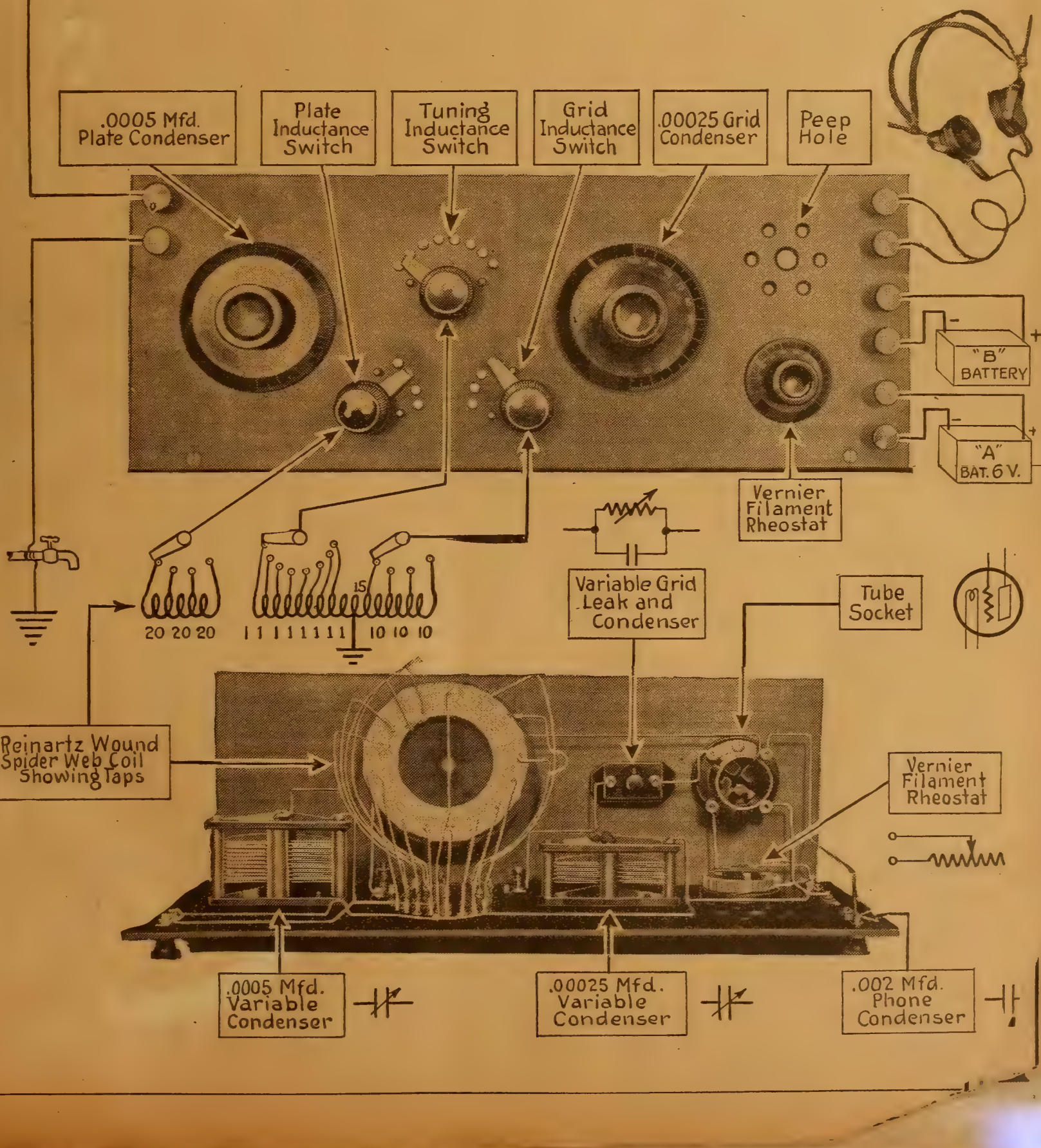
97 Beekman Street, New York City

The Reinartz Set

Its Construction and Operation

The photo diagram illustrates a Reinartz regenerative receiver designed and built by Benjamin E. Freund in the Radio laboratory of the Chicago Salvage Stock Store, Radio dealers located in Chicago. The efficiency of this simple regenerative set is surprising to many Radiophans. Undoubtedly it is one of the most satisfactory receivers. On page thirteen, Harry J. Marx explains how to make and use the set illustrated here. Turn to Mr. Marx' page and you'll want to make a Reinartz receiver.



Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAX, Crafton, Pa. Radio Service Corp.
WAAY, Youngstown, O. 500 mi. Yohrling Rayner Music Co. Daily ex Sun, 5:30 pm, reports; 8:15-9 pm, music. Eastern.
WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Daily ex Sun, 7-8 pm, weather, entertainment. Central.
WAH, Eldorado, Kans. 485 only. The Midland Refining Co. Daily ex Sat, 10:30 am, 1:30 pm, markets, weather. Sat. 1 pm, same. Central.
WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.
WAJU, Yankton, S. D. Yankton College.
WBAA, W. Lafayette, Ind. 50 mi. Purdue University. Fri, 7:15-7:30 pm, educational lecture. Central.
WBAB, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms etc. Eastern.
WBAD, Minneapolis, Minn. Sterling Elec. Co.
WBAF, Moorestown, N. J. Fred M. Middleton.
WBAG, Bridgeport, Pa. 485 also. 300 mi. Diamond St. Fibre Co. Daily, 11:45-12 m, markets, weather. Eastern.
WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.
WBAJ, Toledo, O. 300 mi. Marshall-Gerken Co. Daily ex Sun, 12:05-2 pm, 6-7:30, news, music, reports. Tues, Thur, Sat, 8-9 pm, concert. Eastern.
WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat, morn. only. Eastern.
WBAO, Decatur, Ill. James Millikin Univ.
WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4 pm. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30 pm, news, reports, concerts. Central.
WBAQ, Mishawaka, Ind. Lyradion Mfg. Co.
WBAU, Hamilton, O. Republican Pub. Co.
WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.
WBAW, Marietta, O. Marietta College.
WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.
WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Daily, 11-12 am, 4:30-5:30 pm. Thurs, 7:30 pm on Eastern daylight saving.
WBL, Anthony, Kans. 200 mi. T & H Radio Co. Mon, Wed, Fri, 10-11 pm, concert, lecture. Sat, 11-12 pm, concert. Sun, 10 am, 4-5 pm, church service. Central.
WBS, Newark, N. J. 100 mi. D. W. May, Inc. Mon, Wed, Thur, 7:30-8:30 pm, reports, music. Sun, 9-10:30 am, 1-3 pm, church service. Eastern.
WBT, Charlotte, N. C. 485 also. 500 mi. Southern Radio Corp. Daily ex Sun, 11 am, reports, 8 pm, music. Sun, 7:30 pm, church service. Eastern.
WBU, Chicago, Ill. City of Chicago.
WBZ, Springfield, Mass. 400 only. 500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 3 and 8, church service. Eastern.
WCAB, Newburgh, N. Y. 150 mi. Newburgh Daily News. Daily ex Sun, 1 pm, 2, 3, 7. Mon, Fri, 10:30 pm. Eastern.
WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.
WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.
WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.
WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Sun, 2-4 pm music. Central.
WCAH, Columbus, O. 150 mi. Entrekin Elec. Co. Tues, Fri, 7-9 pm, music. Wed, Thur, Sat, 7-8 pm, music. Sun, 10-12:30, church service. Central.
WCAI, San Antonio, Tex. Southern Equipment Co.
WCAJ, Univ. Place, Neb. 485 also. 100 mi. Neb. Wesleyan. Univ. Daily ex Sun, 11 am, weather, news. Wed, 9 pm, music, lecture. Central.
WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:15 pm, music. Wed, 8-9:15, concert. Sun, 3-4:30 pm, concert. Central.
WCAL, Northfield, Minn. 500 mi. St. Olaf College. Thur, 11 pm, music. Sun, 8:30 pm, music, concert, lecture. Central.
WCAM, Villanova, Pa. Villanova College.
WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 7:30-8:30 pm. Eastern.
WCAP, Decatur, Ill. Central Radio Service.
WCAQ, Defiance, O. 200 mi. Tri-State Radio Mfg. Co. Daily, 11:30-12:30 pm, 3, baseball; 6-6:30, baseball, concert; 8, special program. Central.
WCAR, San Antonio, Tex. 200 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Sun, 11 am, church service. Central.
WCAS, Minneapolis, Minn. 200 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8-8:45 pm, music, lectures Central.
WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Mountain.
WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.
WCAV, Little Rock, Ark. J. C. Dice Elec. Co.
WCAW, Quincy, Ill. 200 mi. Quincy Elec. Sup. Co. (Quincy Herald.) Daily ex Sun, 8:45 am, markets; 11, markets; 1 pm, markets; 5, music, baseball. Tues, Wed, Thurs, Sat, 8:30-9:45 pm, concert. Sun, 6:30-7:30 pm, religious. Central.
WCAX, Burlington, Vt. Univ. of Vt.
WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.
WCE, Minneapolis, Minn. Findley Elec. Co.
WCK, St. Louis, Mo. 50 mi. Stix Baer & Fuller (Grand Leader). Mon, Wed, Fri, 6:45-8 pm, concert, lecture, bedtime story. Central.
WCM, Austin, Tex. Univ. of Tex.
WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.
WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.
WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.
WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.
WDAF, Kansas City, Mo. 400 and 485 only. 500 mi. Kansas City Star. Daily ex Sun, 3-4 pm, reports, music; 6-7, educational, bedtime story, etc. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3:30-5:30 pm, music. Central.
AG, Amarillo, Tex. J. Laurance Martin.
AH, El Paso, Texas. 485 also. 300 mi. Mine & elter Supply Co. Daily ex Sun, 10 am, news, re-s. Tues, Thurs, Sat, 7:30-8:30 pm, music. Mountain.
Syracuse, N. Y. 485 also. 200 mi. Hughes Corp. Daily ex Sun, 12 m, reports. Wed, Sat, concert.
College Park, Ga. 485 also. 300 mi. A. & W. Co. Daily, 9-10 pm, concert etc. Central.
M E L Hartford, Conn. 150 mi. Hartford Courant.
motor-d Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40,
stalled i tory; 8:15, concert. Eastern.
onville, Fla. 485 also. 250 mi. Florida
specially . Daily, 11 am, time, weather, 3-3:15,
in reci 5, 8-9:30 music. 10:05-10:20 pm, re-
Automotive Elec. Co.
2,000 mi. Drake Hotel. Tues,
5 pm, 6 pm, 10 pm, dance music.
music. Sun, 8:30 pm, 9 pm,

WDAQ, Brownsville, Pa. 200 mi. Hartman-Riker Elec. & Mach. Co. Daily ex Sun, 10:30-10:50 am, music; 12:50-1:10 pm, music, news, weather; 5:05-5:30 music. Tues, Thurs, Fri, 9:15-10 pm, concert. Sun, 5 pm, chapel. Eastern.
WDAR, Philadelphia, Pa. Lit Bros.
WDAS, Worcester, Mass. Samuel A. Waite.
WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Wed, Fri, 7:45-10 pm, music. Sun, 10:30-12 m, 5-6 pm, church services. Eastern.
WDAV, Muskogee, Okla. Daily Phoenix.
WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.
WDAY, Fargo, N. D. 485 also. 300 mi. Daily ex Sun, 12:15-12:30 pm, 7:30-8:15, reports, news, music. Central.
WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.
WDT, New York, N. Y. Ship Owners Radio Service.
WDV, Omaha, Neb. 100 mi. John O. Yeiser, Jr. Daily 7-8 pm. Tues, Sat, 12-1 am. Fri, 10-10:45 pm. Sun, 2-4 pm. Music. Central.
WDY, Roselle Park, N. J. Radio Corp. of America.
WDZ, Tuscola, Ill. 70 mi. James L. Bush. Daily ex Sun, every half hr., 8:30 am-12:15, Chicago Board of Trade quotations. Tues, Fri, 7-8 pm, concert, entertainment. Central.
WEAA, Flint, Mich. Fallain & Lathrop.
WEAB, Fort Dodge, Iowa. 485 also. 600 mi. Standard Radio Equipment Co. Daily ex Sun, markets every 30 min. from 9:40 am to 12:40 pm, 5:15 pm, 7-8 pm, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30 pm, church services. Central.
WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.
WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 am, markets, music; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news sports. Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.
WEAE, Blacksburg, Va. Polytechnic Inst.
WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.
WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.
WEAH, Wichita, Kan. 485 also 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:30 pm, 1:30, 3:15, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.
WEAI, Ithaca, N. Y. Cornell Univ.
WEAJ, Vermillion, S. D. 300 mi. Univ. of S. D. Mon, Wed, Fri, Sat, 7:30 pm, music, lectures. Central.
WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.
WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.
WEAN, Providence, R. I. 50 mi. The Shepard Co. Daily ex Sun, 3-5 pm, 6-8, music, bedtime stories. Mon, Wed, 8-10 pm, concert. Eastern.
WEAO, Columbus, Ohio. Ohio State Univ.
WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily, 4-5 pm, 7-8:55. Central.
WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Thur, Sat, 7:30-9:30 pm. Eastern.
WEAS, Washington, D. C 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.
WEAT, Tampa, Fla. John J. Fogarty.
WEAU, Sioux City, Ia. 50 mi. Davidson Bros. Co. Daily ex Sun, 9 am, 10, 11, 1 pm, reports, news. Mon, Wed, Fri, 8:30 pm, concert. Central.
WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.
WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.
WEAX, Little Rock, Ark. T. J. M. Daly.
WEAY, Houston, Tex. Will Horwitz, Jr.
WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.
WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.
WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.
WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.
WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.
WFAA, Dallas, Texas. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10:15 am, reports; 12:30-1 pm, address; 6:45-7, bedtime story; 8:30-9, music. Tues, Thur, Sat, 11-12 pm, music. Central.
WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.
WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.
WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.
WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, 8:15 pm, feature program. Eastern.
WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.
WFAH, Port Arthur, Tex. Elec. Supply Co.
WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.
WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4:00 pm, markets; 7:30-9, entertainment. Central.
WFAN, Hutchinson, Minn. 485 also. 500 mi. Hutchinson Elec. Service Co. Daily ex Sun, 1 pm, markets etc. Central.
WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.
WFAS, Fort Wayne, Ind. United Radio Corp.
WFAT, Sioux Falls, S. Dak. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15-12:15 pm, 2:15, reports; 7:30 pm, music. Tues, 8-9 pm, concert. Central.
WFAU, Boston, Mass. Edwin C. Lewis.
WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 10:10 am, weather, markets. Sat, 9:00 pm, concert. Central.
WFAW, Miami, Fla. Daily Metropolis.
WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.
WFAZ, Charleston, S. C. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.
WFI, Philadelphia, Penn. 400 and 485 only. 350 mi. Strawbridge & Clothier. Daily ex Sun, 1:16 pm, news; 3:30-4:30, concert; 5:30-6, sports. Mon, Fri, 6:30-7 pm, Radio talk. Wed, Fri, Sat, 7:30-8:30 pm, concert. Fri, Sat, (alternate weeks) 7:30 pm, concert at 8:30 pm. Sun, 4 pm, church service. Eastern.
WFO, Dayton, O. 485 also. 300 mi. Rike-Kumler Co. Daily ex Sun, 9 am, 11, 4 pm, music, news, reports. Mon, Wed, Fri, 8 pm, concert. Sat, 11:30 pm, concert. Central.
WGAB, Houston, Tex. 250 mi. QRV Radio Co. Daily ex Sun, 8:30-9 am, police reports; 1:30-2:30 pm, concert, agriograms; 4-5, concerts, police reports. Central.
WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAH, New Haven, Conn. New Haven Elec. Co.
WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.
WGAK, Macon, Ga. Macon Elec. Co.
WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.
WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, baseball; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.
WGAN, Pensacola, Fla. Cecil E. Lloyd.
WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 8 pm, music. Sun, 11 am, 7:30 pm, church service. Central.
WGAR, Fort Smith, Ark. Southwest American.
WGAS, Chicago, Ill. 1,000 mi. Ray-di-co Organization, Inc. Daily ex Sun, 9-9:20 am, 11:15-11:30, 1:30-1:45 pm, 2:45-3, 5-6, music. 12:15-12:30 pm, 4-4:15, 4:30-4:45, reports. Wed, Fri, 10-11 pm, music. Central.
WGAT, Lincoln, Nebr. 100 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program, concert. Sun, 3-5 pm, sermon. Central.
WGAU, Wooster, O. Marcus G. Limb.
WGAW, Altoona, Pa. Ernest C. Albright.
WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 9 am, 2 pm, music, news. Mon, Wed, Fri, 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.
WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.
WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 2-3 pm, music, 7-8 pm, music. Central.
WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.
WGI, Medford Hillside, Mass. 485 also. 200 mi. Am. Radio and Research Corp. Daily ex Sun, 7 am, setting up exercises; 9:30, 11:30, 3:25 pm, music; 10:30 am, 1:30 pm, 3, 6, 6:30, reports, news. Mon, Wed, 7 pm, entertainment. Tues, 8:30 pm, fashion talks, concert. Thur, Fri, 9 pm, concert. Sat, 8 pm, concert. Sun, 4 pm, concert; 6:30 pm, reports; 7:30, church service; 8:30 concert. Eastern.
WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.
WGM, Atlanta, Ga. 400 only. Atlanta Constitution.
WGR, Buffalo, N. Y. 485 also. 300 mi. Federal Tel. & Telg. Co. Daily ex Sat and Sun, 12:15 pm, weather, agriograms; 2, music; 3, lecture; 4 music; 5:30, reports; 7:30, bedtime stories; 8:10, concert. Eastern.
WGV, New Orleans, La. Interstate Elec. Co.
WGY, Schenectady, N. Y. 400 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 11:55 am, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, church service. Eastern.
WHA, Madison, Wis. 485 also. 600 mi. Univ. of Wis. Daily ex Sun, 12:30-1 pm, weather, markets. Tues, Thurs, Fri, Sat, 12-1 pm, weather, markets, time. Tues, 8-9 pm, concert. Fri, 8-9:15 pm, news, concert. Sat, 1-1:20 pm, instruction. Central.
WHAA, Iowa City, Ia. 200 mi. State Univ. of Ia. Daily ex Sun, 8-8:30 pm, lecture, concert, sports, news. Sun, 10:45-12 am, church service. Central.
WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45-10:15 am, 3 pm, 5 pm, reports, music, news. Mon, Wed, Fri, 8 pm, entertainment. Sun, 10 am, church service. Central.
WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6:15 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.
WHAD, Milwaukee, Wis. 485 also. 100 mi. Marquette Univ. Daily ex Sun, 10:58 am, time; 11:20, weather. Wed, 7:30-8:30 pm, music, entertainment. Central.
WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.
WHAF, Pittsburgh, Pa. 200 mi. Radio Elec. Co. Daily ex Sun, 11:30-12 m, 3-3:30 pm, music, news, Sun, 9-10, music. Eastern.
WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.
WHAH, Joplin, Mo. John T. Griffin.
WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm. 4:30-5:30. 10-11, Sat. 10-11 am. 2-2:30 pm, 5-5:30, 11-11:30. Central.
WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.
WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 9:15-9:45 am, 12:30-1 pm, 3:45-4:15, 7:30-8:30. Sun, 2:30 pm. Central.
WHAM, Rochester, N. Y. Univ. of Rochester.
WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 9:30-10 pm. Eastern.
WHAP, Decatur, Ill. 100 mi. Dewey L. Otta. No definite schedule.
WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.
WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.
WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Central.
WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, Sat, 6-7 pm. music. Eastern.
WHAW, Tampa, Fla. 50 mi. Pierce Elec. Co. Daily ex Sat, Sun, 12-1 pm, 4-5, music, agriograms. Sat, 12-1 pm, 8-10, music, entertainment. Eastern.
WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 1:30 pm, 6, reports, sports. Mon, Wed, Sat, 8 pm, concert. Central.
WHAZ, Troy, N. Y. 400 only. 500 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Eastern.
WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.
WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.
WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 1:30-2 pm, 4-4:30, 6-6:30. Tues, Thur, Sun, 8-9:30 pm. Concert. Eastern.
WHN, Ridgewood, N. Y. Times Printing & Pub. Co.
WHX, Des Moines, Iowa. 50 mi. Iowa Radio Corp. Daily, 12:30-1 pm, 6-6:30. Sat, 3 pm, sports. Central.
WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 8:30-9:30 pm, music. Central.
WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.
WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.
WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.
WIAF, New Orleans, La. 300 mi. Nola Radio Co. Sun, 10-11 am, music, lecture. Central.
WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.
WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.
WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co
WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:15, 12 m. 1:50 pm, 3:50, markets, weather. Central.
WIAO, Milwaukee, Wis. 200 also. 100 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.
WIAQ, Marion, Ind. Chronicle Pub. Co.
WIAR, Paducah, Ky. 150 mi. J. A. Rudy & Sons. Daily ex Sun, 11-12 am, markets, weather, news, music; 4-5 pm, same and sports; 7:30-9, concert, lectures, etc. Sun, 11-12 am, church service. Central.
WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.
WIAT, Tarkio, Mo. Leon T. Noel.
WIAU, Le Mars, Ia. Am. Trust & Savings Bank.
WIAV, Binghampton, N. Y. N. Y. Radio Lab.
WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.
WIAX, Lincoln, Neb. 200 mi. Capital Radio Co. Thur, 8 pm, music, entertainment. Sun, 2:30 pm, 8, 9, church service. Central.
WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Sat, 8-10 pm, concert. Eastern.
WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.
WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.
WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.
WIP, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Gimbel Bros. Daily ex Sun, 2:30-3:30 pm. Mon, Wed, Thur, 7-7:30 pm. Tues, Fri, Sat, 7-12 pm. Sun, am, pm, church service.
WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.
WJAB, Lincoln, Nebr. 200 mi. American Radio Co. Mon, Wed, 8:30-9 pm. Central.
WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.
WJAE, San Antonio, Tex. 485 also. 500 mi. Texas Radio Syndicate (Evening News). Mon, 9:30-10:30 pm. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Central.
WJAF, Muncie, Ind. 100 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm. Mon, Wed, Fri, 7-8 pm. Sat, 6-7 pm. Central.
WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 10:30 am, 12:15 pm, 3:30, 5:30, reports. Central.
WJAJ, Dayton, O. Y. M. C. A.
WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.
WJAL, Portland, Me. Victor Radio Corp.
WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.
WJAN, Peoria, Ill. 300 mi. Peoria Star and Peoria Radio Sales Co. Daily ex Sun, 11:30 am, markets, weather; 1:30 pm, closing markets, agriograms, bond news; 6:15, sports. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.
WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thur, 8-9:30 pm, music. Sun, 11-12 m, pipe organ, 12-1 pm, church service.
WJAQ, Topeka, Kans. Capper Publications.
WJAR, Providence, R. I. The Outlet Co.
WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11-11:30 am, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.
WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 2-2:30 pm, 5:35-6, concert. Central.
WJAX, Cleveland, O. 485 also. 500 mi. Union Trust Co. Daily ex Sat pm, Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Eastern.
WJAZ, Chicago, Ill. Chicago Radio Lab.
WJD, Granville, O. 25 mi. Denison Univ. Tues, Thur, 5-6 pm, educational lectures. Sun, 5-6 pm, religious stories. Central.
WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.
WJK, Toledo, O. 300 mi. Service Radio Equipment Co. Daily ex Sun, 2-3 pm, reports. Mon, Wed, Fri, 7:30-9 pm, concert. Sat, 2-5 pm, sports, news. Sun 11-12:30 pm, 7:30-8:30, church services. Eastern.
WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.
WJZ, Newark, N. J. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 15 minutes hourly from 9 am to 6 pm; 12-12:30 pm; 7-10:15 pm. Miscellaneous program of highly varied nature. Sun, 3-10:15 pm, music. Eastern.
WKAA Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.
WKAC, Lincoln, Neb. 400 mi. Star Pub. Co. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.
WKAD, East Providence, R. I. Charles Looff.
WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.
WKAG, Louisville, Ky. Edwin T. Bruce.
WKAH, West Palm Beach, Fla. Planet Radio Co.
WKAK, Okemah, Okla. Okfuskee County News.
WKAL, Orange, Tex. Gray & Gray.
WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Daily ex Sun, 3:30 pm, 8:30, music, news. Eastern.
WKAP, Granston, R. I. Wilcox Flint.
WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.
WKAR, East Lansing, Mich. Mich. Agrl. College.
WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.
WKAV, Laconia, N. H. Laconia Radio Club.
WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.
WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.
WKAY, Gainesville, Ga. Brenau College.
WKAZ, Wilkes-Barre, Pa. 100 mi. Landau's Music Co. No definite schedule. Sat, 8-12 pm, dance music. Sun, 11 am, 8 pm, church service. Eastern.
WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.
WKN, Memphis, Tenn. Riechman-Crosby Co.
WKY, Oklahoma City, Okla. 485 also. 500 mi. Oklahoma Radio Shop. (Daily Oklahoman.) Daily, 12 m, weather; 7-7:30 pm, sports, specials; 8:30-9:30, concert; 9, weather, news. Sun, 3:30-4:30 pm, concert. Central.
WL2, Fairfield, O. U. S. Army.
WLAC, Raleigh, N. C. N. C. State College.
WLAF, Lincoln, Neb. Johnson Radio Co.
WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30-12 am, music, market reports; 1:30-3 pm, music, farm news, styles; 3:30-4:45, markets, music; 6-7:30, farm news, children's hour. Thur, Fri, Sat, 8-9:30 pm, concert. Sun, 4:30-5:30 pm, church services. Central.
WLAH, Syracuse, N. Y. Samuel Woodworth.
WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, Sat, 7:45-8:45 pm, music. Sun, 3 pm, church service.
WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.
WLAL, Tulsa Radio Co. Tulsa, Okla.
WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.
WLAN, Houlton, Me. Putnam Hdwe. Co.
WLAO, Scranton, Pa. 100 mi. 485 also. R. C. Ehrhardt and J. H. Jones. Mon, Wed, Fri, 7:15 pm, bedtime stories, reports, 8-9:45 pm, music. Sun, 7:30 pm, music; 8:30, church services; 9:15, music. Eastern.
WLAP, Louisville, Ky. W. V. Jordan.
WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.
WLAR, Marshalltown, Ia. 50 mi. Meikel Music Co. No definite schedule.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

PLANT OWNERS IN BETTERMENT GROUP

ORGANIZE TO IMPROVE BROADCAST SITUATION

Washington Station Proprietors Send "Feelers" to Learn Public Wants in Radio Entertainment

WASHINGTON.—Definite action which may insure the permanent improvement of the Radio broadcasting situation in the District of Columbia was taken when owners and representatives of all broadcasting stations here met at the City Club as guests of Harold H. Levi, general manager of the Hecht Company, owners of Station WEAS, and formed the Radio Broadcasters' Association of Washington.

The membership includes representatives of concerns operating broadcasting stations in the District of Columbia only. C. O. Fisher, manager of the Radio department of Woodward & Lothrop, was unanimously elected president. A committee was appointed to prepare and arrange publicity for a questionnaire to determine the wishes of the public concerning the nature of Radio entertainment desired. The most important action taken was improving the arrangement of broadcasting schedules.

To Study Public Demand

Mr. Levi urged those present to co-operate, organize and make a study of the public demand for Radio entertainment. C. O. Fischer and Chief Radio Inspector Terrell, who was elected an honorary member of the association, spoke briefly. Mr. Terrell described methods pursued in other communities, particularly New York City, where station operators have made every effort to co-operate for greater efficiency on the part of broadcasting stations, and likewise for the greater benefit shared by the public and listeners in.

As the object of the session was the furtherance of co-operation between operators of broadcasting stations and the public dependent on the entertainment supplied by these stations, it was decided by all those present to eliminate so far as possible long waits between the announcements and the actual broadcasts of selections on Radio programs.

Radio to Assist China Missions

Phones and Airplanes to Help Work of Methodist Episcopal Church in Orient

BOSTON, MASS.—Word has been received by the Methodist Episcopal missionary department that Radiophones and airplanes are to be used as an aid in carrying on missionary work of the church in virtually inaccessible parts of China. This announcement is made by the committee on conservation and church advancement, the statement further adding that the decision was reached at a conference of missionaries in Tzechow, West China. Rev. James Maxon Yard, new executive secretary of the centenary, in China, sent the news to Rev. Paul Hutchinson, editor of the Chinese Advocate, and the latter relayed it by Radio to the committee in America. The Tzechow district is several weeks' journey from Shanghai and the missionaries there can see the mountains of Thibet from their headquarters. It lies in one of the wealthiest provinces of China, Szechuen, with 60,000,000 inhabitants. The Radiophone and airplane at present are the only means available for communication and quick transportation.

Predicts Wider Use of Air Waves by Farmers

Weather Bureau Chief Sees Steps Beyond Forecasts Stage

WASHINGTON.—A great future increase in use of Radio by farmers is forecast in the report of Dr. C. F. Marvin, chief of the weather bureau, to the Secretary of Agriculture.

"The great value of Radiophony as a means for disseminating weather forecasts and warnings to the people already has been demonstrated," Dr. Marvin pointed out. "Its future usefulness cannot be estimated."

Extension of telephone lines into rural districts overcame only a part of the difficulty of giving the farmer the latest weather advice, the report continued. Then came Radio. "Thousands of farmers installed such receiving apparatus during the past year, and are now obtaining the weather forecasts and warnings which are so important to their operations, as promptly and effectively as the business interests in urban communities," said Dr. Marvin.

KITCHEN, BUSINESS HELPS TO WGI FANS

Women's Club Expert Gives Tuesday Cooking Tips—Market News Four Days

MEDFORD HILLSIDE, MASS.—Several new features have been added to the broadcasting program of WGI, Amrad station here. In the afternoon on Tuesdays, the Amrad Women's Club has an hour, and for a time a series of helpful cooking lessons by Mrs. Christine Frederick, director of the Applecroft Efficiency Station, will be given. The first lesson was "The Bride's Own Cooking Primer," a lesson intended for newlyweds.

The broadcasting of information of interest to business men has proven so popular that the regular program has been enlarged and includes the following: Mondays, at 6 p. m., a weekly review of conditions in the iron and steel industry, prepared by the Iron Trade Review; Tuesdays, at 6 p. m., Babson business report, assembled by the Babson Statistical Organization and reviewing the economic situation of the past week; Wednesdays, at the same hour, "News of the Wool Market," prepared by the Commercial Bulletin and arranged so that the layman as well as wool dealers and merchants may be interested; Thursdays, "Weekly Review of the Shoe and Leather Industry," prepared by the New England Shoe and Leather Association, same hour.

Radiophone Used to Direct Movie

Rex Ingram Controls Crowds in "Prisoner of Zenda" by New Device

LOS ANGELES, CALIF. — Radiophony has found new application in the hands of Rex Ingram, director of "The Prisoner of Zenda," in giving commands to the young army of extras in the great coronation scenes.

It was during the height of the recent Radio popularity that the brilliant young director undertook to transfer to the screen Anthony Hope's celebrated romance, "The Prisoner of Zenda," which was dramatized by Edward Rose.

In the course of making "The Four Horsemen," Mr. Ingram had encountered an obstacle in the control of the thousands of actors in the big scenes. He had in that case used a wire telephone with success. But with the advent of the Radiophone, he saw one undeniable superiority in the newer instrument; that there need be no switchboard operator to delay the transmission of his direction.

Practical use of the Radio idea brought approval from Mr. Ingram. The working out of the scheme was not so complicated as he had anticipated. By placing subdirectors to issue orders to every group in the crowds at the coronation scenes, and so arranging the position of these subordinates as to hide them from the camera, and equipping them with receiving apparatus tuned to the same wave length as the transmitter he used, he was able to direct the entire mass of people with great success and instant response.

Radio Carries Coolidge's Voice into Distant Homes

WASHINGTON.—Vice President Coolidge has received some interesting communications in connection with the broadcasting of his talk on Americanism which was sent out by Station WGY at Schenectady, N. Y., on Christmas Eve. A great number of communications have reached the Vice President, including one from Jasper, Ind., Carthage, Mo., Gypsum, Kans., Greensboro, Ala., and other distant places.

The communication from Carthage says in part: "Your message was as clear as though you were speaking to us ten feet away."

From Gypsum comes the following: "Articulation and modulation were as perfect here through a loud speaker as though I had been there."

From Omaha, Neb.: "This address was received in our home, every word perfectly audible and very clear, and it almost fills one with awe at the thought of the great possibilities of the future of the Radio as a servant of the public."

Champ Canary Warblers Entertain from Chicago

CHICAGO.—Probably the most novel features of any program broadcast by Radio was recently sent out from Station KYW. This entertainment was given in connection with a recent midnight show and consisted of the singing of twelve champion roller canaries. These birds were the prize winners in the International Roller Canary contest held at the local Hotel Sherman. Several of the wee yellow warblers have toured the world, and have the distinction of having sung at the Crystal Palace in London before King George.

R-A-D-I-O

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Includes 17x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete... $11.45

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This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial..... $17.95

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now..$1.75 — $3.10 Value, 5 PLATE, now..$1.25
$3.70 Value, 23 PLATE, now..$1.45 — $2.70 Value, 3 PLATE, now..$1.15
$3.30 Value, 11 PLATE, now $1.35

U. S. A. Signal Corps Aviation Type 194-W Western Electric Phones, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

COMPLETE PARTS FOR FLEWELLING CIRCUIT

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... $12.45

MAGNAVOX, Loud Speaker, Type R3 $34.95

VARIOMETERS GENUINE MAHOGANY, $5 VALUE, NOW **$1.95**

VARIOCOUPLERS, $4.50 Value, Now $1.75

HONEYCOMB COILS

1,500 Turns	$1.50	750 Turns	$1.00	75 Turns	40c
1,250 Turns	1.50	250 Turns	75c	50 Turns	40c
1,000 Turns	1.25	150 Turns	60c	35 and 25 Turns	40c
		100 Turns	50c		

$8.50 Guaranteed 3,000 Ohm **HEAD PHONES $3.65**

RHEOSTATS 45c

Sponge Rubber EAR CAPS, Pair 50c

DIALS, 2, 3 and 3½ in 25c

THORDARSON AMPLIFYING **TRANSFORMERS** $4.50 VALUE, NOW **$2.95**

GREWOL DETECTORS $1.65

Signal Corps Super Sensitive Microphone Transmitters, $2.45

Solid Copper Aerial Wire, 100 ft.	35c	2-Slide Tuning Coils, at	$1.95	Anti-Capacity Switches	$1.50
Spaghetti Tubing, yard	10c	3-Coil Honeycomb Mountings, with knobs	$4.20	Lightning Switches	$2.65
Cord Tip Plugs	60c	Phone Caps, for mostly all phones	25c	Hydrometers, now at	45c
Lightning Arresters	95c	Signal Corps Hot Wire Ammeters, at	$5.45	Radiocite Crystal, at	35c

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Radio Digest Illustrated

TRADE-MARK

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, January 13, 1923 No. 1

Radio Brings Cheer

First Year's Popularity of the Science

RADIO is a great many years older than many realize. That is in a strict sense, it has existed rather obscurely for many years. But it was about this time, a year ago, that the Radiophone sprang boldly into the limelight and grew in popularity at a breath-taking pace, until it reached its present status as an institution almost as firmly established as if it had grown steadily for a decade.

Radio, in its recreational phase, has achieved popularity more quickly and more consistently than almost any other thing the American public has ever known. It has come to stay. It is spreading across the world. Conservative estimates have placed at better than a million the number of interested auditors who are equipped with Radio receiving outfits varying from home-made crystal sets, built of scraps, at an outlay of a quarter of a dollar, to magnificent tube sets of values up to a thousand dollars. The number is expected to double during the ensuing year.

Radio reaches everywhere. Few barriers prevail against it. It defies time, space and matter. Every day reveals some new phase of its usefulness. Home, hospital, school, hall, store, office and factory are entered and entertained by it. It is too large a thing for the human mind even to conjecture at the ultimate development.

Meanwhile, however, the Radio-minded of the nation are celebrating a milestone in Radio's endeavors with mingled awe at its great strides of the past, and wonder as to what it will do in the future. The Radio receiving set is speedily establishing itself as a fixture of the American home, and is as permanent and necessary as telephone or baby carriage.

Bringing Peoples Close Together

Air Communication Results in Removing Barriers

IT IS difficult to keep one's feet on the ground when contemplating the possibilites of Radiophone communication. They stagger the imagination. Radio is a utility of great value and like all discoveries and inventions it is causing a revolution in our civilization. Every day sees new opportunities for service along different lines of activity.

Experimenters are working night and day on improvements. The greatest development in broadcasting has been made through the use of the vacuum tube and future possibilities of immense improvement in this one feature are confidently expected.

There is one important factor, however, in this recent product of the inventive genius so active among our citizens that is fraught with tremendous significance. That is the effect that it will have on the ages-long struggle of the human race for attaining a perfect system of society.

Radio now is and will become more so, one of the greatest influences along the lines mentioned, for it removes effectively those barriers of time, space and lack of communication, and brings the peoples of the world close together. It will act as a great impetus to the movement to establish an international, or world-wide, language, and play no small part in assisting the race to reach the goal destined for it by a beneficial Providence.

Fundamental Definition Lacking

What Radio Means to Hundreds of Thousands

THE word Radio has as its fundamental definition the means whereby concerts, plays, operas, football scores and the like are brought into the individual home with the expenditure of little money and a comparatively small amount of labor. To a certain extent this is true, but there is now vastly more than that connected with the science itself, has been in the past and will be a hundred times more in the future.

Today Radio is the very heart string of the merchant marine of the world. It is the safeguard of the sp[illegible] tourist and sailor when miles away from home on the [illegible]less expanse of the world's oceans. True, lives [illegible] lost regardless of Radio, yet how many more [illegible]ed by the fleetness and magic of the [illegible]

Condensed

By DIELECTRIC

There are times when a piece of news would never be noticed by us stuck down in a corner somewhere on an inside page of the daily journal. After hearing the announcement from Station DOE of the theft of a large number of five dollar Federal Reserve notes, and their numbers, then we plainly saw the news item to that effect in the paper we had just carefully perused. The trouble in the circuit when such a thing happens to any of us probably lies in our optical bulbs; one of these is directional, the other fixed. One oscillates before the printed page, while the other never leaves the filament rheostat that gentle fingers are persuading to mount ever higher! It is no easy thing to read all the news and at the same time keep ambitious hands from ruining the set. However, speaking of bank notes, I never knew even one of their numbers personally.

Will England send its Radio Premier to this country to beseech our aid in co-operating with them in their effort to keep American made sets off the British market? Receiving sets manufactured in the United States are admittedly superior to theirs, but they must needs develop the industry to themselves. A British broadcasting company has been granted a charter which insures that concern at least two years' monopoly in this line.

From the American Radio Exposition held in the Grand Central Palace, New York city, many items of general interest were given the listeners in, one of these being a wedding ceremony with two couples participating. It is rather a strange experience to hear the parson proclaim, "I pronounce you man and wife," when neither of the contracting parties are visible to the majority of the invited guests. The most aggravating part of it all, perhaps, is to be unable to contribute the usual rice and old shoes to the newlyweds. Some means will be provided in time whereby we listeners may play a more active part in starting a Radio-married couple on their life journey. For instance, we might shock them.

At that same exposition, we heard a speech broadcast by vice-president Griswold, of the American Telegraph and Telephone Company, in which he called our attention to the problems of the future in Radio broadcasting. We were advised to consider the necessity of placing this great source of entertainment on a sound business basis, as considerable sums of money are required to maintain broadcasting stations and to give to the public what it desired to hear. Then, the following evening, we heard (those of us who were listening to WJZ) a rather different aspect of the subject. We were told that the expense of broadcasting was to be less the concern of the Radio audiences, than that well-organized stations should be supported by public approval made manifest to the ruling authorities. Whom are we to believe? Read column four, page one, of RADIO DIGEST, of December 23rd issue. Shall we put all our eggs in one basket?

Good news for the "silent period" fans! KSD announced two evenings a week when virtually no broadcasting would be done by stations in St. Louis, Mo. Others are learning to keep quiet, though it's a slow process.

Many of you may have heard the music from Station WMAF and not known the identity of the owner of that station. If other men of wealth would do as Col. Edward Green has here done, devote some of their means to the furtherance of the science of Radio, we could advance even more rapidly than is now the case. He has provided an equipment in his laboratory, which is second to none, of such experimental value that important discoveries may be looked for from this source. The appealing feature of it all is that any amateur may visit the place and, without expense, benefit by whatever he finds of new ideas. This is in marked contrast to the monopolistic spirit which seems to be pervading some quarters at the present time. Not that I would suggest hampering the purely business phase of Radiophony, rather, to extend the field of operation beyond the narrow confines of a single corporate interest. We will continue to need diversified application to this mammoth industry, if we wish to develop all of its latent possibilities.

Like reading a dime novel detective story just before retiring for the night, it is a bit disturbing to hear hold-up descriptions direct from police headquarters. That station in Detroit, Mich., with the well-chosen call letter—KOP—is responsible for my having spent a restless night on a recent occasion. In forboding tones I heard of two cases of highwaymen successfully accomplishing their nefarious purposes, and could easily visualize the whole exciting drama. Each character was carefully described as to dress, weight and the beautiful finish of his treasured automatic, and in both cases I was informed that these criminals were heading in my direction. With so vast an audience it is quite possible that the leading men were detained before they had gone very far. The incident serves to impress one anew with the utility of Radio broadcasting; not, however, with the need of spending money for blood curdling literature.

Music with your meals is possible without the cost of employing an orchestra. Simply tune that station which is transmitting an orchestra concert for your benefit at the dinner hour.

RADIO INDI-GEST

The Grid Choked Up with Tears and Leaked

Why did the tube howl? Because an electron passed round the plate, but found not a bite had been put on the grid.

Hook the Two in Series

Dear Indi—The following was "lamped" in a so-called newspaper "Radio" department.

$1.45

11-Plate Invariable Condenser

Please tell me how to hook-up said "invariable" condensers. The same paper also mentioned the use of "negative" B batteries. Do the dealers pay you the price when you purchase a "negative" B battery?

—F. W. L.

He Usta Be Out Till He Listened "In"

Long into the night she sat watching
The fire that but feebly burned;
The hour of midnight solemly telled,
But yet he had not returned.

What could she do to keep him at home,
Keep him away from that club?
While love springs eternal hope will not die,
Traps must be set for that "hub."

But now you'll find him always at home,
And proudly to you he'll own,
That he's never been out since the day
She bought him a Radiophone.

—Popular Wireless (London.)

Even Poems Have Meter

Pa: "I see Radio is sent according to meters."
Ma: "First it was the gas meter, then the electria

meter, then we get an automobile and Will uses it to meet her every night and now it's Radio wavemeters."

Dancing at Radio Frequency

He wondered why "The Blue Danube Waltz" didn't sound just right. Then he found he had plugged in the two-step amplifier.

We Like Radio but We Eat First

When a Radiophan tells his wife, who is holding supper for him, that he wants to listen in just one more minute—he is usually picking a minute half an hour away.

Well, You Need a Ground

Notatube: "What's in the Radio concert program?"
Whataset: "Concert in A Minor."
Notatube: "Probably Massa's in the coaled, coaled ground."

Three Cheers for Marconi!

Lawyer: "Now, if you will let me have some of his love letters"—
Ex-Sweetie (suing for breach of promise): "I haven't any. We both had Radio sets."

She Listens in for Him

Ida: "I can't afford a Radio receiving set."
Angela: "How foolish! What is your hubby's average income?"
Ida: "Oh, usually midnight."

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

Chapter II

IN CHAPTER one we learned about the nature of electricity and about the different kinds of electric currents that are used in modern Radio practice. We also took up the subjects of electrical pressure, current flow, and resistance, and learned that pressure is measured in volts, current flow in amperes, and resistance in ohms. The entire chapter ought to be carefully reviewed before a study of this second chapter is undertaken.

In this chapter we will discuss electric circuits and magnetism, two very important subjects with which everyone should

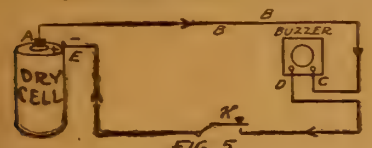


FIG. 5

be familiar who wishes to understand the why's and wherefore's of Radio operation.

The Electric Circuit

In order that an electric current can flow, it is necessary to have a complete and uninterrupted conducting path or ring. This unbroken path over which an electric current flows is called an electric circuit. The complete circuit includes three essential parts: First, a source of current flow which may be either a battery or a dynamo; second, the apparatus in which the energy of the electric current is consumed, and third, the necessary connecting wires and switches.

In Figure 5 we have illustrated a simple electric circuit consisting of a dry cell as the source of the electric current, a buzzer in which the energy of the current is consumed, and the connecting wires containing the switch or key K. As long as the key is open, there is a break or gap in the circuit and hence no current can flow; but as soon as the key is closed, the circuit becomes continuous and the dry cell is then able to cause a current to flow and to operate the buzzer. Although this is only a simple electric circuit, still its operation is the same as that of a large power circuit in which a large water wheel driven generator is delivering several thousand horsepower by means of a high tension (voltage) transmission line to a distant city.

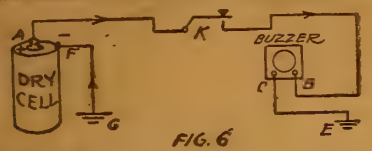


FIG. 6

Every electric cell, storage battery or dynamo, always has two terminals, one positive and one negative. The positive terminal is the one at which the current leaves the generator and flows to the energy consuming device, while the negative terminal is the one at which the current returns and again enters the generator. The wire conducting the current away from the generator is hence known as the positive side of the line, and the other wire over which the current returns is the negative side of the line.

Thus, in Figure 5, A is the positive terminal of the dry cell and the wire ABC is the positive side of the line, for through it the electric current flows from the cell to the buzzer. The wire DKE is then known as the negative side of the line, for through it the current returns to the cell.

Sometimes the earth or ground is used as the negative side of the line for conducting the return current. In Figure 6 we again have a simple buzzer circuit, in which the current leaves the cell at the positive terminal A and flows through the key K to the buzzer at B. The current then leaves the buzzer at C and enters the ground at E, it flows through the ground to G, and then returns to negative terminal of the cell at F. Note carefully how a ground connection is represented. For making a ground connection the wire can be connected to a

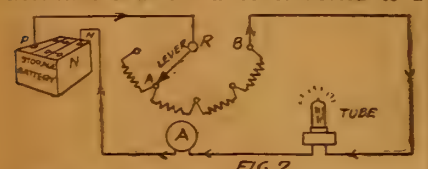


FIG 7

water pipe by means of a special "ground clamp," or else it can be connected to an iron rod or pipe which is driven down into the earth to a depth of six or eight feet.

Ohms Law

The amount of current (No. of amperes) flowing in a circuit depends upon the applied electrical pressure (volts) and the amount of resistance (ohms) offered by the circuit to the flow of current. The higher the pressure, the more current will be caused to flow; also with a high resistance the same pressure can cause less current to flow than if the resistance is small. There is an important law which combines these three factors. This law is known as Ohm's Law, and states that the number of amperes of current flowing in a circuit is equal to the number of volts pressure divided by the number of ohms resistance. Thus, if a storage battery can exert a pressure of 6 volts, and the resistance of the filament of a vacuum tube is 3 ohms, the number of amperes of current flowing will be equal to 6 divided by 3 or 2 amperes.

Since at a given pressure the current flow (No. of amperes) depends upon the resistance of the circuit it is evident that we can control the strength of the current by regulating the amount of resistance. A device consisting of a variable resistance and used for regulating the current flow in a circuit is called a rheostat. It is always connected in series in a circuit so that it forms a part of the circuit and all the current must flow through it. A rheostat is illustrated at A in Figure 7. The current leaves the storage battery at the positive terminal P, and enters the rheostat at R. The rheostat consists of a number of coils of high resistance wire connected between a series of contact points over which the end of a rotating lever moves. In the position in which this lever is in Figure 7, the current must first flow through all of the resistance connected in between A and B before it can flow on through the filament of the tube. Thus by rotating the lever any amount of resistance can

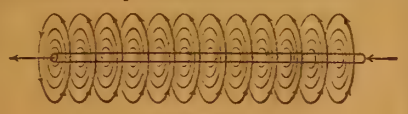


FIG. 8

be cut in or out of the circuit, and the current correspondingly decreased or increased. As the current strength increases, the filament of the tube burns brighter, while with a decreased current the filament glows less dim.

The amount of current flow (No. of amperes) in a circuit is measured with an instrument known as an ammeter. An ammeter, like a water meter, is always connected "in series" in a circuit so that the entire current to be measured must flow through it. As is illustrated in Figure 7, an ammeter is represented by a circle with the letter A in it. As the current flows through the instrument, the pointer indicates on a scale the number of amperes flowing. The two terminals of an ammeter are marked P (positive) and N (negative). When connecting the instrument into the circuit, the positive terminal must always be connected to the positive side of the line, and the negative terminal to the negative side of the line.

Magnetism

Although magnetism is a very broad and interesting subject, we will be able to take up only a few of the important points which are necessary in order to understand the fundamental principles of Radio. We are all familiar with the small horseshoe magnet and have per-

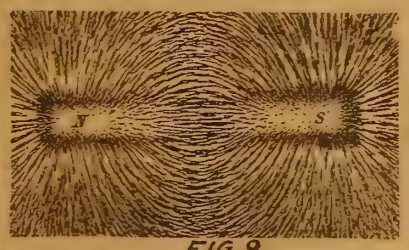


FIG. 9

formed many interesting experiments with it. A magnet will pick up only small pieces of iron and steel; but no other metals. Hence iron and steel are used so extensively in the construction of electrical apparatus and machinery, for they are the only metals which will carry magnetism or can be magnetized.

However, a magnet does not possess its power of attraction over the entire surface, but only at certain places near the ends of the magnet. These spots where the magnetism seems to be concentrated are called the poles of the magnet. A magnet always has two poles, one called the north pole and the other the south pole.

If we lay a piece of stiff paper over a magnet on a flat surface and then sprinkle iron filings on the paper, these filings will arrange themselves along definite lines as is illustrated in Figure 9. These lines are called magnetic lines of force or merely lines of force, because the magnetic force of the magnet seems to act along these lines. These lines appear to come out of one end of the magnet, the north pole, travel around through the surrounding space, and enter the magnet again at the other end or south pole. The entire collection of lines of force is commonly called a magnetic field, or magnetic flux.

Whenever an electric current flows through a wire or any other conductor, that conductor is surrounded with a magnetic field in the form of circular lines of force, all of which have the conductor as a common center. They all become larger as the distance from the conductor increases. Such a circular magnetic field is illustrated in Figure 8. The direction in which the magnetic lines of force act around the conductor depends upon the direction in which the electric current flows. If the current is reversed, the lines of force act in the opposite direction around the conductor.

The strength of the circular magnetic field, that is, the number of magnetic lines of force, depends upon the strength of the electric current (No. of amperes)—the larger the current, the more lines of force encircle the conductor. We can never have an electric current without also having the magnetic field around it. Such magnetism is known as electro-magnetism.

If the strength of the electric current changes, the number of lines of force also change. If the current increases, the lines of force expand around the wire and increase in number; while if the current decreases, the lines of force shrink together and decrease in number. If the current flow stops altogether, all of the lines of force collapse and disappear within the wire.

Since a change in current strength causes a change in the magnetic field around the wire, an alternating or pulsating current which is constantly changing in strength, is surrounded with a variable or everchanging magnetic field. As the alternating current increases from zero to a maximum value in one direction, the lines of force expand outward around the conductor; and as the current again decreases to zero, the lines of force also shrink together and collapse within the conductor. As the current reverses and increases to a negative maximum, the lines of force again expand, but this time act in the opposite direction. With the current again decreasing to zero, the lines of force again collapse.

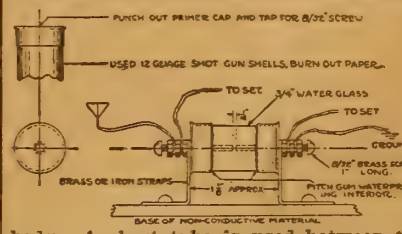
An alternating current is thus surrounded with a variable or pulsating magnetic field. Such a magnetic field, we will learn in the next chapter, plays an important part in the operation of all Radio transmitting and receiving apparatus. In fact, the entire art of Radio is based partly upon the possibility of establishing such variable magnetic fields.

The Third Chapter

With this chapter we have practically completed our study of the electrical fundamentals of Radio, and are now ready for the third chapter in which will be taken up the subject of oscillating circuits. Oscillating circuits and the high frequency currents established in them form the real essence of all Radio operation. The third chapter is, therefore, a most important one; and no one who desires to learn all about Radio can afford to miss that chapter.

Lightning Arrester

The construction of a lightning arrester shown in the illustration uses the brass ends of shot gun shells for making the



body. A short tube is used between the shell ends. The base is made of bakelite or porcelain.—George M. Swallow, Davenport, Iowa.

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Panel Shield Prevents Body Capacity

Grounding Shafts Aids in Eliminating Capacity

Finding that I still had considerable trouble from body capacity in the operation of a Copp circuit receiving set, even after the panel had been carefully shielded, I investigated for the trouble, found it and got rid of it in the following manner:

The body capacity appeared to come from the arrangement of shafts for the movable sections of both the aerial condenser and the variocoupler which carried it to the front of the panel and outside of the protection of the grounded shield. The trouble was overcome by changing the connections to both the condenser and the variocoupler. The sketch is self-explanatory.—E. H. Rankin, Lakewood, O.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets at are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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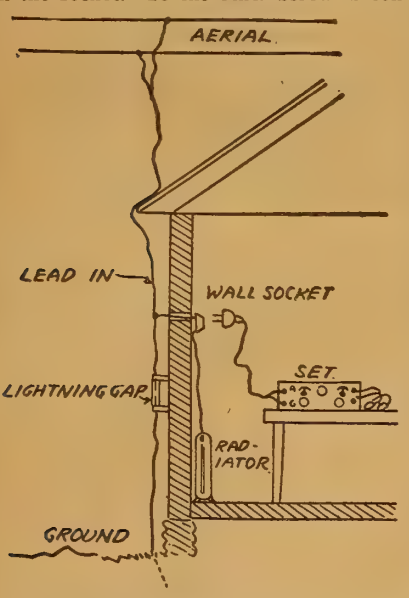
Plugging in the Aerial

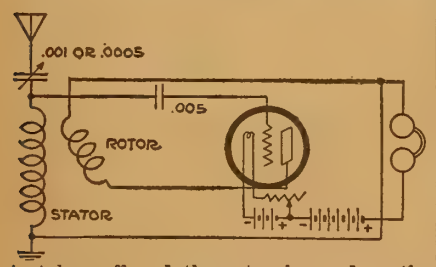
Where the aerial lead-in enters the house I fastened an ordinary electric light socket with screws to the wall and connected the lead-in to one of the two screws in the socket. To the other screw is connected to the inside ground wire. A small piece of ordinary drop light cord is attached to the aerial and ground binding posts. The other end has a regular light plug attached. When ready for use I insert the plug.—William Graham, Chicago, Ill.



Long Distance Receiver

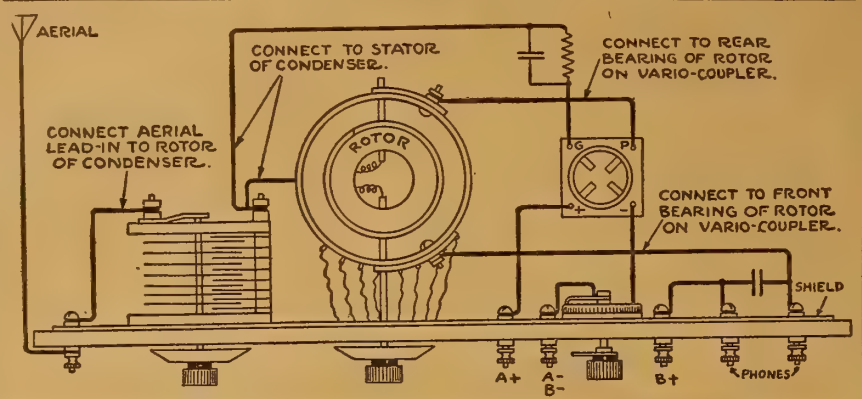
The articles required for this set are one variometer, one 23 or 43-plate variable condenser, phones, batteries, detector tube, socket, rheostat and grid condenser.

The variometer is split, or, in other words, where one end of the stator is connected to the rotor metal plate, this lead is taken off and the rotor is used as the plate inductance and the stator ends are connected, one side in the grid and the other side in the ground.



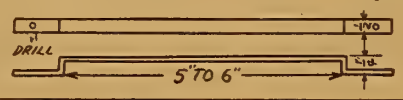
Using about 28 volts on the plate and with an aerial about 60 feet long, seven [illegible] high at one end and 20 feet high at [illegible] tourist [illegible] the following stations have been [illegible]-less expa[illegible]be: WHAS, PWX, WHB, [illegible] lost rega[illegible]ed by the WDAP, WFAF, WOC, CKAC, WWG, KYW, WBAP and WFAA. If the amateur has difficulty in getting this set to operate, he should reverse the A battery, or if he has a rather large aerial he may get better results by using the tap where the two halves of the rotor are joined.—Samuel Wells, Atlantic City, N. Y.

COPP CIRCUIT RECEIVING SET

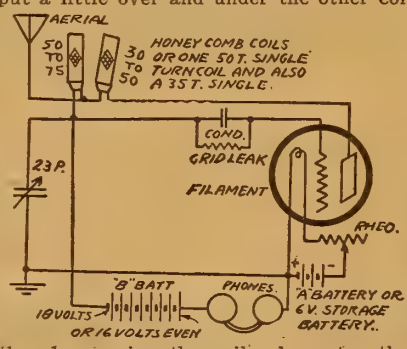


Mounting for Honeycomb Coils

Homemade coils are difficult to mount and are a nuisance if placed on the table in front of the cabinet. The coils may be held in an upright position with a strip of tin which is from 5 to 6 inches long and about ½ inch wide and bent as shown in the illustration. After shaping the strip, mount it in a convenient place on the cabinet panel. If two coils are used, four binding posts are necessary, two of which are mounted just below each coil, then enough wire is taken off the coil so that it will reach to the binding posts and still have enough wire to let the coil move back and forth on the tin bracket to cause regeneration.



The other binding posts are put on the panel in the same way, except that it is put a little over and under the other coil,



then by moving the coils closer together or farther apart it will cause regeneration, providing they are connected right. If three coils are used and one is to be stationary, the stationary coil wires may be drawn through the panel and pulled up firm to it so that it will rest easy against the panel and connect it. The other two coils are put on as shown in the illustration, except that one coil will be on each side of the stationary coil.

If regeneration is desired from a two coil hook-up the diagram gives one that received up to 200 miles distinctly. This hook-up I am using with great success.—Kenneth Voeck, Baraboo, Wis.

Homemade Multiple Headset

Usually when a receiving set is working good there are more persons wanting to listen in than there are headsets. If there is one headset at hand a multiple hearing device can be made from a good, sound cigar box. Procure some rubber tubing, 3 or 4 feet for each person. and drill holes in the sides of the box for the tubing to fit in snugly. Tune in as loud as possible and detach the receivers from the headset and place them in the box. Each member of the party listens in through a rubber tube with its end placed in the ear.—Glenn E. Ganfin, Escanaba, Mich.

In buying or building a receiver, select a design capable of rendering selective tuning,

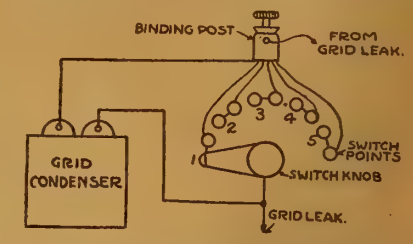
Signal Light on Loud Speaker

A friend of mine arranged a handy attachment for my loud speaker, which, after my first carelessness in leaving my battery connection on, has saved me much trouble and expense in recharging the battery. He attached a small automobile lamp and socket on the base of the loud speaker by spreading the twisted wires sufficiently to slip them over the socket. The wires were held together on each side of the socket with tape. The ends of the wires were connected to the back of the loud speaker. When connections are made

with the loud speaker the small light is a constant reminder that the current is on, and I never forget now to disconnect the battery circuit when I am through using the instrument.—J. Howard Howe, Lewiston, Idaho.

Ten Variations in Grid Leak Increase Signals

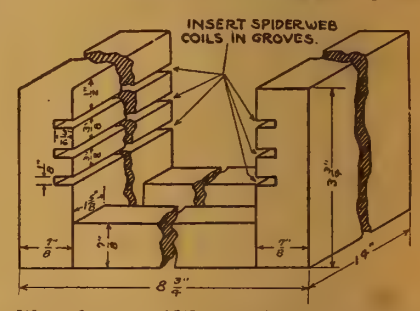
Procure ten switch points, one switch knob, one grid condenser and one binding post. Fasten the switch on the panel. In the track of the switch place the switch points spaced equally about one-half inch apart, then between the first two points draw a light line with a soft lead pencil. Between the next two draw a heavier line and so on, drawing heavier lines until you have made five grid leaks, then make the hook-up as shown in the diagram.



Place the switch spring on the point No. 1. If the signals are heard, but not loud enough, turn to the next two, and so on until the signals are heard the best.—M. Hindert, Peoria, Ill.

Mount for Spider Web Coils

The illustration shows a tray-like support for holding spider web coils. It is made of wood to the dimensions given, although any width may be used suitable to the diameter of the coils. The coils slide in the grooves. Binding posts may be placed on either side.—Irving A. Brown, Anthony, R. I.



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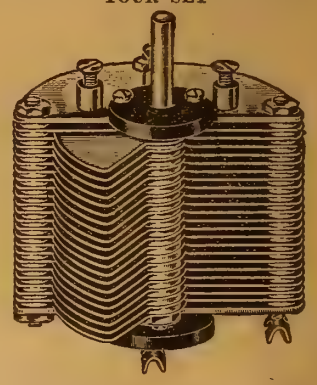

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How to Make and Operate the Reinartz Receiver

An Explanation of the Photo Diagram Shown on Page Seven

By H. J. Marx

THE photo diagram shown on page 7 and the following article explain the Reinartz construction and use of a receiving set regenerative tuner. The Benjamin was designed and built by associated E. Freund, technical director of Stock Store, with the Chicago Sun. The Reinartz Radio dealers, of Chicago and efficient, has tuner, highly sensitive extensively by the long been used very amateurs of this long distance reliability with the great country, but its popularity body of Radiophone listeners in, has been only short lived.

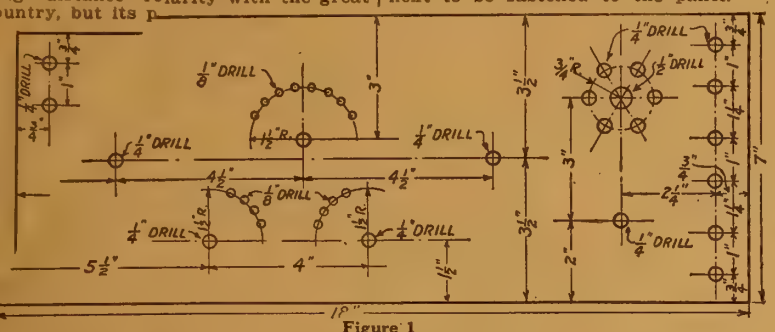

Figure 1

The panel layout and circuit diagram accompanying this article are those used by Mr. Freund in making the set which is pictured in photo diagram.

Parts Required

The set, if constructed exactly as shown, will require one bakelite or formica panel 18 inches long by 7 inches wide and ¼ inch thick, eight binding posts, two three-inch dials, one rheostat dial, three switch levers (¼-inch shanks) and knobs, 16 switch contacts (⅛-inch shanks), six switch stops, three flat head nickeled wood screws 1¼ inch long, one 23-plate variable condenser, one 11-plate variable condenser, one variable grid leak and condenser, combination (0 to 5 megohms and .00025 mfd. respectively), one standard four-prong tube socket, one .002 mfd. fixed phone condenser, one vernier filament control rheostat, No. 14 tinned bus wire for connections, and, one spider web coil Reinartz wound.

The latter in this case is known as the "BarrChasCo" inductance and is made by the BarrChas Radio Coil Company of Springfield, Massachusetts. However, the photo diagram is illustrative of the method of winding a similar coil in the event one so desires.

Extras Necessary

In addition to the parts there will be needed phones, a hard or soft tube, B battery, and A battery. This circuit will function well with any tube, provided the correct plate voltage is used. With Cunningham 300 or other soft tubes a B battery or plate voltage of 22½ will be ample. With a WD-11 and other hard tubes, 45 volts or more should be used.

A six-volt storage battery is indicated in the photo diagram. This is proper for lighting the filament of a standard tube, but a battery of only four volts should be used with a Myers tube, and of only one and one-half volts (dry or wet cell), with the WD-11 or UV-199 tube.

The base used in making the set illustrated was of poplar and is designed so that the entire assembled panel and mounted apparatus will slide into the cabinet which affords the ultimate housing. The cabinet can be made to suit one's fancy or can be purchased already finished. In the latter case, the panel dimensions should be made to agree with the space allowed for the panel in the finished cabinet nearest approximating the necessary size.

Drilling the Panel

The first step in the construction is the drilling of the panel. It is here suggested that bond or other tough finished paper be pasted on the panel with library paste. The paper should be stretched tightly and should be smooth against the side of the panel to be the front when finished. After the paper is mounted securely and dry, the holes necessary to be drilled should be laid out in pencil on the paper. After making sure that the holes are located properly on the paper, the centers should be center-punched carefully.

Figure 1 shows the dimensions for locating and drilling the panel for the set shown on page seven. Three drill sizes are necessary, ⅛, ¼, and ½ inch.

After drilling the holes, the paper may be peeled off, and the sticking parts can be rubbed off with a moistened cloth.

It is to be noted here that no holes are indicated for the mounting of the panel on the base. However, if it is desired to follow the design shown, drill these holes ⅛ inch in diameter, ¼ inch from the bottom edge in the center of the panel and 1½ inches from each end.

Steps in Assembly

To make the assembly more easy, it it advisable to insert and lock the switch contacts and binding posts in position first. Before placing the two right upper binding posts in position, slip a small .002 mfd. fixed condenser under these two posts. In the set shown, a condenser having a 1-inch space between terminal holes, made the mounting on the phone posts easy.

Next mount the switch levers and knobs so that they "feel" right when turned. The two variable condensers follow in order, and the vernier rheostat is the next to be fastened to the panel.

The tube socket, variable grid leak-condenser combination, and Reinartz spider web should then be fastened to the base in the relative positions shown in the bottom photograph of page seven, which view is of the base, looking down on it from above.

Mounting Spider Web Coil

Mounting the spider web coil should not be difficult and can almost be left to the will of the builder. In the set shown a "BarrChas" coil was used and was only laid, not fastened, on a circular disk of panel material, which was supported ¾ inch away from the wooden base by use of a ¾-inch long spacing washer under the disk in the center, through which a wood screw was fastened. A small, ten cent disk talking machine record, new, can be used to support the coil very satisfactorily, if one desires to affect an economy here.

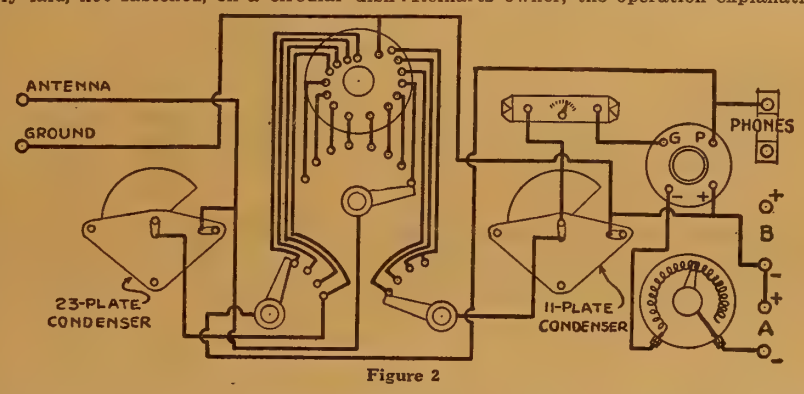

Figure 2

The coil should be mounted with the eight tuning inductance leads toward the front, the three grid inductance taps to the rear right, and the four plate inductance taps should be at the rear left, as one faces the front of the panel.

Wiring the Set Properly

More good sets go wrong from improper wiring than from any other single reason. It is for this reason that the conventional wiring chart shown as Figure 2, and drawn by Mr. Freund, should aid in placing the connecting tinned copper bus wires properly.

The photo diagram, page seven, also will aid in making these connections. Make all bends neat, and ALWAYS SOLDER to the taps, apparatus or binding posts.

It is to be forewarned here that the eight tuning inductance taps (top center switch) would best be left unconnected until the last, as their positions will interfere with soldering other connections.

Purchasers of the manufactured "BarrChas" spider web inductance will receive with it a printed circular which will aid materially in assembling this outfit.

The Figure 2 layout is designed to resemble the front of the panel and base of the set in a flat projection so as to show the necessary connections more simply.

It will be noted that the two top taps on the right, or grid inductance, switch, are connected together. This was done only to secure balance, that is, so that both the right and left switches would have four contacts on the front of the panel, and hence, look symmetrical.

Explanation of Finished Set

For both the builder and the interested Reinartz owner, the operation explanation may be valuable. The photo diagram shows the necessary external connections and names the parts in a proper fashion, and so as to avoid confusion.

It is difficult to give definite sure-fire rules for the positive working of a sensitive regenerative set. That is what the Reinartz is. It is only possible to lay down general rules for the possible operation, and let the experimenter's experience carry him on from there.

The left and right condensers should be set at zero capacity (all the plates out). The plate inductance switch (left) should rest on the bottom contact point. Tuning inductance switch (center) is left on about the center contact, and the grid inductance switch (right) should be also on the contact point next to the bottom.

The rheostat may be adjusted now until the hissing or howling (oscillation) point is just approached.

Probably the best advice to give (at least the most practical) is to vary the center and right switches until the signals come in best. Then adjust the 11-plate variable condenser (right) until the best position is found. Next it is advisable to vary the plate inductance switch and the 23-plate condenser (left) until full regeneration without distortion is obtained.

Small changes in the adjustments now may even better the reception. It is neither advisable nor necessary to burn the tube filament very brilliantly. See how low the rheostat can be turned once and you may be surprised at the good results.

The antenna system for best results with this set should not be much over or under 100 feet in length.

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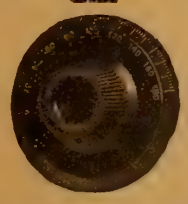
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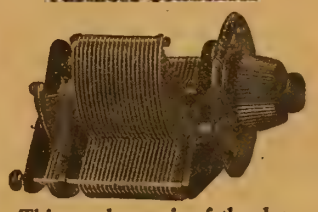
This condenser is of the decremeter type and is unusually well constructed.
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No. 604 23 plate without Vernier. Less Knob and Dial. Each.....$5.50
No. 605 43 plate with 5 plate Vernier. Knob and 4-inch Dial. Each.....$8.75
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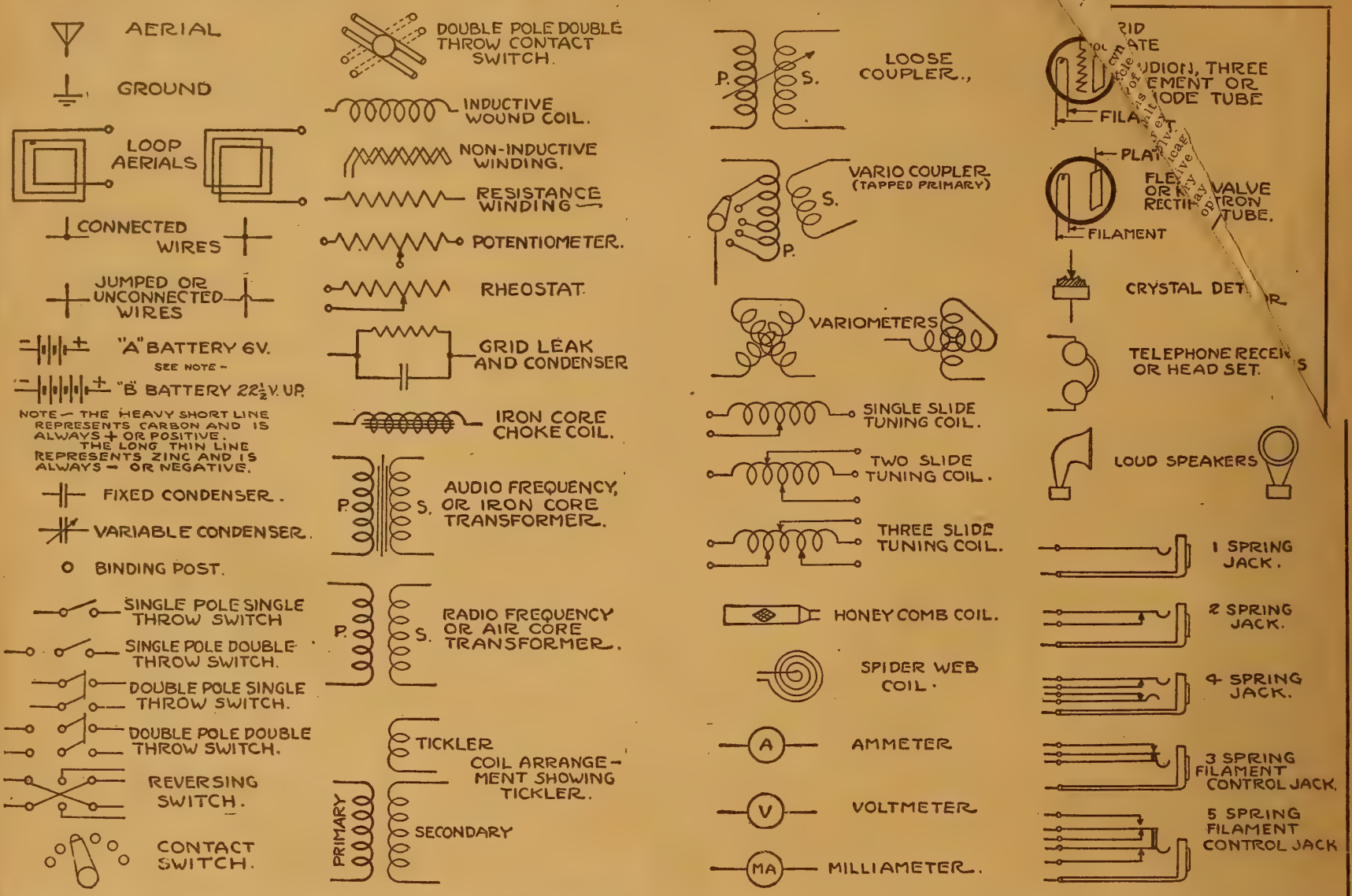

The Reader's View

A Plea for Grand Opera from the Metropolitan

Let me add a word to the plea for broadcasting Grand Opera from the Metropolitan Opera Co. All who have had the privilege of listening in on the operas as given by the Chicago Civic Opera Co. will agree that Station KYW, with the co-operation of the opera company, is doing a splendid work in the line of educating the people in the best in music, and thereby is rendering a service to this age and the rising generation. We are sure that the Metropolitan Opera Co. can be no less humanitarian in its outlook on the musical world. But we know there are many, as we, who can not rely on getting Chicago, but in the South and East, here, can often without interference get New York. The two sets, which we use interchangeably, with a two-step audio amplifier, will not always tune out other stations satisfactorily enough to get good results with Chicago.

I know this is the case with others. We all working to have better sets. Those who can afford to buy the more expensive sets are doing so, and getting distance, or the boys at home, as in my case, are building more improved sets. We want the best in Radio sets. Likewise, there is no question in my mind that there is a vast Radio audience that wants Grand Opera, and those who do not will learn to want it. The more the Radiophans learn about Radio, the better sets they want, so with the listeners in regard to programs heard.

Take the movies. Time was, not so long ago, when slap-stick comedy and a piano player would do. Now we want good plots, finished actors, and a symphony orchestra. We don't have to wait to grow up to the best in music. If the best is made available the growing generation will take hold of it, is my opinion. The talking machine and player piano have done wonders to make us, as a nation, more musically inclined, but it remains for Radio to guide and shape our tastes. The great majority, of necessity, choose the records from the 50-cent stores. But the Radio selections are, to use an old, old expression, "free as air," and if the producing companies will only co-operate with the managers of broadcasting stations, so they may send out the best productions, then the tube will not need to usher in the familiar "clack clickety, clack," and even the humble little crystal will "glow" with the reflected beauty of the tones it brings in.

To illustrate: In the last several weeks, here in Virginia, my son of fourteen years has learned to distinguish Grand Opera. We turned in, by chance, New York the night of the broadcasting of "Aïda," which of course I recognized and thoroughly enjoyed. So last Friday, when my son caught the last act of "Il Trovatore" at Chicago, he breathlessly called, "I have Grand Opera for you." He also stopped his experimental tuning, lately, to listen to the fine Shakespearean reader who recently gave "As You Like It," because he had been making a book report on that very play at high school. Then Saturday night, a week ago, we heard the wonderful Symphony Orchestra from New York, and I find Radio is the way to study and teach the symphonic form. Then the harpist, whom we heard from Atlanta last Saturday, gave us clearly the tone qualities of the harp in all their beauty.

What makes the Italians such a musical people is, not only their ability to execute but the wonderful opportunity of the masses to hear the operas. Think of the impetus to the hearing of opera on the stage this listening in will give! Why do the young people love jazz? Because they know it. But let them constantly hear the best, and they will no more go back to it than the Radiophans will discard their amplifying devices or their improved hook-ups. I know, for I am one who from babyhood not only studied but constantly heard the better forms of music.

Who would stop the avenues, which Radio is opening up, for the onward progress of a better appreciation and a truer valuation of the best music? Let's have Grand Opera from the Metropolitan!—Harriet Reynolds Marchant, Petersburg, Va.

Likes Flewelling Set

It may interest you to know that I built a Flewelling super-regenerative circuit as given in RADIO DIGEST in the December 2 number and I have been getting some remarkable results. I am using the set without any real antenna. For receiving purposes I attach a wire to the heating system of the house or simply drop fifteen or twenty feet of ordinary annunciator wire out of the window and not touching the ground. In either of these methods of receiving I have been able to receive up to a distance of one thousand miles. It remains to be seen what I can do with a real antenna.

Now comes the strangest thing of all. With this set and without any receiving wire of any kind I can pick up stations as far away as Pittsburgh and bring the voices and music loud and clear. I can pick up Pittsburgh in this manner almost at will. I have demonstrated this fact to several people who have been skeptical and I have done it with the set inside of a brick building in the heart of Asheville, N. C., among all of the trolley and lighting wires. If you can devote the space in your paper I wish you would give the theory of the reception in this instance. The set itself is picking up the signals and regenerating them of course, but just what part of it is probably doing it?

A good many of the Radiophans here are interested in this and so far as I know I am the only person in this part of the state who has been experimenting with the Flewelling circuit, although several have tried out the Armstrong circuit. Here I wish to congratulate you upon the good paper which you put out and in my humble estimation it is the very best published for those wishing to keep up with the latest in Radio and to experiment with circuits. Your diagrams are the most explicit for the novice that can be found anywhere. This is my first attempt at building or using a receiving set and I am very proud of the fact that by using your diagram and directions I was able to put this set up and it worked from the very beginning.

In final explanation I wish to state that my set is mounted on a beaver board panel with dimensions of about 10 by 14 inches. The connecting wires are rather longer than ordinarily used and this may have somethig to do with such long-distance reception without receiving connections. Please note that Pittsburgh is about 275 miles from here. Thanking you and assuring you that I enjoy your paper each week, I beg to remain.—Dr. F. C. Locke, Oteen, N. C.

Condensers Vary

Mechanical motion of the dial of the condenser of a receiving set is not necessarily an indication of the sharpness of tuning. Moving a dial on one set a single degree may lose a particular signal, while it may take ten degrees of another set to tune out the same signal. However, ten degrees on the second condenser may correspond to the same change in capacity which is made in one degree on the first condenser, if there are fewer plates or if the latter are more widely separated.

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Questions and Answers

Wants to Add Amplification

(1248) CG, Baylis, Ill.

I have a set containing a 43-plate variable condenser, variocoupler, grid leak and grid condenser, rheostat, detector tube, socket, 22½-volt battery, 6-volt storage battery, and a pair of 2,000 ohm phones. What other parts would it take to add one stage of amplification?

Does it take a 45-volt B battery or a 22½-volt B battery for an amplifier? Can you use one A battery for two tubes?

Is there any way by which you can use a transformer on a 110-volt electric light so as to take the place of a storage battery?

A.—Your detector set is complete as now is. For one step of amplification add socket, rheostat, 45-volt B battery, amplifying tube and amplifying transformer.

Best results will be secured with either a 45-volt B battery or two 22½-volt batteries. The A battery may be used for two or more tubes.

We do not believe that 110-volt transformer designed by the Bureau of Standards for elimination of the A battery is on the market as yet. Any six-volt output transformer will serve, although we do not recommend it as a practical venture.

Page fourteen of September 2nd issue will afford you diagram of one stage amplifier.

Variocoupler Suggested

(1193) PMC, Ft. Stockton, Texas.

I have been reading your paper from the start and have gotten lots of information from your question and answer page. I am going to ask that you answer some questions for me.

I have a detector and two-stage audio frequency amplifier which I assembled. I am sending you the hook-up I use. My aerial is a three-wire inverted L, seventy-five feet long with a twenty-five foot lead-in and twenty-five foot ground lead. One end of my aerial is seventy feet high; the other, twenty. I have brought in Stations WHB, WDAF, KFAF, KUY, and a number nearer, but I have considerable trouble in tuning them in. I am using a homemade loose coupler with tapped primary and secondary for tuning.

Would a variocoupler work better with this set? Am I receiving as far as I should with this set under favorable conditions? Should a potentiometer across the A battery weaken the signal? If not, why is it that I find this the case with mine? Why is it that I can sometimes hear the whistle of a station clear but can't tune the voice in? If I should add one stage of Radio amplification to my set, would it increase the signal strength?

I would appreciate any change in the hook-up you might offer to improve the tuning.

A.—We are gratified to answer your inquiries briefly as follows:

We suggest the use of a variocoupler with variometer for tuning and one in plate circuit for regeneration. Radio frequency amplification will increase your range slightly and also the signal strength. For this addition of Radio frequency to your circuit, see page fifteen of August 19th and page fourteen of September 16th issues of RADIO DIGEST.

Your receiving records are good. However, your potentiometer should not function as you describe. Increase the detector plate voltage slightly. This will doubtless remedy the unfavorable condition.

Don't Put in Acid!

(1253) AM, Spiro, Okla.

How often would I have to put acid in a storage battery? I am using a charger to charge it.

Could the battery be used while it was being charged?

A.—Never put acid in a battery unless you have the experience and skill of a practical battery man and then not more often than at six month intervals. This is very important to the protection of your battery and should be carefully observed.

Using the battery while being charged is not advisable on account of the hum that occurs while charging.

Condenser Construction

(1247) EJF, Vincennes, Ind.

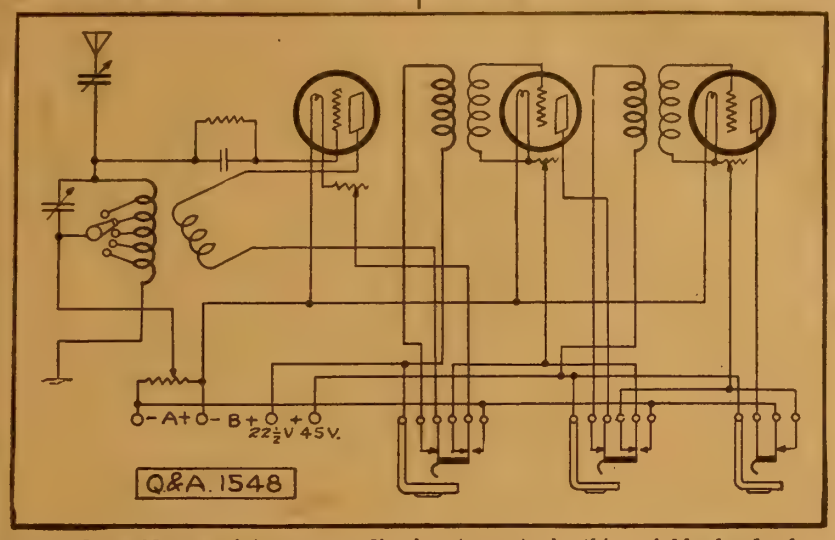
For my benefit and others, please say if it is a good custom to have condensers consolidated. I have in mind making lead foil and manila or waxed paper condensers to nearly their minimum capacity and then cut in parallel with each set of plates, a 5, 11, or 13-plate rotary condenser with them, the idea being to lay all the foil sheets in one shallow container leading out the necessary taps for 4 auxiliary condensers, and sealing up the lead sheet container permanently. Will one interfere with the others in such close proximity?

A.—There will be no interference between condensers in close proximity in the method you describe. Consolidation of condensers in this manner is practical and convenient.

Circuit for Out-of-Town Stations

(1548) EJH, Chicago, Ill.

I am having difficulty in getting my set hooked up so as to get out-of-town stations, and would appreciate your sending me sketch connecting the apparatus of my set as you think it ought to be connected. I have one variocoupler, one 43-plate variable condenser, one 23-plate variable condenser, one deterctor tube, two amplifier tubes, rheostats for each tube, two audio transformers, one potentiometer, three jacks and one plug for phones.



Please lay particular stress on connecting the potentiometer so as to bring the best results.

A.—Q. & A.1548 diagram shows one type of circuit that you can employ with your apparatus, and which should bring in out-of-town stations.

Windings; Leak Resistance

(1246) MV, Portland, Ore.

1. The primary and secondary of my variocoupler and grid variometer are wired with No. 24 wire and plate variometer with No. 21 wire. Should I have used No. 21 wire throughout or a larger sized wire and if so would results justify my rewiring the set?

2. When a grid leak has too heavy a pencil mark or too light a pencil mark what effect has it on the working of a set, and how can I tell when it has just the right resistance?

A.—1. Wire used in construction of your apparatus is all right and there would be no advantage in making suggested rewiring.

2. The best way to determine resistance of grid leak and proper adjustment to that end is to make a heavy pencil mark and keep erasing until you sense the verge of howling. When too little resistance obtains, a howl or whistle is noticeable; when too much, a decrease in signal strength results.

Loop Aerial in Series

(1258) ANF, Paterson, N. J.

I am employing hook-up which you published in your issue of Saturday, August 12th, 1922, page 15, of 1 stage Radio and 2 stage audio frequency with a 43-foot outdoor aerial. I am getting good results but would like to get better if possible by increasing my wave length inductance with a loop aerial.

Will you please show me how to employ a loop aerial with this hook-up and size of variable condensers to use in their respective places?

A.—Place loop aerial in series with set and antenna with a forty-three plate variable condenser across it. However, we do not believe that this will materially assist you and would rather advise to increase the length of your outdoor antenna to one hundred and fifty feet.

Page fourteen of September 16th issue of RADIO DIGEST affords a rather comprehensive article on loop aerials, which will be helpful in employing them.

Allen's Circuit Layout

(1238) FXB, Weehawken, N. J.

I am particularly interested in the circuit submitted by A. J. Allen, page 4, Vol. 2, No. 11. Will be very thankful to know how he constructed the set, or the position of various inductances.

A.—The only communication we had from Mr. Allen, (3807 Graceland Ave., Indianapolis, Ind.) was that given in the article you read.

I don't think the arrangement would be very important, except first, that your grid leads (lead to grid variometer—to leak and condenser—to grid) should be as short as possible, and second, that the three variometers and their leads should be separated enough so as to avoid back coupling through induction. If the latter is impossible, shield the variometers with ungrounded but commonly connected shields.

Has Silent Week!

(1233) CTR, Newport, Pa.

For one whole week we failed to get anything on our outfit. There are eight or ten sets in this neighborhood, also a number in nearby towns having the same trouble.

A.—It would be difficult to arrive at a conclusion as to the nature of the phenomena you are experiencing. Off hand, the solution might be in suspended broadcasting of stations you are accustomed to receive. RADIO DIGEST affords a weekly bulletin of broadcasting stations and the hours of operation by which you might be able to determine if this might explain your period of silence. However, the cause may lie in the geological terrain.

Trees Near Aerial

(1226) JH, Sylvan Beach, N. Y.

1. My aerial is 150 feet long, with lead-in, and 35 feet high and entirely surrounded by trees, some only a few inches from the wire. Have heard stations 800 miles distant with this arrangement. Would raising the aerial above the trees increase the range of the set?

2. What would be the advantage of shunting a variable condenser across the primary of the first step amplifying transformer? What capacity should it be?

A.—1. It is granted that the higher the aerial, the better. Your present results are certainly satisfactory and would not suggest the necessity of any change. Proximity of trees is not objectionable provided they do not touch antenna at any point.

2. There would be no advantage derived from shunting a variable condenser across the primary as suggested. If your circuit is regenerative, use a .001 mfd. fixed condenser here.

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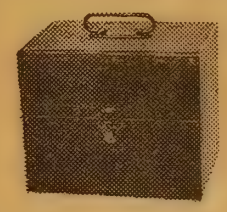
FREE  **FREE**

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$1.00 Genuine Bakelite Dials, 3-in., $0.45; 4-in.	.55	Special Radio Soldering Iron	4.95
$7.00 Guaranteed Genuine Bakelite Variocoupler, silk wound	4.75	20c Bezel	.15
$6.60 Wessco Variometer, highest quality guaranteed	3.25	$8.00 BRANDES PHONES	5.75
$5.00 Acme Transformer	3.40	$1.00 FRESHMAN VAR. GRID LEAK	.75
$24.00 A BATTERY, 100 AMP., 6 V.	16.75	100 ft. Coil No. 14 7-strand Pure Copper Aerial Wire	.50
$19.00 A BATTERY, 80 AMP., 6 V.	11.45	HOMECHARGER DE LUXE	13.25
$14.50 A BATTERY, 60 AMP., 6 V.	8.75	Thordarson Grid Condenser	.15
$1.00 Rheostat	.32	$1.50 Thordarson Vernier Rheostat	1.10
$5.00 23-pl. Variable Condenser	1.65	Johns-Manville Blk. Com. Tubes, 3-inch	.25
$5.50 43-pl. Variable Condenser	1.95	75c Crystal Detector	.35
$4.50 Variometer, guaranteed high quality	2.40	$1.50 Multi Jack	1.15
$4.25 Variocoupler, guaranteed high quality	2.25	$1.50 Twin Adapter	1.15
Contact Points, dozen	.04	$1.25 Universal Plug	.75
Bronze Bus Bar, tinned, ft.	.02	$18.00 WESTINGHOUSE BATTERY CHARGERS	13.25
$1.00 Socket	.35	$19.50 WESTINGHOUSE BATTERY CHARGERS for A & B Batteries	16.00
$3.00 BATTERY, 22½ V. VARIABLE, HIGHEST QUALITY GUARANTEED, LARGE SIZE	1.45	$5.00 Murdock Phones	3.55
$1.75 B BATTERY, 22½ V. VARIABLE, HIGHEST QUALITY GUAR., SMALL SIZE	.75	70c Open Circuit Jack	.40
3-plate Vernier Variable Condenser	.70	85c Double Circuit	.45
Guaranteed Genuine Bakelite Panels—7x10, $1.25; 7x18, $1.85; 9x10, $1.60; 5x5, 47c; 5x9, 95c; 6x12, $1.25; 7x12, $1.50; 7x9, $1.15; 12x14, $3; 7x24	3.00	40c K. D. Crystal Detector	.16
50c Mica Condensers	.25	Magnet Wire 20 per cent, discount off List.	
$1.00 All Moulded V. T. Sockets	.25	$3.00 Radio Frequency Transformers	1.65
$1.50 MICROSTATS	.85	75c Battery Hydrometer	.35
SPAGHETTI per length	.07½	Knife Switch, S. P. S. T.	.14
$8.00 Moulded Variocoupler, highest quality	4.50	Knife Switch, S. P. D. T.	.22
		Knife Switch, D. P. D. T.	.35
		$6.50 Wessco Audio Transformers, highest quality guaranteed	3.25
		$6.75 Westinghouse Storage Battery	4.75
		$5.00 Shamrock Variocoupler	2.59
		$8.00 Dreyfuss Phones	6.00
		$7.50 Wooden Horn	6.00

MAGNAVOX, NEW TYPE, NEW CONSTRUCTION. NEW FINISH $45.00

Radio Illustrated

Married by Radio. Several marriages took place at the Grand Central Palace during the show. This couple is rehearsing for the occasion, using the Radiophone to receive the marriage ceremony. In this case both the bride and bridegroom are at the altar and the minister at home delivering the marriage rites by ether waves. © U. & U.

Ivan Steschenko, new basso with the Chicago Opera Company, is here leading us in song. In this case he is Music Master Basilio in the comic opera, "The Barber of Seville." Steschenko has been heard over KYW several times. Moffett Photo

A new type Radiophone recently brought out by a large manufacturer of these goods is shown in this picture. It is a fine cabinet construction. The daughter of one of the officials is listening in on the new instrument. © Wide World

The latest contribution to science is the code sending and receiving typewriter, which is equipped to either operate by wire or Radio. The inventor of the instrument, Edward Hebern, is shown using the machine, which has already awakened the interest of government officials. The machine, with the code wheel inserted, translates the coded message from any similar machine immediately on its receipt. An electric current is applied in certain combinations, which causes the machine at the receiving end to reproduce the words in a readable way. © Wide World

Presented with the smallest tube Radio set by his associates at the federal board for vocational training of war veterans in Washington, R. Edwin Joyce is shown listening in to a concert that was broadcasted from St. Louis. Joyce is in the hospital at Washington, where he had a leg amputated recently. The miniature tube set is the invention of Barney J. Goy, who is in charge of the electrical training courses at the Washington bureau for war veterans. © Int.

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Flewelling Data, Pages 12, 15; Reflex Circuits, 13

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL, SATURDAY, JANUARY 20, 1923 | No. 2

RADIO JOINS CRIME WAR

'RICH' FOR DAY, HAS PHONES INSTALLED

RADIO FOR WINNER IN "MILLIONAIRE" CONTEST

Lucky Boston Woman, Free to Have "Anything," Spurns All for Air Concert

BOSTON, MASS.—Mrs. E. W. Bickmore of 40 Brent street, Dorchester, had a Radio receiving set especially installed in her home for one day, on New Year's Day, and enjoyed a Radio concert throughout the day and evening. For some years Mrs. Bickmore has been in poor health, and when she won in the Boston Post's contest of "A Millionaire For a Day," she requested that the Post have a Radio set installed in her home, that she might hear a Radio concert.

The set was installed Saturday, tested out Sunday, and she heard the entire program, including the beautiful sermon, at St. Paul's Cathedral as well as if she were present there. On New Year's Day she listened into the holiday programs of the Shepard Stores and Amrad stations.

The Boston Post's "Millionaire For a Day" contest ran for a month and the winners of each day's answer to the questions propounded in the paper were given anything that they asked for, and allowed as guests of the Post, to do just as they imagined a millionaire might do, all expenses being paid. Expensive limousines, trips to New York, boxes at the opera, theaters, dinners at the finest hotels and all such things as people of means might enjoy, were on the card if the daily winner wished them. The program in each was laid out to suit the winners.

Mrs. Bickmore was the one who chose a Radio concert over a specially installed set, for one day.

WHY?

(Special to RADIO DIGEST)

WASHINGTON.—The Westinghouse Electrical and Manufacturing Company, which sells Radio apparatus through the Radio Corporation of America, plans to present new sets to several members of the Cabinet interested in Radio, according to E. L. Norcross, local representative, who has already installed a set for Secretary Weeks in the War Department.

SHIP-TO-SHORE RADIO SETS UP NEW RECORD

Vessel in Pacific Covers 4,050 Miles with 1KW Set

SAN FRANCISCO.—The most remarkable records yet made in ship-to-shore Radio telephony were hung up during the voyage of the S. S. Matsonia from Honolulu to San Francisco. The ship has a one-kilowatt, combination Radio telephone and telegraph set. With it the operator was able to talk with the operator of the station at Apia, British Samoa. The last conversation took place at 8:30 a. m., when the Matsonia was 4,050 miles from Apia. The following day she docked in San Francisco.

During the entire voyage the vessel was in constant voice communication with the shore, speaking directly to KPH at San Francisco, or with KHK, at Hawaii, whichever one was nearer. All the work was done on a 550-meter wave length.

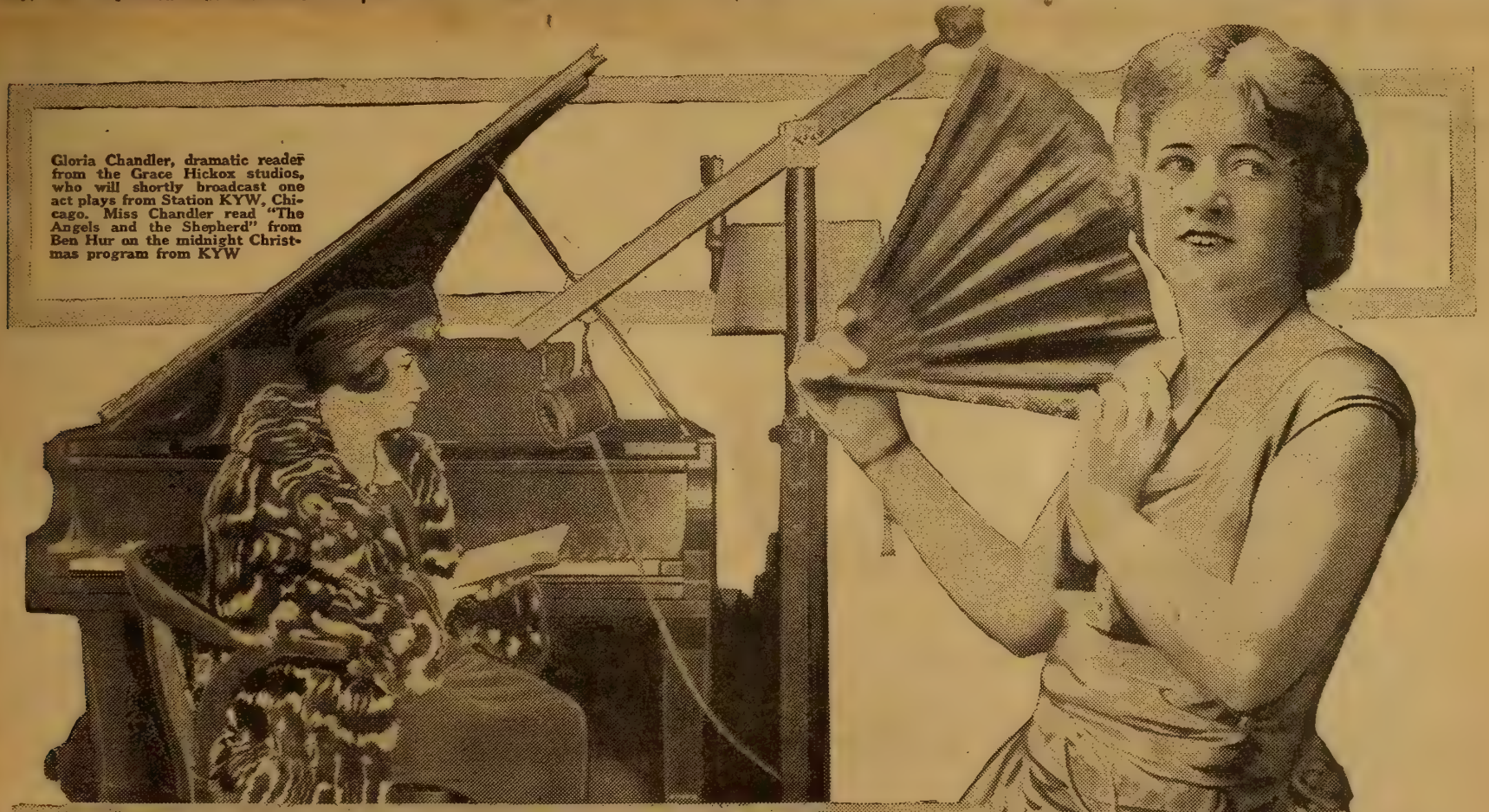
CHIEF BURNS TAKES STEPS IN BIG DRIVE

Daugherty Tells How Crooks Will Be Defeated by Air Waves

Plans National "Gallery"

WASHINGTON. — Attorney General Daugherty announces a plan for a national

(Continued on page 2)



Gloria Chandler, dramatic reader from the Grace Hickox studios, who will shortly broadcast one act plays from Station KYW, Chicago. Miss Chandler read "The Angels and the Shepherd" from Ben Hur on the midnight Christmas program from KYW

Frances Starr, heroine of "Shore Leave," playing at Powers Theater, Chicago, which was broadcast direct from the stage Saturday afternoon, January 13, by Station KYW.
Nicholas Murray Photo

RADIO JOINS CRIME WAR

(Continued from page 1)

bureau of identification and information in Washington with Radio as the means for broadcasting data on criminals and their activities to the whole country. The report has been verified by William J. Burns, Chief of the Bureau of Investigaton. This national gallery of rogues and crime, the idea of the attorney general, is believed to be something unique in criminal investigation as it will cover the whole country and be immediately available.

"In these days of preventative medicine, and fire and accident prevention," said Chief Investigator Burns, America's foremost detective, "we have now come to crime prevention. We plan eventually to have on file in this bureau photographs, finger prints, descriptions and histories of every known criminal in America, as well as data on his methods of operation."

First Real Crime Prevention Step

When legislation authorizes it and the system gets into operation with state, county and municipal police departments co-operating, Mr. Burns believes the country will have made the first practical step toward the prevention of crime and the apprehension of criminals.

If a local police department Radios to Washington the details of a crime, together with a description and name of the suspect, or asks for data on a man in the national rogues' gallery, the fugitive from justice can then be sure that a few minutes later his whole history will be broadcast throughout the United States. Within an hour after the commission of the crime he would be watched for at every possible point of departure. Mr. Burns believes this would greatly hinder the activity of criminals.

Rogues' Archives in Preparation

Already one police association has voted to turn over its criminal historical data to the Washington national headquarters, where the government records will be moved soon from Leavenworth, Kansas, to form the nucleus of the criminal archives to be kept by the new division under Mr. Burns. Co-operation of all the states is anticipated as well as from all large cities where Radio broadcasting is in popular use.

"A national bureau of identification will be of immense value to the country," Mr. Burns said, explaining that a criminal's psychology is such that when he is known, he is practically out of the game.

"Turn the light on him, and he is destroyed," Mr. Burns couched it. "Catch him, without his knowing how it was accomplished," he said, "and he becomes uneasy and is ever thereafter slow to take a chance." Sir Basil Thomson, formerly head of Scotland Yard and a recent visitor in Washington, was most interested in the scheme, Mr. Burns said. Sir Basil is also a firm believer in the value of Radio in general police work.

Radio Greatest Achievement in World

"I believe Radio is the greatest scientific achievement in the history of the World," declared the chief of the government's criminal investigation bureau. Within two years, he predicts every home, institution and establishment will be equipped with Radio receiving sets capable of receiving messages from all over the country and even abroad.

In New York, he added, the police broadcast warnings from headquarters when a crime is committed and the criminal is yet at large. These messages are not only picked up by all stations but by a fleet of scouting automobiles. They immediately scatter or assemble, so as to cut off the escape of the criminal. The system is also in operation in Chicago, and is applicable everywhere.

When asked if the criminals wouldn't get Radio sets and learn what the police were planning to do, Mr. Burns replied that it wouldn't do them any good, as they "couldn't dodge Radio broadcasts."

GROWTH OF PUBLIC HEALTH SERVICE

First Anniversary of Broadcasting Since It Was Inaugurated at NOF

WASHINGTON.—On the first anniversary of its broadcasting, the Public Health Service announces that since its inauguration on NOF, the service has grown, until today ten stations in nine states and one in Canada, are carrying its educational talks. It is unique, in that it is the only national Radio health service in the world. Its messages are not only heard by thousands, but are being used extensively in the foreign language press in both America and Europe. For the first time a call is being made for replies from listeners in to determine exactly how extensive is its scope and how its broadcasts are received.

A Radio club is being organized in Seattle, its members being amateurs who desire to become proficient in Radio telegraphy. The club proposes to establish a broadcasting station, to open a bureau for information on all Radio subjects and to undertake experimentation in the field of Radio.

FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close January 27 at midnight. Awards will be announced in the February 24 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $25.00; Second, $15.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded both contestants.

5. Judges will be the Technical Staff of Radio Digest, Illustrated.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The contestant must build this set and test it before entering the contest. The article must tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Radiophone Arrives in Denmark

Washington, D. C.—The Radio telephone has arrived in Denmark, and experiments lately have been made with a view to bringing this method of communication to the attention of the public, according to a report from Consul General Letcher, at Copenhagen. The development of the Radio is being retarded, however, by laws forbidding the use of all amateur telephone and telegraph outfits. Many firms and institutions have endeavored to secure permission to operate sending and receiving stations but only certain schools, laboratories and educational institutions so far have been given the requisite authority and only for technical and educational purposes. It seems that nothing will be done until the proposed international conference on the regulations of Radio phone and telegraph communication, which will meet at Paris next month.

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Looking Ahead

Answering Questions on Flewelling Circuit will be a feature of the January 27th issue of Radio Digest. Many of the difficulties encountered by experimenters with this wizard circuit will be explained simply in this article. Don't miss the next number.

Still More About Reflex Circuits will be given by Harry J. Marx, as a feature of the next issue. Many fans have reported good results with these double duty circuits. You will want to study them because they promise unusual possibilities of reception. Sure buy the January 27th number.

A-B-C Lessons for Radio Beginners, Chapter IV, in January 27th Digest, will give many interesting facts for the new and old fans. These articles by Arthur G. Mohaupt are proving popular because of their simplicity. Better order your copy from your newsstand today.

The Eighteenth Photo Diagram of the Standard Receiving Sets shown only by the Digest will appear next week. The Aeriala will be explained clearly in photo diagram. You'll want to see this one because of its simplicity.

Story of a Well Known Broadcasting Station will be part of the Digest next issue. A human interest tale of a station you have heard. Guess which one?

The Only One Sure Fire Broadcasting Schedule will be published as usual with part one in January 27th number. Many corrections have been made. Keep your list up-to-date. This service is original with Radio Digest. Imitation is the sincerest form of flattery.

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IMPROVE CHECK ON WEATHER BY RADIO

MORE ACCURATE REPORTS BY FORECAST EXCHANGE

U. S. to Get Observations from Canada, Mexico, Europe, Pacific Islands and Far East

WASHINGTON.—More accurate weather forecasting is to be made possible this year through international exchanges of reports by Radio, it was learned at the Department of Agriculture.

"Arrangements have been made for exchanging observations from Canada, Mexico, 22 European countries, the Pacific Islands, and the Far East," said Charles F. Marvin, chief of the weather bureau.

Government statistics show that forecasts both of weather and temperature have averaged better than 90 per cent accuracy for the past 10 years. The rapid development of the Radio in the past year has made increasing certainty possible.

Radio Aids Disseminating Reports

"Radio telegraphy as a medium for the dissemination of weather forecasts, warnings and information to agricultural interests," said Mr. Marvin, "became a realization during the past year. With the introduction of Radiophony the broadcasting of information over the interior has increased enormously."

The introduction of Radiophony has made it possible for anyone to receive messages in spoken words instead of a code. A year ago the daily forecasts of the weather bureau were being broadcast from 12 Radio stations in only seven States, and principally by Radio telegraphy. On July 1, 1922, 98 stations in 35 States were broadcasting daily weather forecasts and warnings.

Weather Bureau Has No Stations

The weather bureau does not own or operate any Radio equipment. The distribution work is accomplished through plants operated by other government agencies, corporations and private individuals, and this without expense to the weather bureau.

To avoid unnecessary crowding of air and interference with schedules, only two stations are licensed to broadcast in any city or community.

Formerly many farmers were so located as to be inaccessible by newspapers or telegraph. Telephone lines extended into rural communities overcame some, but not all of this difficulty. To benefit by Radio telegraphy the code has to be learned. The marvelous advance in Radiophony has changed this situation, for thousands of farmers have installed receiving apparatus during the past year and are now obtaining forecasts and warnings easily and promptly.

Air to Transmit Motion Pictures

Time Is Near When We Will See a Movie at Home

Will moving pictures be transmitted by Radio? Will an event that is happening on one side of the world be reproduced simultaneously on the other side?

Back of these questions there lies one of the most astounding possibilities of the immediate future. The thought has not been conjured up by some imaginative brain, but as a matter of fact is based on some very careful experiments which show remarkable promise of success within a shorter time than is really popularly believed.

We are all more or less familiar in a general way with the fact that photographs can be transmitted over distances by means of telegraph lines, and even through the instrumentality of Radio. In this case, however, we need the invention of a camera to take the photograph in the first place. Moreover, the photographic plate has to be developed and a print made before the photo-telegraphic process can be put into operation.

Hungarian Performs Remarkable Results

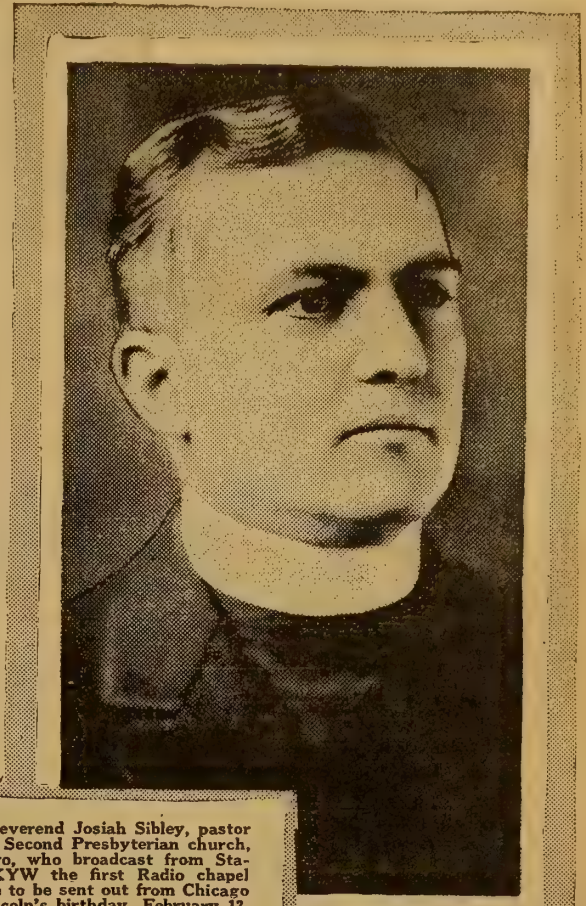
The new art involves the transmission of a complete vision just as it is occurring at some distant point. In this connection some remarkable experiments have just been concluded by Nicholas Langer, a Hungarian scientist, who has probably produced the rudiments of a successful system. Although the practical development of this may take several years, there is no question that an auspicious start has been made.

His own views, after outlining the difficulties that will have to be overcome, were expressed in the following words: "Personally, I look forward with confidence to the time when we shall not only speak with, but also see, those with whom we carry on telephone or Radiophone conversations, and the distribution of motion picture films will be superseded by the direct transmission from a central studio."

AIR WAVES HELP SPREAD GOSPEL

The Reverend Gardner A. MacWhorter, priest in charge of St. Edmund's Episcopal church, Chicago, broadcasting the Christmas midnight service from Station KYW. Reverend MacWhorter is in charge of the KYW studio chapel service every Sunday afternoon.

Bishop Francis J. McConnell, head of the Pittsburgh area of the Methodist Episcopal church, who addressed the Sunday Evening Club on January 14. Bishop McConnell returned recently from the Orient. This service was broadcast direct from Orchestra Hall by Station KYW.



The Reverend Josiah Sibley, pastor of the Second Presbyterian church, Chicago, who broadcast from Station KYW the first Radio chapel service to be sent out from Chicago on Lincoln's birthday, February 12, 1922.

Chicago Clergy Joins in Recognizing Value of Radio Sermons

Fans Hear Huge Choir

Services of Famous Sunday Evening Club and KYW Wins Pastors' Praise

By Vera Brady Shipman

It was a Sunday afternoon in August in the north woods. The Radio was turned in on chapel services from WDAF, the Kansas City Star. An old Swedish farmer, who had probably not been inside a church for many years, came with his family a distance of thirty miles to make a call. As in the north woods the Radio was tuned, prayer came through the ether, the man who lived in the woods stood with hat in hand, with bowed head, his lips moving as though in his own supplication. His face was radiant. And the word of God that afternoon reached a depth which is fathomless. A soul of a man apart from his Maker, was in communion.

And Jesus said, "Inasmuch as ye do it unto the least of these, ye do it unto Me."

Chicago Sunday Evening Club on Air

And now Chicago's nation-famous Sunday Evening Club service is being broadcasted direct from Orchestra Hall each week. The audience of about 1,500 people listens to the word of God and supplication, to the great organ, to the choir of a hundred voices, to the speaker of the day—a man of international fame introduced by the club's president—in this church of the man downtown.

But the vast invisible audience which listens in from Kokomo, from Denver or from Plainville can never be counted. In every group listening in on a Radio set, the gospel is heard, religious spirit fills the air tempororily and the unbeliever who heards the Lord's prayer as he tunes in from a Dakota ranch house, recalls the prayer of his childhood.

KYW Begins Three Service-Sunday

Station KYW Chicago began broadcasting three services on Sunday, December 24. The plan includes the morning service direct from Central Church, Dr. Frederick Shannon officiating, chapel services at the broadcasting station at three o'clock in the afternoon, directed by some well-known ministers who bring their choir and organist with them, and in the evening, the Sunday Evening Club direct from Orchestra Hall. Somewhere, somehow, a soul is being reached by some bit of one of these services.

The man who ridicules, or the self asserted atheist who listens in to such a service, cannot but be impressed with its seriousness. There are those who will say: "You are not worshipping in your church when you direct services from a broadcasting station."

Defends Broadcast Church Service

The Reverend Gardner A. MacWhorter, priest in charge of St. Edmunds Episcopal church, Chicago, gives this portion of the prayer book service as his authority for conducting services of this kind:

"It is meet, right and our bounden duty that we should at all times and at all places give thanks unto Thee, Oh Lord Almighty and Everlasting God."

"And that 'IN' ALL PLACES' is my church authority for doing what I think is a broader field of ministry than is often attempted," says Reverend MacWhorter.

The Reverend was one of the first chicago clergymen to be enlisted in the cause of Radio church extension. As former religious editor of the Chicago Tribune, for six years priest in charge at St. Chrysostom's and for the past year in St. Edmund's, Chicago, Reverend MacWhorter's valuable aid has been solicited and used advantageously many times, both for himself and enlisting the services of his colleagues in other churches.

Clergy Took Slowly to Radio

"It was very difficult," says Reverend MacWhorter, "in the beginning to arrange for ministers for services two Sundays ahead. The clergy was afraid of Radio. It would surely keep the congregation at home; it would take away completely the collection. The man who could hear it at home would not bother to come and would possibly keep others away. But the ministers who wavered began to see that that kind of man was in the minority. If he were interested at all, he would be helped by the service. If he were a scoffer, he wouldn't go to church anyway. If he were a church-going man, Radio would have no appeal as a substitution for the nearness of the house of worship."

The spark of interest in a service grows into a full fledged desire for more. The man may or may not attend church as a result of the service. But he may find something in it to apply to himself, and he tunes in for more.

Denomination Doesn't Count in Ether

The Reverend Josiah Sibley, pastor of the Second Presbyterian church, Chicago, was the first minister to broadcast a sermon from a Chicago station when KYW broadcasted on Lincoln's birthday, February 12, 1922.

Reverend Sibley says, "Radio sermons are an influence for good. Letters come from Tennessee to Dakota telling of the good it does the listener in. And the public is gradually interested in the novelty. The listener in can get an equally valuable message from Protestant, Catholic or Jewish ministers. The religious message to be broadcast today is that of Christianity, which is greater than any denomination."

Doubts Stimulating Effect of Broadcasts

The Reverend John Thompson, pastor of the First Methodist church, Chicago, the first denomination in the world to erect a church skyscraper, was an early Radio enthusiast.

"Whether it is stimulating church attendance," says Dr. Thompson, "may to some minds be an open question. I have already heard more than one man say that he could stay at home and hear the entire service. He thinks he has obviated the absolute necessity of attending church. Such men overlook all advantages of united and plural worship. Radio can never take the place in religious life of regular church service. I give it as my honest opinion, on the whole, broadcasting gives the invisible congregation listening in, a fine conception of what the church stads for, and a better idea of value of pulpit ministrations. I think it will convey to the minds of non church going public, a clearer vision of the larger place that worship and preaching are meant to fill in human life. It may absolutely stimulate interest in religion and church as to lead to their becoming regular worshippers and loyal supporters of the church in all its manifold ministries. This would be especially true if the type of service and characters of ministers could be varied as much as possible. It would furnish different angles of vision."

Is Unseen Power for Good

Dr. William H. Carwardine, religious editor of the Chicago Herald-Examiner, says, "The Radio will never take the place of church. But it will be more influential as an unseen power for good than any other factor outside the house of worship. The Radio, we must consider, is in many homes which are not religious. In these, listening in on church services is bound to have an effect upon thinking minds."

The Reverend Charles E. Shaw, pastor of the Woodlawn Park Presbyterian church, was slower to become a convert to this new phase of service. "I have debated it for a long time," says Reverend Shaw, "and I have concluded that the general influence is for good. Many non church going Radio listeners in, will tune in to hear church services from curiosity. If these services are not too long, great good can be derived from every one."

And so the larger service is carried on, and the message of God goes marching on through the air, caught at various points by some enthusiast who tunes his set in on a church service.

KGB Scores in Giving Entire Messiah Oratorio

Choir of 30 Sing Handel's Composition at Tacoma Station

TACOMA, WASH.—One of the most ambitious undertakings attempted by a station in the West was carried to a triumphant consummation during Christmas week by KGB, the Tacoma Ledger-William A. Mullins Electric Company broadcasting station in this city. The entire Christmas oratorio, "The Messiah," by Handel, was broadcast by a mixed church choir of 30 voices.

The choir was that of the Westminster Presbyterian church, one of the largest in Tacoma, and sang under the direction of Raymond D. Holmes, well-known musical director. Eight men and women were employed as incidental soloists. As far as can be ascertained, this is the first time on record that an entire oratorio of such size and caliber has been given via Radio.

Interest in "Lighthouse Club" Floods Mails

WASHINGTON.—The interest aroused by the announcement of the formation of an amateur Radio club in the Bureau of Lighthouses has been very gratifying. A number of responses have been received to date and more are coming in every mail. One member said that the amount invested in a Radio set "brings in more pleasure to oneself and family than the same amount spent in giving the movies the once over." Then, too, the "movies" are not readily available to men in the lighthouse service.

Harpist Performs at WOR

NEWARK, N. J.—Philip Sevasta, harpist, reappeared at L. Bamberger & Company's station here, WOR, Friday evening, January 12. Mr. Sevasta is one of the foremost harpists in this country and he plays, as music critics have said, "with a master's touch."

EXPLAINS FEDERAL R. F. RECEIVING SET

DX TYPE 58 UNIT BRINGS IN DISTANT STATIONS

Apparatus Comprises One Step Radio, Detector and One Step Audio Amplification

(See Photo-Diagram on Page Seven)

The standard receiving set illustrated on page seven is a Federal DX Type 58 Radio Receiver, manufactured by the Federal Telephone and Telegraph company of Buffalo, New York. It comprises a tuned primary and tuned secondary circuit, one stage of Radio frequency amplification, a detector and two stages of audio frequency amplification. Since the receiver is provided with properly designed coupled circuits it is extremely selective and, in addition, is very efficient. Other adjustments provide for change in coupling and control of signal strength.

While this receiver will operate with a wide variety of antennae, it is designed particularly for the average experimenter's antenna; for example, one comprised of from two to four wires fifty to sixty feet in length and at a height of thirty or more feet above the ground.

A low resistance lead direct to the ground is essential. Good electrical connection should be made to the water supply main, or equivalent grounding point, and contact should be made by means of a ground clamp securely bolted to the metal surface, which has previously been scraped clean of all dirt and corrosion.

Description of Connections

Since all the amplifying stages are included in the same cabinet with the detector, the description of the connections is considerably simplified. It will be noticed that all the battery connections are concentrated in four binding posts at the base of the panel. Starting from the left, the first is for the negative filament battery connection and is marked —A, the second is for the positive filament battery and the negative plate battery and is marked +A—B. The third post is for the positive plate battery tapped at 22.5 volts and is marked +B DET. The fourth post is for the positive plate battery with a total of 67.5 volts and is marked +B AMP.

The two binding posts on the left side of the panel are for the antenna and ground connections. The upper one is marked ANT and the lower one GND. The two posts in the upper right corner of the panel are for auxiliary output connections, operating in conjunction with the jacks.

Tuning Controls

The knob of the upper tap switch on the left side controls the rough adjustment of the primary wave length, while the one below it is for the fine wave length adjustment. The large lower dial in the center is used to adjust the wave length of the secondary circuit. The smaller dial just above it controls the coupling between the two circuits for obtaining the point of resonance and most distinct reception.

The knob to the right of the large dial marked AMP INCREASE controls the grid potential of the Radio frequency amplifier tube, and for this reason is one of the most important controls for the best reception of distant stations. The knob to the right and a little above, marked DET INCREASE, controls the detector tube filament and is also a rather critical control. The one to the right and a little below this, marked R.F. INCREASE, controls the filament of the Radio frequency amplifier tube, while the one on the extreme right controls the filament lighting of the two

(Continued on page 15)

NAT Gives More Forecasts

NEW ORLEANS.—Additional weather forecasts and warnings were given their initial broadcast recently from NAT, the naval Radio station at New Orleans. The new broadcasts, twice daily, on a wave of 1,832 meters, are for the district included in Louisiana, Arkansas, Oklahoma and Texas, and comprise weather forecasts, river conditions, and a summary of the conditions over the United States.

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Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Prices, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication serivce of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price. $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison, St., Chicago, Ill.

New Broadcasters for Week

CHICAGO.—During the past week eight plants were licensed to broadcast on 360 meters' wave length. The list of new stations follows:

KFEL, Winner Radio Corp., Denver, Colo.; KFFQ, Markshoffel Motor Co., Colorado Springs, Colo.; KFFJ, Jenkins Furniture Co., Boise, Idaho; WQAE, Moore Radio News Station, Springfield, Vt.; WQAN, Scranton Times, Scranton, Pa.; WQAY, Gaston Music & Furniture Co., Hastings, Neb.; WRAO, Radio Service Co., St. Louis, Mo.; WSAT, The Plainview Electric Co., Plainview, Tex.

A card was recently received by Station WGY, of Schenectady, N. Y., from Maui, Hawaii, saying that signals from the former place had been clearly heard at the latter.

KELLOGG SWITCHBOARD
& SUPPLY COMPANY
Chicago

NAVY WILL FIGHT LICENSING: DENBY

"NO COMMERCIAL PERMITS FOR US," HE SAYS

Naval Stations Not Commercial, Secretary Declares in Stand Against Hoover

WASHINGTON.—"The navy will fight very vigorously any attempt to bring its Radio operators under commercial license."

This was Secretary of Navy Denby's declaration following the statement of Secretary of Commerce Hoover before the House of Representatives merchant marine committee, urging that all Radio operators, including those of the navy, be compelled to take out licenses from the commerce department under the proposed Radio bill.

Secretary Hoover declared that inasmuch as the navy department was accepting commercial business, it should not be an "outlaw" among other broadcasting agencies and should conform to the general regulations proposed in the Kellogg-White amendment to the Radio act of 1910.

To Be Settled Amicably

"If Secretary Hoover urged the licensing of naval Radio operators under any condition, he must have acted upon misinformation as to the status of such operators," said Secretary Denby. "We talked over the telephone about it and are to have a conference about it soon which will doubtless result in an agreement.

"We take commercial business only when it is necessary, and are gradually eliminating it, for we do not want it. Under no circumstances will we consent to the licensing of navy men by any other department of the government. They are part of the naval forces of the United States and subject to orders and regulation only by the navy department."

Bill in Committee Now

The Radio bill has been referred to a sub-committee of the House committee on merchant marine. The sub-committee is composed of the following:

Representative White, of Maine, chairman; and Representatives Chindblom, of Illinois; Rosenblum, of West Virginia; Hogan, of New York; Bankhead, of Alabama; Davis, of Tennessee, and Bland, of Virginia.

The sub-committee was to meet soon in an effort to get the badly needed quick action on the bill.

Washington Scribes Get Set

WASHINGTON.—One of the first of the latest type of Radio receiving sets made by one of the large electrical companies has been presented to the National Press Club in Washington. With this new set, which has a wide wave length range and long reception radius, many of the Washington correspondents whose papers broadcast, now tune in the "home station."

Broadcasters in the Middle West and South have been heard since the new set has been installed. Theodore Tiller, well-known representative of the Atlanta Journal, which operates WSB, was much disappointed recently when told that he was "paged" by Radio the night before. His paper put on a special program for him, announcing it by Radio and calling for him to listen in. He was not in the club, however, and missed out.

Saves you 50% of the usual cost and you get an unconditional
WRITTEN 2 YEAR GUARANTEE
Best battery buy on the market today. Thousands of satisfied users.
6-Volt 40 Amp. $8.50
6 Volt 60 Amp. $10.00
6 Volt 80 Amp. $12.50
6-Volt 100 Amp. $14.50
Ask about our rubber containers
WORLD BATTERY CO.
60 E. Roosevelt Rd.—Dept L
CHICAGO, ILLS.

SHAKESPEARIAN STAR PERFORMS FOR RADIO

NEWARK, N. J.—Moffat Johnston, who is now playing the leading role in Brock Pemberton's production, "Six Characters in Search of an Author," well-known Shakespearian actor, made a broadcast from Station WOR on January 10. Mr. Johnston played at 14 Shakespearian Festivals at Stratford-on-Avon, before the World War. His first appearance in New York was in "Back to Methuselah."

MINERS ISOLATED IN ARCTIC GET AIR WAVES

Radio Entertains 185 Men Working 700 Miles North of "Circle"

GOTHENBURG, SWEDEN.—One hundred and eighty-five Swedish coal miners are now cut off from the world digging coal in a mine 700 miles north of the Arctic circle. They are on the island of Spitzbergen, north of Sweden in the Sea of Greenland, and the sun will not again appear above their horizon until next April. They have plenty of supplies and plenty of fuel, and their camps and mines will be lighted by electricity through the long arctic night. One of their principal diversions is the phonograph, and when they get tired of reading last year's newspapers, they can receive the latest world news through their own Radio station.

The Swedish company for which these men work shipped 72,000 tons of coal into Sweden from Spitzbergen during last summer. But now nothing can be moved until navigation opens again in the spring.

1923 to Be Good to Farmers

COLUMBUS, O.—Giving his first Radio address through Station WPAL of the Superior Radio & Telephone Equipment Company last week, Prof. B. A. Hibbard, of the department of agricultural economics of the University of Wisconsin, urged farmers of the Buckeye state to look forward with greater optimism for what 1923 will bring them.

For the first time in history, airplane races have been reported by Radio. The National Airplane Races, held in Detroit, were described from the cockpit of a high-powered flying boat, which had been equipped with a 50-watt transmitting set.

HOW TO MAKE
FLEWELLING
RECEIVER
COMPLETE
Blue Prints
for the construction of a Flewelling Receiving Unit and two step amplifier.
Full Instructions
FOR ASSEMBLY
Description of apparatus and accessories and details of tuning.
Cabinet Dimensions
Panel Layout
List of Parts
Only 50c
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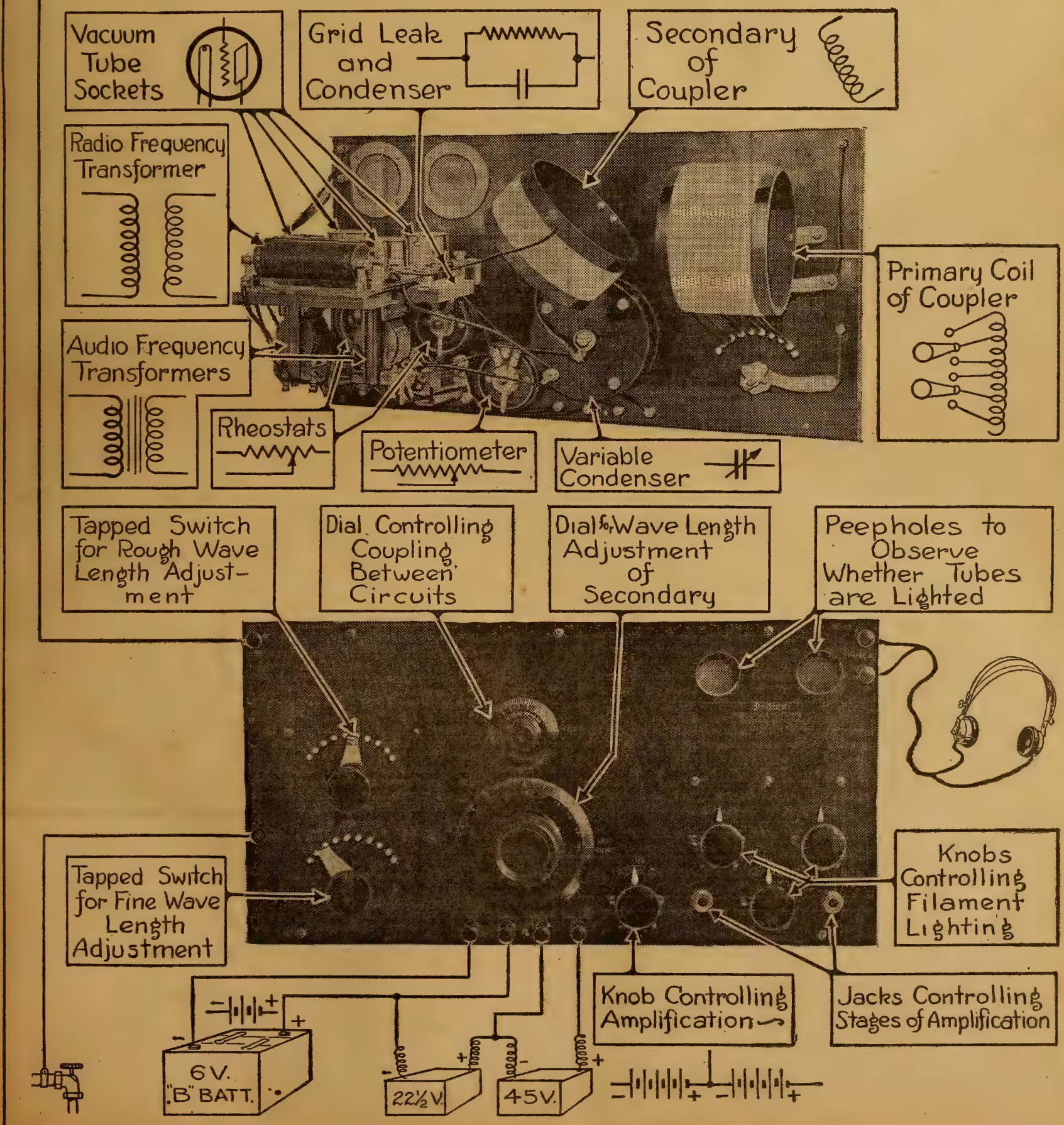
123 W. Madison Street
CHICAGO, ILL.

Radio Receiving Sets

Federal DX Type 58 Radio Receiver

As the seventeenth of the series of standard receiving sets, Radio Digest presents herewith the Federal DX Type 58 Radio Receiver, manufactured by the Federal Telephone and Telegraph Company of Buffalo, New York. This receiving unit employs the use of a tuned primary and tuned secondary circuit, one stage of Radio frequency amplification, a detector and two stages of audio frequency amplification. The circuit is non-regenerative, extremely selective, and in addition, is very efficient. Full installation and operation instructions will be found on page six. Although the amateur may not possess this particular make of apparatus, it will be well for him to study the diagram and instructions carefully. The points of similarity in standard types of receiving sets will enable the beginner to benefit materially.



Radiophone Broadcasting Stations

Corrected Every Week—Part III

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WOAY, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KDZA, KFDH

Arkansas:
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Glendale, KFAC
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KDZP, KFCL KFI, KHJ, KJS, KNN, KNV, KOG, KUS, KWH, KXS, KYJ
Modesto, KXD
Oakland, KFBN, KLX, KZM
Pasadena, KLB
Reedley, KMC, KFAZ
Richmond, KFCM
Sacramento, KFBK, KVQ
San Diego, KDPT, KDYM, KDYO, KFBC, KFFA, KON
San Francisco, AG1, KDN, KDZG, KDZW, KDZX, KFDB, KLP, KLS, KPO, KSL, KUO, KZY
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4 KDZQ, KEEP, KFAF, KFDL, KFEL, KLZ
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Anacostia, NOF
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WWX

Florida:
Jacksonville, WDAL
Miami, WFAW, WIAZ
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

State, City, Call

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO

Idaho:
Boise, KFAU, KFDD, KFFJ
Moscow, KFAN
Thomasville, WPAX
Wallace, KFCC

Illinois:
Belvidere, WOAG
Carthage, WRAM
Chicago, KYW, WAAF, WBU, WDAP, WGAS, WJAZ, WMAQ, WNAJ, WPAD
Decatur, WBAO, WCAP, WHAP
Mattoon, WQAL
Peoria, WJAN
Quincy, WCAW, WCAZ
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Evansville, WNAM, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Mishawaka, WBAQ
Muncie, WJAF
Richmond, WOZ
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Cresco, WNAG
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Dubuque, WQAK
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Manhattan, WNAK, WTG
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Louisville, WHAS, WKAG, WLAP
Paducah, WIAR

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WGAQ

Maine:
Auburn, WMB
Houlton, WLAN
Portland, WJAL

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WEAU, WNAC
Dartmouth, WMAF
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ, WPE
Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Butte, KFAP
Great Falls, KDYS
Havre, KFBB
Polytechnic, KFED

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WKAM, WQAY
Lincoln, WFAV, WGAT, WIAX, WJAB, WKAC, WLAF, WMAH, WQAP, WSAS
Norfolk, WJAG
Omaha, WAAW, WDV, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ

State, City, Call

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WAAT, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Roselle Park, WDY
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WWZ
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Wahpeton, WMAW

Ohio:
Akron, WOE
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WFO, WJAJ
Defiance, WCAQ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WBAJ WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA
Enid, WNAF
Muskogee, WDAV
Norman, WNAD

State, City, Call

Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WLAL

Oregon:
Astoria, KFBM, KFGG
Corvallis, KFDJ
Eugene, KFAT
Hood River, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Bridgeport, WBAG
Brownsville, WDAQ
Clearfield, WPI
Crafton, WAAX
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WHAF, WJAS
Scranton, WLAO, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WKAZ, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
East Providence, WKAD
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ
Yankton, WAJU, WNAX

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WPO

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WJAE, WOAI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

State, City, Call

Utah:
Ogden, KDZL
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Pullman, KFAE
Seattle, KDZE, KDZT, KFC, KHQ, KJR, KTW, KZC
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CHCC, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CFZC, CHCX, CHYC, CJBC, CKAC, CKCS
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHCZ, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CHOC, CJCE, CKCD
Walkerville, CFCI
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLAS, Hutchinson, Kan. Hutchinson Grain Radio Co.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. Hutton & Jones Elec. Co.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 2-2:30, 3-3:30, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 2-4 pm, 8:30-10. Central.

WLW, Cincinnati, O. 485 also. 500 mi. Crosley Mfg. Co. Daily ex Sun, 10 am-3 pm, music, reports. Tues, Thur, Fri, 8-10:30 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Daily ex Sun, 9:30-10:30 pm, music. Fri, 11:30-12:30 pm. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 also. 600 mi. Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 2:15, weather, markets. Central.

WMAK, Lockport, N. Y. Norton Labs.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. Utility Battery Service.

WMAQ, Chicago, Ill. 2,000 mi. Chicago Daily News. Mon, Wed, Fri, Sun, 7-7:30 pm. Sat, 4:35-5 pm. Tues, Thur, 9:15-10 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. Paramount Radio Corp.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMH, Cincinnati, O. 485 only. 500 mi. Precision Equipment Co. Daily ex Sun, 11 am, 4 pm, reports. Mon, Wed, Sat, 8:15 pm, entertainment. Central.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8,9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAF, Enid, Okla. Enid Radio Dist. Co.

WNAG, Cresco, Ia. Rothert Radio and Electric Shop.

WNAH, Wilkes-Barre, Pa. Wilkes-Barre Radio Repair Shop.

WNAJ, Chicago, Ill. Benson Co.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. Syracuse Radio Telephone Co.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm, Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. Tyler Commercial College.

WOAG, Belvidere, Ill Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Wed, 7:30-8:30 pm, concert. Sun, 9:30-10:30 am, 7-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. Ervin's Elec. Co.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Grove, Mo. William E. Woods.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. Penna. Nat'l Guard.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 7, concert. Central.

WOE, Akron, Ohio. 100 mi. Buckeye Radio Service Co. Mon, Wed, Fri, 7-8:15 pm, music, agriograms, sports. Sat, 4-4:30 pm, music, sports. Eastern.

WOH, Indianaoplis, Ind. 1,000 mi. Hatfield Elec. Co. (Indianapolis Star.) Daily ex Sun, 10-11 am, music; 10:15, financial, markets; 1-2 pm, music; 1:20, markets; 4-5 pm, music; 4:15, police notes; 4:50, sports. Mon, Wed, Sat, 8:30-10 pm, Concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 and 485 only. 500 mi. John Wanamaker.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7, music, talks. Tues, Fri, 8-10, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WOZ, Richmond, Ind. 485 also. 300 mi. Palladium Printing Co. Daily ex Sun, 12-12:25 pm, 4-5, 6:30-7, music, markets. Central.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, time, 2:30-3 pm, 6-6:30, 9-9:30. Sun, 3-3:30 pm, 9-9:30. Mon, 11-12 mid. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB. State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 1,000 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7, music. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. Wisconsin Dept. of Markets.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. Concordia College.

WPAV, Laurium, Mich. Tinetti & Sons.

WPAW, Wilmington, Del. Radio Installation Co., Inc.

WPAX, Thomasville, Ga. S-W Radio Co.

WPE, Kansas City, Mo. 300 mi. Central Radio Co. Sun, 6-7 pm, church services. Central.

WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. Elec. Supply Co.

WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

WPO, Memphis, Tenn. 100 mi. United Equip. Co. Daily, 7:15-8:15 pm, music. Central.

WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. E. B. Gish.

WQAK, Dubuque, Ia. Appel-Higley Elec. Co.

WQAL, Mattoon, Ill. Cole County Tel. & Telg. Co.

WQAP, Lincoln, Nebr. Am. Radio Co.

WQAQ, Abilene, Tex. West Tex. Radio Co.

WRAA, Houston, Tex. Rice Institute.

(Continued on page 9)

STATION SCHEDULES

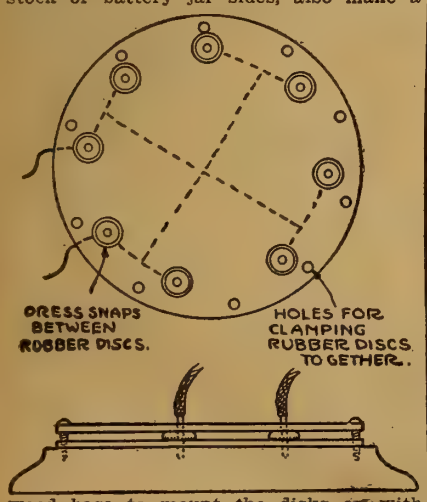
(Continued from page 8)

WRAM, Carthage, Ill. Robert E. Compton and Carthage College.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Wed, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. Jacob Carl Thomas.
WRAU, Amarillo, Tex. Daily News.
WRAY, Scranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7:8:30, bedtime stories, music. Sun, 3 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thur, 8:30-8:50 pm, 9-9:30 news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Daily ex Sun, 10:30-12 m. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAJ, Grove City, Pa. Grove City College.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 9:30 am, 9:45, 10, 10:30, 10:45, 11, 11:30, 11:40, 11:50, 12 m, 1:15 pm, 1:30, 1:45, reports.
WSAV, Houston, Tex. 300 mi. C. W. Vick Radio Const'n. Co. Mon, Tues, Fri, 8-10 pm, concert, entertainment. Central.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:45 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Mon, Wed, Fri, 3-3:30 pm, 8-8:45, reports, concert. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. Agricultural and Mechanical College of Tex.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 200 mi. Sanger Bros. Daily ex Sun, 10 am, weather, 1:30 pm, music. Mon, Wed, Fri, 8:45 pm, music. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWB, Canton, O. Daily News Printing Co.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400 and 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:40 am, household hints; 9:40-10:25, health talks; 10:25-10:30 am, weather; 11:55-12 m, time; 12:05-12:45 pm, music; 3-3:30 music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports; 7:30-10, entertainment. Sun, November 11, and every other week, 11 am, 4 pm, church services. Sun, fill in weeks, 2 pm, 7:30, church services, special. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.
WWX, Washington, D. C. 1,160 only. 600 mi. Post Office Dept. Daily ex Sun, 10 am, weather; 10:30, markets, 12:30, 2:15, 3:30, markets, 5 pm, 7:30, markets; 9:45, weather. Eastern.
WWZ, New York City. 200 mi. John Wanamaker. Daily ex Sun, 1:15-2:15 pm. Tues, 7:30-9 pm. Fri, 7:30-8:30 pm. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

Multiple Phone Connectors

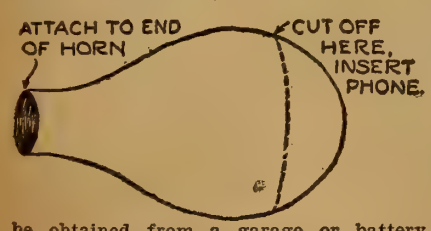
Dress fasteners make ideal devices for holding the tips of phone cords, and several of them connected together in a block make a multiple holder. Turn up or saw out two circular disks from panel stock or battery jar sides, also make a



wood base to mount the disks on with the dress fasteners between them. The wire connecting to the fasteners is shown by the dotted lines.—Dr. T. L. Morgan, Rome, Ga.

Horn Attachment

An inexpensive attachment for a loud speaker may be made of an old leaky bulb used on a battery hydrometer. One may



be obtained from a garage or battery charging station. Cut out the larger end and insert a receiver. The other end may be slipped over the end of the phonograph horn.—Knud Overgaard, Kimballtown, Ia.

Use Little Effort to Wind Honeycomb Coil

The satisfaction of proudly exhibiting the ordinary man's ability to make this or that as well or better than the "boughten article," is likely more pronounced in the Radio enthusiast than in any other hobby, and this article is to show how any kind of honeycomb coil may be made with very little trouble.

First of all, determine the number of turns you want, as this matter is important in selecting the size of wire to be used. Number 24 single cotton covered is about right for small inductances, and Number 28 S. C. C. for large ones.

If possible, secure a heavy cardboard box two inches in diameter and cut it into rings one inch across in the manner of a napkin ring. The start is made under auspicious circumstances. However, such a tube is not always at hand. Then take a piece of soft pine and work it down to a diameter of about 1⅞ inches, cut some heavy wrapping paper into long strips, the width being about equal to the length of the round pine stick, and with well-strained shellac coat one side of the paper, wrap it neatly around the stick until you have built up a tube of 2 inches diameter.

Some oil or waxed paper wrapped around the stick before laying on the paper tube will greatly aid in slipping the coil off the tube when the winding is completed.

After the tube is thoroughly dry, and has had another one or two coats of shellac, it is ready to cut into rings. Don't throw the stick away; it will be needed again. Cut about two inches off one end of the round piece of wood, drill a hole through the center of the small piece, and take a nail just a trifle larger than the drill hole and drive it through the drill hole up to the head, which will leave about an inch of the point of the nail protruding. Take the longer piece of round pine and set it on end and drive the nail into it, in the center, if you can, but this is a matter of little moment. This is your winding form. The nail is used to hold it in the vise, or if you have loaned that out, fasten it on the work bench. This allows one end to be revolved for your winding while the other end holds your work upright and in front of you.

Take a strip of paper and measure around the stick, marking the exact diameter on this strip, and mark off 24 equal spaces on it, numbering each mark from 1 to 24, so that if there were a line number 25 it would just fall under the lap of number 1. Now, in a straight row all the way around the stick, drive a pin through the center of each mark, into the wood as far as you can drive it without its bending. If you bend a pin pull it out and do better on the next one, as a bent pin will interfere with your winding.

After one row of pins has been put around the stick, slip one of the rings over the end of your stick down to where the row of pins will stop it, and then drive another row of pins around the stick, each pin to be as close to the end of the ring as possible, so that the ring will not slip. Now, if you have the 24 spaces marked and numbered so that the numbers are visible to you, you are ready to begin winding. Put the end of the stick that holds the work in the vise, hold your spool of wire in one hand, with a few inches of wire sticking out, wrap it around the pins 9 and 10, thence to 21 and 22, going laterally across, then back again to and around 8 and 9, then over and across to 20 and 21, then to 7 and 8, 19 and 20, 6 and 7, and so on, until you have returned to where you started from, which in the few minutes you have been at work, gives you exactly 24 turns. At this point, especially if making a large number of windings, it would be well to make a tally sheet, so that if interrupted, you have not lost count. After the desired number of turns has been made, it is well to cut the wire a few inches away from the coil, secure the loose end with a weight, or get Willie to hold it, while you drop a small gob of hot sealing wax on it to hold it in place.

Now, the coil is ready to apply a fixitive or coat of something to hold it rigid. Shellac can be used for this, putting on only enough to hold it in shape, but collodion is probably better for that purpose, and a couple of ounces will paint a good-sized coil, always remembering that collodion is very inflammable and will dry in a few minutes.

After this is dry, remove one of the rows of pins and slip the completed coil off the form and mark the coil inside with the size wire, date, and more important, the number of turns.

In starting your winding, especially a large coil, it is well to take a sheet of paper and map off each zigzag of your winding so you won't lose your place, as, for example,

9-10 to 21-22
8- 9 to 20-21
7- 8 to 19-20, etc,

When you have reached 10-11 to 22-23, you are ready to go.

The expense of constructing a multiple wire antenna may be reduced and its efficiency increased by placing one or two insulators in the rope connected to the bridle instead of inserting an insulator in each individual wire.

R-A-D-I-O

BUY HERE FOR LESS

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete.... $11.45

ORIGINAL TYPE "C" **BALDWIN UNITS** **$4.95**

COMPLETE PARTS FOR REGENERATIVE SETS

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial..... **$17.95**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now..$1.75 $3.10 Value, 5 PLATE, now..$1.25
$3.70 Value, 23 PLATE, now..$1.45 $2.70 Value, 3 PLATE, now..$1.15
$3.30 Value, 11 PLATE, now $1.35

U. S. A. Signal Corps Aviation Type 194-W **Western Electric Phones, $7.95**

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

COMPLETE PARTS FOR FLEWELLING CIRCUIT

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... **$12.45**

MAGNAVOX, Loud Speaker, Type R3 $34.95

VARIOMETERS GENUINE MAHOGANY, $5 VALUE, NOW **$1.95**

VARIOCOUPLERS, $4.50 Value, Now $1.75

HONEYCOMB COILS

1,500 Turns.....$1.50	750 Turns.....$1.00	75 Turns.....40c
1,250 Turns..... 1.50	250 Turns.....75c	50 Turns.....40c
1,000 Turns..... 1.25	150 Turns.....60c	35 and 25 Turns.....40c
	100 Turns.....50c	

$8.50 Guaranteed 3,000 Ohm HEAD PHONES $3.65

RHEOSTATS..... 45c

Sponge Rubber EAR CAPS, Pair..... 50c

DIALS, 2, 3 and 3½ in..... 25c

THORDARSON AMPLIFYING **TRANSFORMERS** $4.50 VALUE, NOW **$2.95**

GREWOL DETECTORS..... $1.65

Signal Corps Super Sensitive Microphone Transmitters, $2.45

Solid Copper Aerial Wire, 100 ft.	35c	2-Slide Tuning Coils, at	$1.95	Anti-Capacity Switches	$1.50
Spaghetti Tubing, yard	10c	3-Coil Honeycomb Mountings, with knobs	$4.20	Lightning Switches	$2.65
Cord Tip Plugs	60c	Phone Caps, for mostly all phones	25c	Hydrometers, now at	45c
Lightning Arresters	95c	Signal Corps Hot Wire Ammeters, at	$5.45	Radiecite Crystal, at	35c

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Radio Digest Illustrated

TRADE-MARK
Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, January 20, 1923 No. 2

Problems to be Solved

Will the Year Bring Changes Acceptable to All?

THERE is much speculation among Radiophans as to what the new year we are now just entering holds for them. There are many problems and some of them either will be solved and Radio will continue its march of progress, or else they will grow more menacing and the welfare of the whole Radio public will be jeopardized. Scientific men are not worrying much about some of the tasks, for they are not problems of the laboratory, but those of executives in control of Radio affairs.

At present the industry is in a period of uncertainty. There are still many questions as to ownership of and the control of certain essential parts. There are questions of merchandising and of manufacturing. The makers of outfits, with few exceptions, are not backing the retailers with advertising campaigns, such as photograph and automobile makers use to aid the local dealers. When this question is settled much will have been done to stabilize the business. The new year should bring a solution of this and other merchandising problems.

The manufacturer is interested in broadcasting because it helps him to sell his outfits. In a similar way the retailer is interested, and if it were not for broadcasting the public would not be interested in Radio.

Certain of the manufacturers are providing elaborate entertainments, but these benefit not only themselves, but also the manufacturers who do not broadcast or contribute in any way to the expense of broadcasting. There are broadcasters who neither make nor sell their equipment, but who are content to continue their services for no other reason than the upbuilding of that intangible asset called "good will." Others employ broadcasting as a means of indirect advertising, feeling that they are sufficiently compensated by the spreading of their names. In no cases, however, are the broadcasters of America compensated by the audiences which listen in to their programs. Will 1923 bring us closer to a solution of this big problem?

DeForrest on Radio Prophecies

America Is the World Leader in Electric Science

SO MUCH interest has been aroused by the press of the nation that the public now seeks information on the wonderful science everywhere it can be obtained. Consider what this widest diffusion of electrical knowledge, this arousal of universal interest in Radio and electrical technics, will mean to the American people, if continued. We shall rapidly become an electrical people—the elements at least of electrics and physics will inevitably become a daily thought and talk and custom of our masses. The man or woman who heretofore has complacently admitted 'all this Radio is absolutely beyond my grasp and comprehension,' will become a curiosity—as much of an ignoramus or mental 'mossback' as are those who know not what causes the tides, or that the stars are similar to our sun.

"A generation of such intimate familiarity with electrical apparatus and knowledge of the fundamental laws governing Radio phenomena must inevitably bring about a rapid development in all electrical lines, which, lacking this stimulus, would require perhaps a hundred years to equal.

"This is to be one of the lasting, far-reaching, wealth-producing products of the new American industry. Those who are listening in nightly to Radio entertainments and instruction surely will take to brief lectures on the principles involved in the apparatus. And this primary scientific education will be sugared with entertainment, made so easy of acquisition to the home that its seeds of knowledge cannot fail to fall on a myriad of receptive minds which could in no other way receive it, and where it grows it will awaken a hunger for new and deeper knowledge.

"America, already the world's leader in this field of invention and application, will thereby so far lead and surpass other nations as to defy comparison. This, at least, will continue to be the situation until foreign countries, following our enlightened example, will lift their governmental bans on broadcasting and exert the [illegible] to compete with us in universal electrical education [illegible] the home."

Condensed

By DIELECTRIC

The phonographic record has made it possible for future generations to hear the golden notes of Caruso's voice in many of his famous opera roles and in lyric songs. Will it not be possible to record speeches by notable men of science, art and statecraft, so that those yet unborn may, by means of Radiophone broadcasting, not only hear what great men of today said, but the very inflection with which it was spoken? Men at sea, on land, and even across the ocean, heard speeches by three of our Cabinet members through the instrumentality of a new invention produced in the laboratories of the General Electric company—the pallophotophone. The presence of none of these national executives at the broadcasting station WGY was required, for their voices had been recorded some time previously and could have been transmitted at any desired time. With the tremendously rapid growth of Radio audiences throughout the United States, one may easily conceive the importance of this late (I dare not say latest) discovery.

In speaking from Station WOR at Newark, N. J., recently, Dr. De Forest called attention to the marked increase in broadcasting by various newspapers in nearly every section of this country. They are rendering a valuable service to Radio audiences and are, naturally, peculiarly equipped to give up-to-the-minute news. But in musical entertainment many of them are contributing greatly to the pleasure of listeners-in, and at no saving of trouble to themselves. I am looking to them for incorporating in their programs noteworthy features, such as are not already in use. You know a member of the press is scouting pretty consistently for the things which will appeal to the general public and when you turn one loose on even a faint trail he is most likely to track to earth some bit of elusive news. Start him to ferreting out matters of interest, which might easily escape notice by untrained sleuths, and in all probability he will return to the broadcasting studio with material that is at once new and desirable. Yes, I have great faith in the press. They permitted me to enter their ranks some years ago, before Radio bugs were evolved.

You pioneers—old-timers—can renew your youth, as no doubt many of you do, by catching the new born enthusiasm of a beginner at the game and passing on a little advice from the storehouse of knowledge at your command. It is a very easy thing for the uninitiated to become discouraged and skeptical, if left alone to their own ofttimes aimless wandering in the mazes of Radio, and to let their ambition to learn something of the science lag. That is where we can step in and save the novice from losing many a joyful evening with the dials. I have just received the news of some pretty fair DX work from a member of the clan living in Pennsylvania, who, when his set was completed, heard nothing for three days. An experienced Radiophan suggested a simple addition to his hook-up and that very night he picked up a station in San Francisco. Is there any likelihood of this fresh "ham" giving up the sport? More than likely he will be looking about to see whom he may induce to enter the ranks.

The American Radio Relay League won many fresh laurels in the recent tests for amateur reception. The first French amateur station to be heard in this country was picked up by a young lad living in Brooklyn, N. Y., who as a bug is only a few months old. Whatever will encourage the amateur will help the science, for we must never lose sight of the remarkable things directly attributable to their painstaking efforts to discover the hidden mysteries, which leads me to call attention again to the fact that quite a few of the broadcasting stations are giving regularly lessons in code. If a station near to you is not doing so at present, ask them to, and have your friends who are interested follow your example. Without a knowledge of the code you are missing much that should be yours.

Even the fish which live in the sea are not free of the effects of Radio. In Sweden the fishermen are notified from the Gothenburg Radio central of the approximate location of schools of herring, a service tending to eliminate periods of long waiting and enhancing the chances of getting more fish. Think what a comfort it would have been to the whale, if he could have sent an SOS call to someone to relieve him of Jonah!

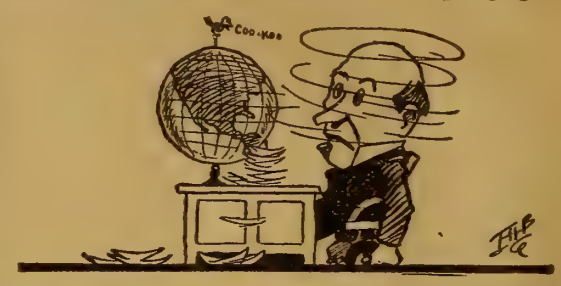
I rather imagine that Santa Claus is seeking the expert knowledge of some famed voice specialist at the North Pole, in order that he may be fully recovered from the taxing experience through which he has maintained his jovial characteristics and be ready to repeat the performance of speaking to millions of children when the Christmas season shall return again. Many a small boy has gulped his evening meal so as to miss no syllable uttered by jolly St. Nick, especially where he had addressed a letter seeking some favor from him. This has been a new delight to those who slept while Santa arranged the toys by the chimney side.

The Tiger has returned to his lair, but not before his voice had carried to more people than ever heard a native of France before, at one time. Regardless of your attitude toward the purpose of his mission, bear in mind that the broadcasting of his speeches to many thousands of American citizens points to the new era: the era of Radiophony. No important message from any source need be restricted to the printed page; broadcast it, and let the waiting listeners in hear at first hand what prominent men have to say. Public opinion will be the beneficiary of knowledge so gained.

RADIO INDI-GEST

The Contestants Use Elastic Consciences

The standard definition of a straight line is "the shortest distance between two points." A paragrapher



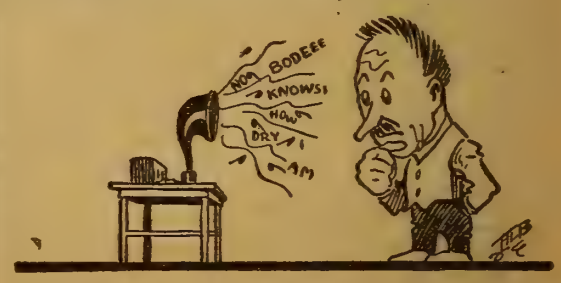
says that Radio has eliminated both the line and the distance. He should see some of the "Receiving Records" with which the Contest Editor often amuses us. The U. S. covers at least three-fourths of old Mother Earth if the said records are any criterion.

Yeh, We Gotta Stop These Wet Waves!

Dear Indi-Gest:

I think Secretary Hoover, Volstead, or maybe W. J. Bryan, should do something about this Canadian stuff that is coming across the U. S. border to disturb the morale and upset our nice New Year's resolutions. For instance, last night, I sat in on the watch services of several churches, enjoyed a fine sermon from Pittsburgh, and picked up the chimes of Old Trinity in New York. Everything was going well, and I decided to usher in the New Year with a nice glass of milk.

Then along comes CKAC broadcasting the New Year's celebration from the Mount Royal Hotel that immediately busted up all the serenity and peace of the evening with a lot of pre-Volstead jollification that would cause any good, liberty-loving, free-born American citizen to just rise up and bleat.



Not only was the jazz particularly jazzy, but it was punctuated too darn often with noises that sounded like the popping of corks, while the laughter of the men and women was loud and unseemly for so solemn an occasion, then there were a lot of strange explosions (vocal) that sounded like "hic." Finally some wretch yelled into the microphone, "Have one on me." With righteous indignation I jammed the coils around, twirled the knobs and picked up WOC, where the chimes were playing. But when I settled back to hear the airs appropriate to chimes and the occasion, they played, "The Gang's All Here," "How Dry I Am," and then "My Country 'Tis of Thee." With a vague feeling that the Palmer School had been listening in to Canada, I turned to WMAT at Duluth, and found them suffering too, for they were playing "The Early Morning Blues."

But alas! My set had probably been drinking in the too much Canadian stuff. Let us organize to dry out the damped waves from the Dominion. Quick, Hoover, a Radio law! Volstead will help you.

CHARLES H. NORTON.

All Right Now, Who Can Think?

A lecturer recently said, "Every cell in the human body is in a state of vibration; we can't think without creating an ether wave." It would require a mighty sensitive Radio frequency receiver to pick up the thinking that some people do.

He Tried to Two-Way It Once!

The Office Squirrel suggests that the two-way Radio

conversation will be a great thing for "Ma," but that "Pa" is not enthusiastic about it.

Call the Radio Doc and Capsule Crystal Set

One enthusiast writes to a broadcasting station: "We eat up your beautiful concerts every night." Most of the programs present something of a mixed diet. A program running from grand opera to the "Jim Jam Blues" is liable to give one musical indigestion.

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

Chapter III

IN THIS chapter we will see how the electrical principles of the two previous chapters are employed in the construction and operation of Radio circuits. Very high frequency (twenty thousand cycles per second and higher) alternating currents are used in Radio communication; and to obtain these high frequency currents, special forms of circuits known as oscillating circuits are employed. The word oscillating means to move back and forth very rapidly, and hence an oscillating circuit is one in which an alternating current of very high frequency flows.

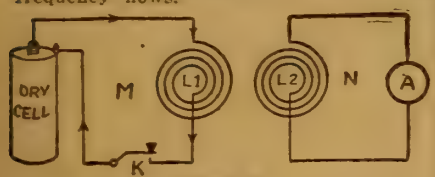


Figure 10

High frequency oscillating circuits involve two interesting and important electrical phenomena, namely inductance and capacity. Although these terms may sound highly technical, we shall presently see how easily they can be analyzed and understood.

Induced Currents

Not only is it true that a conductor through which an electric current is flowing is surrounded with a magnetic field; but the opposite condition is also true, that is, if in some way a magnetic field is established around a conductor, there will be generated within the conductor a voltage which will cause a current to flow when the circuit is closed.

For example, in Fig. 10 we have the coil L-1 connected in series with the dry cell and the key K. Near the coil L-1 is the coil L-2 connected in series with an ammeter A. As soon as the key K is closed, current at once begins to flow in the circuit M and a magnetic field expands outward around the coil L-1. This magnetic field (lines of force) cuts the turns of coil L-2 and generates in it a voltage which causes a current to flow as is indicated by the ammeter. If the current sent through L-1 is an alternating current, a corresponding alternating

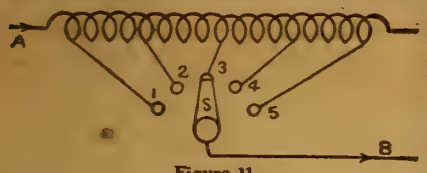


Figure 11

current of the same frequency will be caused to flow in coil L-2 and the circuit N.

The voltage set up in the coil L-2 is called an "induced" voltage and the current caused to flow in circuit N is called an "induced" current. The word induced means "due to the influence of," for the current in circuit N is a result of the influence of the current in circuit M. The process of setting up an induced current is known as induction, and the two coils L-1 and L-2 are said to be in "inductive relationship" or to be "inductively coupled." If the two coils are close together so that the induction is a maximum they are said to be closely coupled; while if they are separated somewhat, they are said to be loosely coupled. This principle of induction is employed in such pieces of Radio apparatus as loose-couplers, vario-couplers, and variometers. These will be taken up in a later chapter. The coil L-1 in which the inducing or influencing current flows is called the primary, while the coil in which the induced current flows is called the secondary. It is evident that in order to have induction take place, a variable current must flow through the primary in order to have a movable or pulsating magnetic field for cutting the secondary.

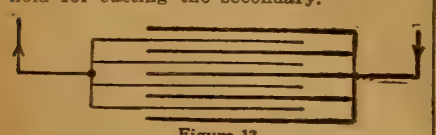


Figure 12

A variable current also has an inductive effect upon the coil in which it itself flows, besides its effect upon nearby conductors. Thus when a current begins to flow in a coil such as L-1, it sets up a magnetic field which rapidly expands and grows from zero to its full value. In doing so, these lines cut all the turns of the coil and induce in them a voltage which tends to prevent or oppose the growth of current. This is known as the voltage of self-induction because it takes place within the coil itself. If the circuit is opened and the current decreases to zero, the magnetic field again collapses; and in doing so it again cuts the turns of the coil in such a direction that a voltage is induced which tends to keep the current flowing. The effect of self-induction is thus to oppose any change of current in a circuit. It manifests itself only when the current varies or changes.

This inductive or opposing effect is employed in such coils known as choke coils which merely consist of a number of turns of wire wound either around an air or iron core. The choking effect depends upon the number of turns of wire and the nature of the core. The greater the number of turns the greater is the choking effect; also with an iron core the choking effect is greater than with an air core. For a given coil the choking effect is much greater for a higher frequency current than for a lower frequency current. Air core coils are commonly known as Radio-frequency choke coils, because they are used to choke out or prevent a high frequency current from flowing through a certain part of a circuit.

Inductance

Inductance is the general term applied to the property or ability of an electric circuit to generate an electromotive force (volts) when the current in the circuit changes or varies. This inductive effect, we just learned, is due to the variable or pulsating magnetic field which is set up by the current.

Inductance is measured in a unit known as the henry, in honor of an American scientist and investigator, Joseph Henry, who made important electromagnetic discoveries. A henry is a rather large unit,

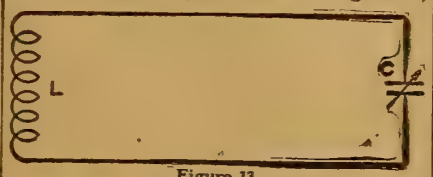


Figure 13

and hence in Radio practice, in which smaller measurements are generally made, a subdivision known as the millehenry is often used. A millehenry is 1/1000th part of a henry. For still smaller measurements the microhenry is used, a microhenry the 1/1000th part of a millehenry or one-millionth part of a henry.

For many purposes a variable inductance is needed. A variable inductance can be prepared by winding a coil so that a series of taps are brought out at regular intervals. Such a variable inductance is illustrated in Fig. 11. Here he have a coil of wire with taps brought out at every fourth turn. These taps are connected to a series of switch points over which the switch lever S moves. If the lever stands at point No. 1, the current enters at A and flows directly through the switchlever and out to B. If the lever stands on point 4 as shown, the first twelve turns of the coil are cut into the circuit and hence inductance to this amount has been introduced into the circuit.

A "loading coil" is merely a form of variable inductance coil used to introduce a certain amount of inductance into a circuit in order to obtain the desired operating characteristics. A little later we will see how such loading coils are used

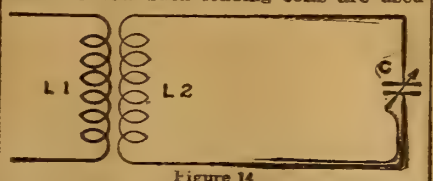


Figure 14

in Radio antenna circuits in case the antenna itself is not of the proper dimensions in order to be able to receive the desired signals.

Condensers and Capacity

Capacity is the second important electrical effect necessary to set up an oscillating cicuit. Capacity is obtained by means of a device known as a condenser. A condenser consists essentially of two sets of metal plates separated by an insulator known as the dielectric. The plates of each set are electrically connected, but the two sets are thoroughly insulated from each other. The function of a condenser is to store up electricity in the form of an electric (electrostatic) field between the metal plates.

The general principles of construction of a condenser are illustrated in Figure 12. The plates are odd in number and are arranged so that one set fits in between those of the other set. Variable condensers have one set of plates fixed and the other set capable of being rotated in and out between the others. Such condensers are used very extensively in Radio work.

The capacity of a condenser is a measure of the amount of electricity that can be stored up in it. The unit of capacity is the farad; but since this is a rather large unit, the microfarad, which is one millionth of a farad, is more commonly used. The capacity of a condenser depends upon the area of the metal plates, upon the nature of the dielectric, and upon the distance between the metal plates. The "dielectric constant" or "specific inductive capacity" of an insulator is the number of times the capacity of a condenser is greater when this material is used than when air is used as the dielectric. Air is thus used as the basis for comparison and is said to have a dielectric constant of 1. The dielectric constant K for other materials is given in the following table:

Air	-1
Mica	4-8
Glass	5-10
Hard rubber	2-4
Paraffin	2-3
Shellac	3-4
Treated paper	3-4

From this table it can be seen that a condenser with glass as a dielectric will have a capacity of from 5 to 10 times as great as it would have if air were used.

A variable condenser has maximum capacity when the movable plates are completely enclosed within the fixed plates, and can have its capacity decreased to any desired amount by rotating the movable plates partially out from between the fixed plates. The two sets of plates must not touch each other at any point while in any position, or the condenser will be rendered inoperative. The variable condensers in common use have the plates made of hard aluminum about 1/32 of an inch thick with an air space of 3/32 of an inch between the plates. The following are the sizes and capacities of the variable condensers in general use in receiving apparatus.

Type	Cap. in Mfds.
3-plate vernier	.00004
11-plate	.00025
23-plate	.0005
43-plate	.001

Oscillating Circuits

An oscillating circuit, it will be remembered, is one in which an electric current if once started will continue to flow back and forth every rapidly, that is, oscillate at a high frequency. An oscillating circuit combines the two electrical effects just described, inductance and capacity, and is set up by connecting an inductance coil of some form in series with a condenser. The inductance can be said to have a retarding effect upon the flow of the electric current, while the capacity tends to accelerate its motion. The result is that by introducing both effects into the same circuit, the current is caused to oscillate, the frequency of oscillation depending upon the relative amount of inductance and capacity in the circuit.

Inductance is always represented by the letter L and capacity by the letter C.

A typical high frequency oscillating circuit as used in modern Radio practice is illustarted in Figure 13, in which we have the coil L connected in series with

(Continued on page 12)

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Rectifier for Charging B Batteries

Four-Jar Electrolytic Rectifier and Hook-up

A storage B battery is a nuisance unless ready charging means are at hand. The four-jar electrolytic rectifier is old, but the hook-up is always puzzling and requires a lot of fussing with connections. Such a rectifier can be made as follows:

Procure four pieces of sheet lead having the dimensions indicated in the illustration and four pieces of sheet aluminum of the same size. Both metals should be as pure as possible. Make two saw slots in each piece as shown. Procure four one-quart fruit jars and hang the strips over the edge of the jars. This will leave the center strip standing vertical.

Make up a wiring "harness" as per diagram using snaps on the wire ends for each connection to the lead and aluminum strips as well as to the B battery terminals. Small notches can be filed in the lead and aluminum strips for better connections. Ordinary flexible lamp cord is good wire for this work. Ordinary lamp sockets, represented by H, with plug-in extensions are used. Instead of light bulbs for resistance, use the family flat iron as shown at F. With a medium sized flat iron the resistance is about right. The other connections are obvious. Lump ammonium carbonate will be found good to use as electrolyte. Make a saturated solution of this chemical.

If two- 24-volt trays are to be put on charge, start them in parallel, but when about half charged, change over to series as shown. This will cut down the charging rate to about the right amount for finishing—less than .5 amperes. The parallel connection will run about one ampere.

An ammeter for these low currents is usually a problem. The Westinghouse company makes a small automobile ammeter that has no terminals. A loop extends on the back through which it is necessary to pass one turn of the wire which conducts the current to be measured. The dial of the ammeter reads up to 20 amperes charge and 20 amperes discharge.

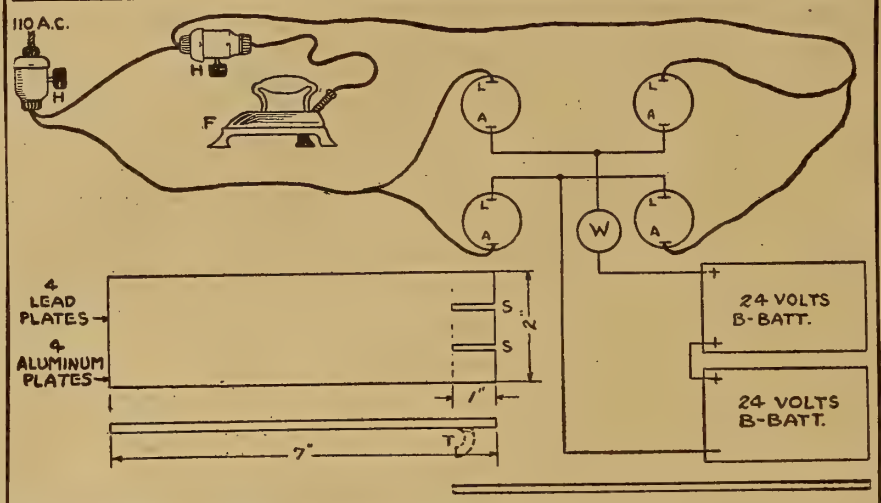
Apply ten turns of small insulated wire around this loop and the reading 20 will really mean 2 amperes and the intermediate readings will also be in proportion. I have calibrated one of these ammeters treated in this manner against a fine laboratory ammeter and have found it extremely accurate. Connect this meter in series at W in the wiring diagram, and it will be perfectly easy to read down to tenths of an ampere.—J. G. Utz, Detroit, Mich.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

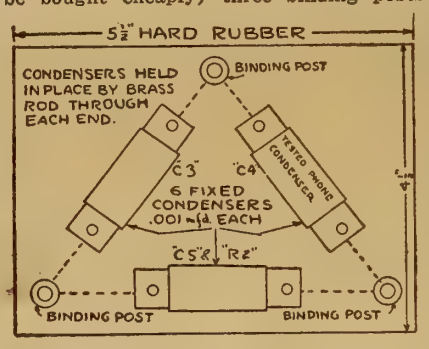
CONNECTIONS TO JARS AND IRON



Flewelling Condenser Bank

In making a super-regenerative set using the Flewelling circuit described in the October 21, 1922 issue of RADIO DIGEST, the amateur may be undecided as to just what condensers to use and how to arrange them, for there are three .006 mfd. condensers, which appear in the illustration as C3, C4 and C5, and also the grid leak R2, which is shunted across the condenser C5. My condenser bank is made up as shown.

The materials needed are as follows: A small piece of insulating material approximately 4½ by 5½ inches, which in my case was cut from an old storage battery cell. Seventeen tested fixed condensers of .001 mfd. capacity each and one combination leak condenser (all of which may be bought cheaply) three binding posts



and six brass bolts 1½ inches long and of a size (2/32 should do) to pass through the holes in the fixed condensers.

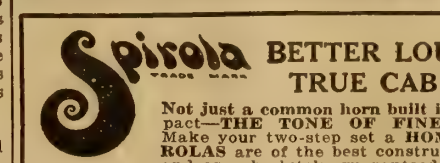
The condensers are set on the hard rubber base so as to form a triangle with six condensers together, held by a bolt at each end. Condenser C5, of course, holds the leak and condenser combination as well as five phone condensers.

The binding posts may be placed one at each corner, as shown, or on the edge of the base, or they may be left out altogether and the wires lead direct to the other instruments of the set.

The connections may be made with wire or copper strips. In any case all the connections are made on the under side.—Chas. J. Curran, El Paso, Tex.

Crystal Detector Mounting

Many crystal detector stands have been described but for simplicity coupled with efficiency the following is my idea



of the best stand. The materials needed are a piece of thin brass or copper 8 inches long and at least ⅛ inch wide; two binding posts; a brass or copper 3/16 inch bolt at least 1½ inches long, three nuts to fit it; a piece of wood 8 inches long, 4 inches wide and ½ inch thick; a crystal detector and its receptacle.

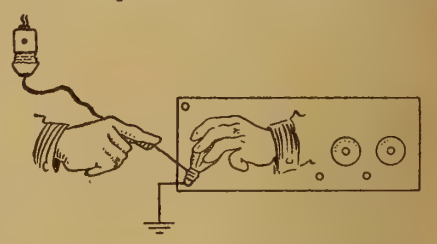
Four holes are bored in the wood, one a ½ inch, 1½ inch, 6½ and 7½ inches from the end on which the receptacle is mounted and half way between the edges. These holes are enlarged in the bottom so that the bolt heads are out of the way. Two holes are bored in the brass or copper strip, ½ inch and 4 inches from the end. The cat whisker is soldered to the other end of the strip and the whole is assembled as shown in the illustration.

The pressure of the cat whisker is regulated by tightening or loosening the nut A, and the cat whisker can be moved from side to side by moving the whole arm.—Vernon Hagelin, Geneseo, Ill.

Electric Light System Used as Ground Tester

To ascertain whether a ground connection is good or not I have used the following method with much success. It is commonly known that generally one wire of the electric lighting system—the return wire—is grounded. If the ground connection in question is good, it will also answer as a return circuit for the current in case the return wire is grounded.

Take a common reversible screw plug and attach one wire to one of the connections. To the other end of this wire fasten a brass bolt or a nail, and tape it so that it can be held without touching the bolt. Screw the plug into a lamp socket and place an electric bulb upon the



ground connection to be tested so that the base of the terminal of the bulb will rest on the ground, then touch the side of the bulb with the bolt, the current being turned on. If the globe lights as bright as when in the regular socket, the ground connection is good. If this does not work, try reversing the plug. Be careful not to touch the bolt to the ground connection as this will very likely result in much fireworks and a burned out fuse. —Laurence Wingerter, Wheeling, W. Va.

Howling Eliminated

Grounding the cores of the amplifying transformers and the negative side of the A battery to the shield of the panel will sometimes aid in eliminating squealing and howling.

Don't Crowd Wires

Wires connecting parts of sets should be run as far apart as possible. Wherever necessary these should cross at right angles. This will help to eliminate many of the noises.

A. B. C. LESSONS

(Coninued from page 11)

the condenser C. The slanting arrow extending through the condenser C indicates that condenser is a variable one, and that by adjusting the plates any desired amount of capacity can be introduced into the circuit.

The frequency with which the current oscillates is known as the natural frequency of the circuit. This frequency depends upon the relative amounts of inductance and capacity in the circuit. If either the inductance or capacity is decreased, the oscillating frequency of the circuit is increased; while if either is increased, the frequency is decreased. But if one is increased and the other at the same time decreased so that the product of their values remains unchanged, then the frequency of the circuit will not be affected. These facts are generally expressed in the form of an equation, such as the following:

$$F = \frac{5033}{\sqrt{L \times C}}$$

In the above equation F stands for the frequency of the circuit expressed in cycles per second, L is the inductance of the circuit expressed in millehenries, and C is the capacity of the circuit expressed in microfarads.

In Figure 14 we have illustrated an [illegible] oscillation circuit, the righthand [illegible] which resembles that in Figure 13. If by some means electrical oscillations are set up in coil L-1, these will try by influence or electromagnetic induction to cause a current to oscillate with the same frequency in the circuit L-2C. If the oscillation frequency of the circuit L-2C is different from that of the current flowing through the coil L-1, the inductive influence will not be very effective. But if the variable condenser C is adjusted so that the frequency of the circuit is the same as that of the current in coil L-1, then the inductive influence will be very pronounced and a strong current will be caused to oscillate in the circuit L-2C.

The process of adjusting the inductance or capacity of a circuit so that it will have the same frequency as that of another circuit, is called tuning. When two circuits have the same oscillation periods they are said to be in resonance. This condition exists when the product of the inductance and capacity of one circuit is equal to the product of these two effects in the other circuit.

Chapter Four

In the next chapter the discussion will continue with the method of sending Radio messages through space and the application of the principles of oscillating circuits for receiving these messages and converting them into audible sounds. It will be a most interesting and important chapter, and will form a valuable link in the complete story of effective Radio reception.

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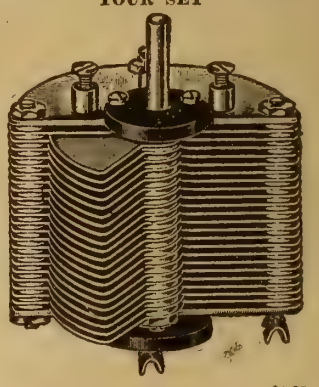

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Questions and Answers

Wants to Improve Set

(1286), SW, San Jose, Calif.

I have picked up KGW, Portland, Oregon, several times and also KOG, Los Angeles. KGW is 580 miles away airline, and KOG, 300 miles. I also hear Salt Lake City, Seattle and other Los Angeles stations regularly. Are these good results? I am using a detector tube without amplification. My set is single-circuit regenerative with a bank wound inductance coil and 23-plate variable condenser for tuning.

Would a honeycomb set be better? How can I increase selectivity? Will Radio frequency amplification work successfully without audio frequency, and if so, how much would my range be increased by two stages of Radio frequency? Would a set using two variometers and a variocoupler have greater range? Have you any suggestions for improving set?

A.—It is a question whether you would achieve as good results with a honeycomb set as you are now enjoying.

Vernier adjustments on all controls will increase the selectivity of your set.

While Radio frequency will work successfully as suggested, you would lose the regenerative feature which is equal to about three steps of Radio frequency.

A set using two variometers and a variocoupler is about the best known and doubtless would increase your range.

Your description of present set is not specific so that it is not possible to advise where it might be improved.

R.D.-52 Questions

(1285), WES, Middletown, O.

I have a single-circuit set with detector and one stage of amplification with which I have received phone stations 750 miles distant. This set is not very selective but is very susceptible to interference from spark stations and other phone stations than the one tuned in.

I am interested only in Radiophone reception and would like to try hook-up R.D.-52, if that will overcome my troubles.

Is R.D.-52 an efficient hook-up for Radiophone reception?

If the loading coil is necessary how should it be made?

What values should the honeycomb coils have?

How much plate voltage should be used, and how arranged?

A.—Yes, R.D.-52 is an efficient circuit. A loading coil is not necessary unless your antenna falls short of fifty feet in length.

Honeycomb coils should be L75 secondary, L50 on primary and L35 on tickler.

Use from 45 to 90 volts plate voltage, with a fairly hard tube as a detector.

Make it Regenerative

(1284), RBC, Crystal Lake, Ill.

What will be the range of the following: Loose coupler, 43 and 23-plate variable condensers, grid leak, fixed condenser and detector unit complete?

Would the addition of one step of amplification prove worth while?

Will it be necessary to have another battery to supply current to a Magnavox?

A.—The range of your apparatus should be approximately two hundred miles, although it may attain even greater distance under favorable conditions.

We believe that you would find a regenerative detector of greater advantage than a step of amplification.

The same battery may be used for both tubes and Magnavox.

Radio Frequency Amplification

(1274) LVP, Owensboro, Ky.

How many steps of Radio frequency amplification would be necessary to bring in stations whose carrier wave I can now just hear? What happens when you place Radio frequency before the detector? Does it give more interference, or less?

A.—Two or more stages of Radio frequency will increase your receiving range. However, it will also increase interference. To bring in more clearly the present audible stations, you should go over your set to lower the resistance at various points.

Critical Filament Adjustment

(1262) JF, Steubenville, O.

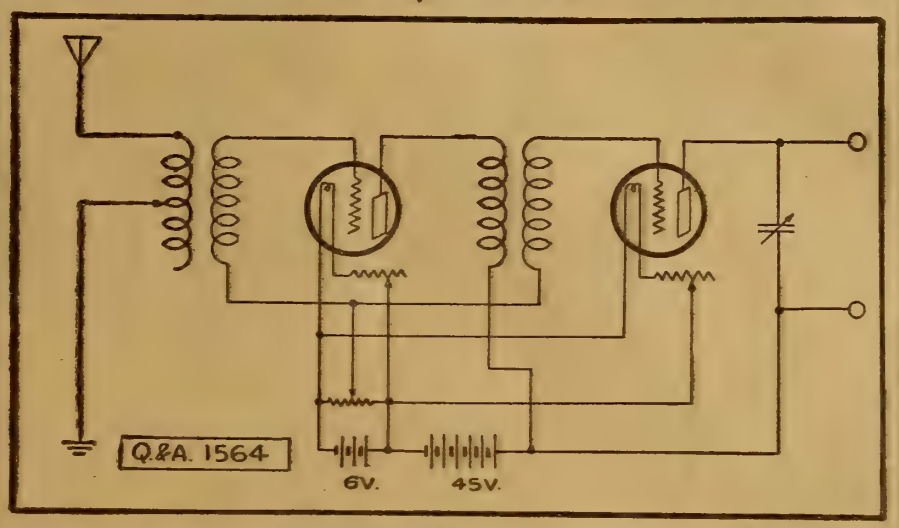
I have a regenerative receiving set. When I try to listen in on the concert, I have to get the music on one spot on the rheostat. I have tried all ways to find out, but it seems to me that nobody knows the trouble. Another thing I want to mention is that I hear a humming noise like high tension and I think that is what the hum is. If you can help me in any way I will be much obliged.

A.—The plate or B battery on your detector tube is probably of too high a voltage. Advise reducing it with potentiometer, or taps on battery, if any. The interference you experience may be due to tube noises from the high voltage on your detector, although these may result from high tension lines in close proximity. If your antenna is not constructed at right angles to the electric service lines, it should be.

Allen Circuit with Two R. F.

(1564), HH, Los Angeles, Calif.

I beg to inform you that I am the proud owner of an Allen selective long distance receiver as described in RADIO DIGEST some time ago, and I am getting very splendid results from its use.



I do not care to add the three stages of audio frequency as recently shown in the Digest, as the one tube gives me plenty of amplification, but I do want to add two stages of Radio frequency, and my dealer says it can't be done as the set is regenerative. Admitted, but I believe RADIO DIGEST can show me how, and I ask you to give me the hook-up.

Again, can you tell me how to overcome this fault? I have great difficulty in bringing in my distant stations from the fact that there is a great amount of whistling and howling right at the critical point. Sometimes I lose the station. I presume body capacity causes much of this. I am using Micadons, .00025 mfd., with Kellogg 1.5 and 2 megohm. leaks. A .001 mfd. condenser seems better than a .00025 and a 1.5 megohm. leak seems better than the 2.

A.—To be more fully deserving of the confidence you express in RADIO DIGEST we are taking time to make a sketch showing the employment of two stages of Radio frequency. These can be connected to your present receiver in the manner desired, as shown by diagram Q. & A. 1564.

Body capacity is very pronounced in your receiver. Give careful attention to adjustment of grid leak, although even this does not always effectively overcome it.

PHOTO DIAGRAM SET

(Continued from page 6)

audio frequency amplifier tubes and is marked A.F. INCREASE.

Use of Jacks and Plugs

The jack to the left does not take advantage of the last tube, while the one to the right throws in the full amplification power of the set. If the headset is connected to a telephone plug, then it is inserted in the desired stage. If binding posts are to be used, a plug made of an insulating material is furnished. This is inserted like a receiver plug, and automatically operates the filament control, throwing the two binding posts into the plate circuit.

Tuning Operations

When all connections are made, the set is ready for operation. Set the primary inductance switches on the last contact to the left. Place the secondary condenser scale on the highest division. Set the coupling adjustment on the zero division mark. Put the amplification control pointer a quarter to a half way to the left. Adjust the filament rheostats until all tubes are burning brightly.

The audio frequency amplifier filament rheostat—A.F. FIL—and the Radio frequency amplifier filament rheostat—R.F. FIL—should be rotated as far to the right as possible and the detector filament rheostat rotated to the right until a loud hiss is heard in the phones.

If this is not heard, the wire from the +B DET terminal should be changed in its connection to the B battery until the hiss is heard. Then the detector filament rheostat is rotated to the left until the hiss barely dies away. Then adjust the tuning circuits as follows:

With the upper button on the far left tap, move the secondary condenser dial through half a circumference. Continue adjusting the upper switch on consecutive buttons to the right and move in conjunction, the condenser dial over its scale. When signals are heard, adjust for maximum intensity first with the secondary condenser, second, with the lower primary inductance switch, and third, with the amplification control. All filament rheostats should be adjusted carefully for clear reception.

Winding Information

(1278) DG, Chicago, Ill.

How many turns should I have in the rotor of a variocoupler? What size wire for winding primary and secondary?

What size grid condenser and what kind of grid leak should I use?

Can you suggest the best tube for my detector set, hard or soft?

A. Thirty turns on rotor of a variocoupler will give satisfactory results. For winding primary and secondary, use the largest size of wire that can be put on and still accomplish the required number of turns.

Use a .0005 mfd. fixed condenser and rather heavy pencil line between terminals for a grid leak. Experimentation will determine proper weight of the line.

Any standard tube, preferably soft, will do.

Tube Trouble

(1282), PHS, Hattiesburg, Miss.

What I want to know is why my tubes go dead so quick. When I say dead, I do not mean that they are burned out, for they are not, but they refuse to bring in the signals except when I first put them in and then only for a few seconds. I turn the rheostat on full and then they begin to make an awful noise like static, but it is that for I disconnect the antenna.

I am using UV-200 tubes on the receiver and they will not last more than twelve to fifteen hours. I have brought in baseball scores over a thousand miles on my set, but buying a new tube every week is a little too costly for me.

A.—Your difficulties suggest battery trouble. Determine by use of voltmeter if your A battery maintains a steady voltage, and the same with your B battery. If not, recharge the A, or buy a new B whenever the trouble is indicated in either of these sources of current. Be sure you are not using over 22½ volts on the plates of any of the UV-200 tubes. They are "gassy" and won't stand much B battery without paralyzing.

Loud speakers can be made of sea shells, by cutting off the stem and attaching a receiver to the small opening.

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$6.75 Westinghouse Storage Battery	4.75
$24.00 A Battery, 100 Amp., 6 V.	16.75
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$3.00 Battery, 22½ V. Variable, highest quality guaranteed. Large size	1.45
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CONDENSERS:	
$5.00 23-pl. Variable Condenser	1.65
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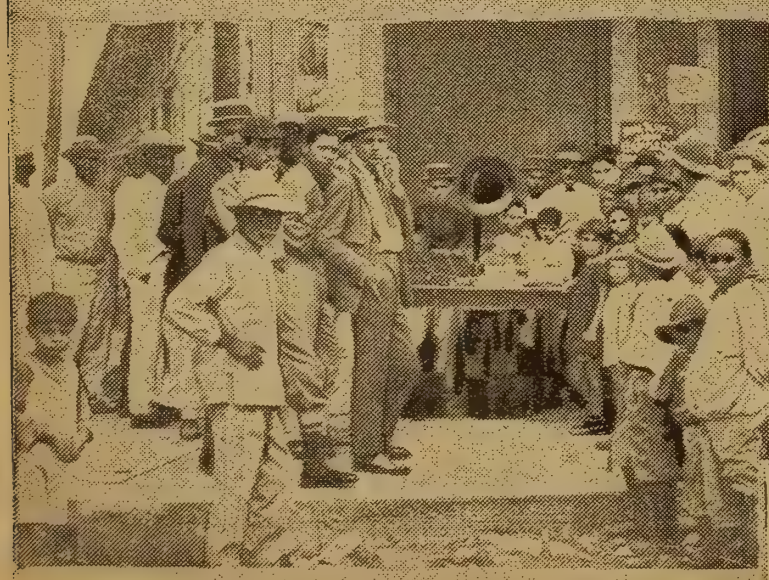
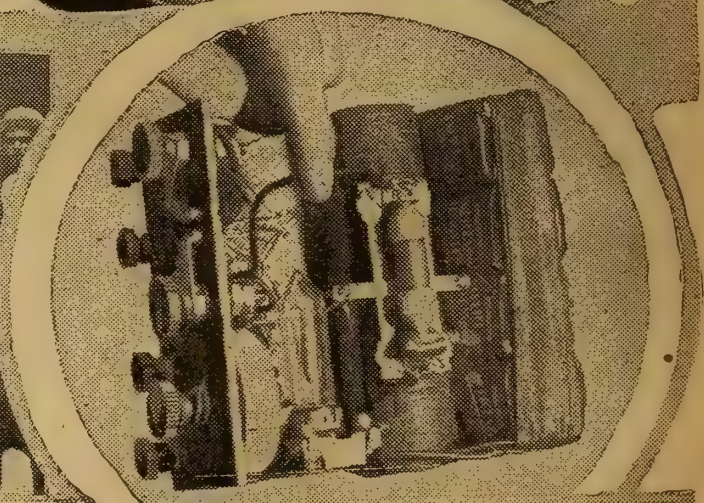
Radio Illustrated

In recent years the ladies at home had no means of entertainment while doing the housework or mending the clothing. The phonograph was a great help, but it required attention. Now that we have everything electrical, there is little or no housework to do, and not much mending. Therefore fancy work predominates. The entertainment is by Radiophone and the stitches may be made in time with the music. Besides, there's no "cranking" to do; just listen in. The Radiophone, like many other electrical household devices, has taken its place in the home, and its utility is not only for entertainment but it is instructive as well as a source of news and market reports. Miss Dorothy Knapp, recent winner of first prize as America's most beautiful girl, listening in while embroidering © Kadel & Herbert



The four corners near Havana, Cuba, where the youth of the island are hearing a concert over the Radiophone for the first time. The program was broadcast by PWX © U. & U.



The interior of a miniature transmitting and receiving set that fits into a camera case. Note the neat arrangement of coils, batteries, etc., also the miniature vacuum tube © K. & H.

18569497 JAN 29 '23

Flewelling Set Questions Answered—Page 15

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, JANUARY 27, 1923 | No. 3

REPORT "YES" ON LAW

EXPECT VOTE IMMEDIATELY ON RADIO BILL

Committee Makes Unanimous Favorable Report to House of Representatives

Hoover-Denby Fight Ends

Special Action Asked—No Opposition Expected—Amateurs Get Wider Wave Band

(By L. M. Lamm, Special Correspondent)

WASHINGTON.—After months of careful deliberation the merchant marine committee has made a unanimously favorable report to the House of Representatives on the White Radio bill. The report, unavailable for a few days, urges immediate action on the bill on the part of the House. The committee authorized its chairman to ask for a special rule for immediate consideration of the bill by the House. If this is allowed, which seems probable, the bill should pass the House shortly after this dispatch has gone to press, according to a statement made by Representative W. H. White of Maine, "father" of the bill.

Bill Smooths Out Difficulties

The bill as reported out on the floor of the house by Chairman W. S. Greene of the merchant marine committee, is identical with the bill introduced by Representative White two weeks ago, which embodied all the changes suggested by the committee. This bill compromises the controversy between the Secretary of Commerce and the war and navy departments which arose relative to the licensing of army and navy Radio operators by the department of commerce.

Among other things the new bill will enlarge the wave length band assigned to amateur transmitting stations.

The bill was changed in this fashion so that it could be favorably reported to the House without amendment.

No Opposition Expected in House

No opposition to the bill is expected in the House.

(Continued on page 2)

Here are Sara Southern and James Kirkwood together in a scene from "The Fool," broadcast recently by WJZ, Newark

RADIO VOICE GOES PAST THICK WALLS

Inventor Talks Through Four Foot Barrier with His New Instrument

NEW YORK.—A demonstration of how Radio can be directed through walls of steel and concrete was given at the Radio Exposition here recently. It was a most remarkable performance. The inventor of the apparatus, Bernays Johnson, stood behind a wall at least four feet thick and directed his voice at will through it.

It is possible, according to Johnson, to place himself and his machine, which needs no aerial or ground, inside the largest steel vault in the country and he will talk to outsiders without the slightest difficulty, metal doors and walls having no deterring effect.

In his experiment Johnson has taken his apparatus 200 feet into a coal mine and talked through the solid walls in a very clear manner. Johnson first made experiments in 1908.

Armstrong Sees World Wide Radio Concert

Only Necessary to Increase Power of Transmitters, He Says

BOSTON, MASS.—Sheldon H. Fairbanks, manager of the Boston Radio Show, who has just returned from New York, where he was advisory director of the American Radio Exposition at the Grand Central Palace, quotes Major Armstrong, the inventor, who was in charge of broadcast reception, as predicting that it would not be long before Radio concerts would be broadcast around the world.

"All that will be necessary," says the Major, "will be to step up the power of the transmitting station, receive it at a central station—say in England—and relay it all over Great Britain." He predicted that broadcasting round the world would come in an amazingly short time, and pointed out the tremendous possibilities for promoting better understanding between the nations.

Million and Half Sets in U. S.

A canvass of the country shows that there are about 1,500,000 Radio sets in homes. It is estimated that Pittsburgh has a set in one home out of every six and that Detroit has between 40,000 and 60,000 sets.

THIS RADIO SPEECH WAS A "BLOW UP"

MEDFORD HILLSIDE, MASS.—A "powerful" subject was that of the talk broadcast January 20 from Station WGI here by Arthur La Motte, of the E. I. du Pont de Nemours company. It was full of pep and possibilities and told the farmers what they could do with dynamite.

Sara Southern as the little lame girl in "The Fool," Channing Pollock's new play, which was broadcast from the Times Square Theater, New York, direct from the stage by telephone wires leading to WJZ, the Westinghouse station. This was the first time a play had ever been broadcast direct, although operas had gone on the air from KYW, Chicago, in this fashion, over a year

President Has Secret Transmitting Set, Rumor

Harding May Plan to Use Outfit to Address Nation

WASHINGTON.—In the basement of the White House at Washington, President Harding is said to have a Radio transmitting set. Very few people know of this. The fact has been kept secret from most of the very high officials, who are popularly supposed to be "in the know" with current happenings at the United States capital.

The station has never been used. There is considerable speculation as to whether President Harding plans to address the whole nation in the future upon ultra-important questions. The set is said to be powerful enough to enable him to do so.

REPORT "YES" ON LAW

(Continued from page 1)

The agreement reached between Secretary of Commerce Hoover and Secretary Denby and their advisors has altered the bill so that it now carries a clause that army and naval Stations shall not require commercial licenses, that their wave lengths will be assigned by the President, but that when commercial traffic is handled rules and regulations designed to prevent interference with other Radio stations will be observed.

In other words, governmental stations when transmitting other than official matter will use commercial wave lengths and comply with all regulations set down by the Secretary of Commerce.

One feature of the Bill increases the membership of the advisory committee of the Secretary of Commerce from twelve to fifteen, including a representative of the treasury department, another from the shipping board, and an additional member who is not a governmental official.

FLEWELLING CONTEST TWO WEEKS LONGER

OWING to insistent demands from interested Flewelling circuit experimenters, the Flewelling prize contest under the auspices of Radio Digest will be open to contestants two weeks longer. This will make the contest close February 10 instead of January 27th. The prize awards will be announced in the March 3 issue instead of the February 24, to make allowance for the extension. The rules of the contest are given on page 2.

Auto Gets Stuck; Radio to Rescue

Stranded Quartet Uses Home-made Set to Relieve "Sting" of Misfortune

BOSTON, MASS.—A letter has been received by Station WNAC, the Shepard Stores here, from a member of the Salisbury, N. C., Lodge No. 699 of Elks, telling how he heard the concert given by Boston Lodge of Elks on January 3, while on a trip from Salisbury to Lynchburg with his wife and another fellow Elk and wife. The party got stuck in the mud about eleven o'clock at night, ran into a ditch and broke an axle (they have some awful roads in some parts of the south), and five miles from the nearest town.

The Salisbury Elk had a homemade Radio set in the car, so he decided to try for some music to while away the hours until daylight, when they could be able to foot their way to town for help.

Erect Temporary Aerial

They ran a one-wire, 25-feet aerial from a tree to a rail from a fence which they stuck in the mud in front of the car, working all the while in the rain. The highest part was not over eight feet from the ground. Tuning in slowly, they picked up WNAC, just then broadcasting the Elk's entertainment.

"Never did I hear music that sounded so good, far out in the rain and lonely country," continues the writer. "We heard you acknowledge messages from Haverhill, Newburyport, Woburn and many other places. It gave me an idea to send a long distance phone call to Boston. We walked for almost a mile to the nearest house where they had a rural telephone. The exchange operator tried for about an hour and although she got through to Boston, could not get the Shepard Stores, so I imagine you had all gone home."

RADIO RAISES DEBT FROM NEW HOSPITAL

Final Appeal Brings Funds to Finish Construction Bills

LONDON, Ont., Can.—Radio played its part in the opening here recently of the beautiful new Western Ontario War Memorial hospital for sick children. It was the ambition of the directors of the new institution to have it entirely free from liabilities by its opening date, but a few days before the scheduled opening it was discoveried that there were still several accounts outstanding which aggregated some few thousands of dollars.

A day was selected when there were to be a number of large public meetings at various smaller Western Ontario centers and arrangements were made with a local broadcasting station and with amateur operators in the towns where the mass meetings were to be held, to broadcast a final appeal for funds. The next morning's mail brought all the additional funds that were required and quite a cash surplus. This was set aside in order to equip a Radio auditorium where the little patients may listen to concerts broadcast from local, Detroit and Toronto stations.

BOOKS

FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 10 at midnight. Awards will be announced in the March 3 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $25.00; Second, $15.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded both contestants.

5. Judges will be the Technical Staff of Radio Digest, Illustrated.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The contestant must build this set and test it before entering the contest. The article must tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Station Hires 7-Year-Old Girl for Vocal Concerts

BELLEFONTAINE, O.—Radio enthusiasts of this city are more than pleased with the word that a resident of the city has been given signal recognition by one of the largest Radio broadcasting station managements in the country. The local dignitary is Miss Clarabelle McDonald, aged seven, daughter of A. L. McDonald, railroad claim agent, who has been placed under contract by the Crosley Manufacturing company of Cincinnati, and was to give her first number from Station WLW on the night of January 26. Little Miss McDonald has been singing since she was four years of age.

The committee appointed by the French ministry of posts and telegraphs has recommended that no licenses be required for receiving apparatus.

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Looking Ahead

E. T. Flewelling, Himself, will begin a series of exclusive articles on the circuit bearing his name in the next issue of the Digest. If you are having trouble with your Flewelling "flivver," read what the inventor has to say. It will be sure to help you. Remember Flewelling is writing exclusively for Radio Digest.

Reinartz Questions and Answers will fill page 15 in the next, the February 3, issue. If you want a simple, sensitive and efficient regenerative set, build a Reinartz tuner from Radio Digest's articles on the subject. If you have one but can't get results, read the "Q. and A." page next week.

For the Picture Fans. Ever heard Miss Jessie Koewing of WOR, the first woman announcer in the United States? Or the announcer on the other end of WJAX, Cleveland? They have furnished the Digest with pictures and satisfactory accounts of themselves and will appear on page five next week. Buy the February 3 issue and you can visualize two more mysterious announcers' voices.

How to Construct and Operate a Crystal Detector Receiving Set will be told next issue by Arthur G. Mohaupt in the fifth chapter of his "A-B-C Lessons for Radio Beginners." Many fans stick to the crystal. Every crystal user or beginner should read Mr. Mohaupt's article.

Letson Balliet Was Unfortunately the Victim of a Train Wreck, and hence his long-promised series of beginners' articles has been delayed. But Mr. Balliet will leave the hospital soon. Just when he will be able to resume his work of writing the series is indefinite, but "looking ahead."

Part II of the Radiophone Broadcasting Station Directory will appear in the February 3 or next issue. You would be surprised at the expense and work necessary to keep this feature up-to-the-minute for Radiophan readers of Radio Digest.

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"LIFTS" CURRENT FROM CARRIERS

SENDS MESSAGE WITH BORROWED POWER

Cleveland Man Takes Current from WHK with Receiving Set

CLEVELAND, O.—Using a regenerative Copp circuit receiving set, H. S. Scott, of this city, borrowed some current from WHK, the local broadcasting station of the Radiovox Company and sent a message that was received at Independence, Kansas, and Butte, Montana. Station WHK's wave length is 360 meters.

Mr. Scott's set is located at his place of residence, about six hundred feet distant from the Radiovox station which had finished broadcasting, but had not shut off their generator and was still putting out a carrier wave. Mr. Scott tuned his receiving set to the station wave length and by tapping with his finger on the grid terminal of the tube, gave his official, amateur station call, 8BFL, asking to be notified of its reception.

In due time, postal cards were received from amateur stations at Independence, Kansas, and Butte, Montana, stating signals were received QSA (loud).

Mr. Scott was formerly a Radio operator with the Marconi company, and is now in the engineering department of the Ohio Bell Telephone company, at Cleveland. Mr. Scott is in charge of the Radio Engineering class at the Cleveland Y. M. C. A., and is very active in Radio work in this city.

Here's Something New in Revivals

WNAC Broadcasts Noonday and Sunday Sermons of Rev. Massee, Evangelist

By F. N. Hollingsworth

BOSTON, MASS. — Up-to-date revival services are those being conducted at Tremont Temple by Rev. Dr. J. C. Massee, a noted evangelist, whose sermons every noonday as well as Sunday mornings are being broadcast from the Shepard Stores Station WNAC, via a telephone-microphone connection between Tremont Temple and the broadcasting studio.

Dr. Massee says that he has been informed by one of the Radio listeners, a prominent and wealthy business man whose name he refused to give, that the latter had been converted by Dr. Massee's preaching after listening in to it over a Radiophone.

Contributions Mailed In

Numerous letters have also come in from people who stay at home and listen in by Radio to the revival services, and many of them have contrained contributions. One letter was particularly appealing. It was from a crippled boy, who informed Dr. Massee that every day during the serivces he has been carried to the home of a neighbor to listen in over the Radiophone.

He sent two dollars in his letter, a dollar of it to be devoted, he asked, toward helping some other crippled boy or girl to hear the services by Radio through the kindness of some neighbor who had a set.

To Broadcast "Brimstone Corner"

Arrangements have been made by Station WNAC to broadcast the services from Park Street Church, Boston. This is one of the most famous churches in Boston, located on the corner of Park and Tremont streets. The corner, from the character of the fiery sermons preached in years past, was long known as "Brimstone Corner." On the first and third Sundays in the month, services from Tremont Temple will be broadcast.

With the broadcasting of the services from St. Paul's Cathedral every Sunday morning and Dr. Massee's service at noonday, New England Radiophans and all within reach of WNAC are fortunate. Owing to the severe weather of the past few weeks, many have been prevented from attending church, but have had the services brought to their homes by Radio.

Alabama Farmers Wake Up to Value of Broadcasts

BIRMINGHAM, ALA.—The farmers of Alabama have commenced to make use of Radio. Throughout the state many farmers are availing themselves of the crop summaries and market reports now being broadcast by Station WSY. Recently Roy C. Bishop, secretary of the Alabama Farm Bureau Federation, took advantage of an invitation of the Alabama Power Company's plant in pushing the membership drive of his association. This organization now numbers 7,000 in Alabama, and Mr. Bishop stated that by the use of Radio he expected to more than double the membership within a few weeks.

"WIRED WIRELESS" STANDS GOOD TEST

BROADCASTS TRAVEL OVER ELECTRIC LINES

Apparatus Plugged Into by Light Socket Will Pick up Messages

WASHINGTON.—"Wired wireless" or broadcasting over electric light and power lines—a new means of communication—was successfully demonstrated publicly for the first time at the Bureau of Standards by R. D. Duncan, Jr., of the Signal Corps and consulting engineer of the North American company of New York, and his assistant, I. Isler.

From the substation of the Potomac Electric Power company in Georgetown, the voice of Isler was transmitted over the high voltage lines and received at the Bureau of Standards—a distance of about five miles.

Invention of Major-General Squier

"Wired wireless" is the invention of Maj.-Gen. George O. Squier, chief signal officer of the army. It consists, essentially, of substituting for the transmitting and receiving antennas of Radio stations the electric light wire network of a city.

Instead of the high frequency energy being radiated through space in all directions, as with Radio, it is confined and directed to flow along definite paths from the transmitting station to the various receivers.

System Has Advantages

This new method of broadcasting, it was explained by Mr. Duncan, offers a large number of advantages over the more familiar method of Radio broadcasting. Among the most important is the elimination of a receiving antenna, elimination of fading, static troubles, interference from the signals of Radio transmitting stations and the fact that the receiving apparatus may be plugged into any convenient electric light socket. Due to the absence of radiation from the electric lines, no interference is produced with the commercial Radio traffic or with Radio broadcasting, and for this reason neither government transmitting nor operators' licenses are required.

Conduct Experiments

In cooperation with the Potomac Electric Power Company Mr. Duncan and Mr. Isler have been conducting experiments in this new method of broadcasting for some time, during which the voice has been transmitted over the high voltage lines of the power company from the Georgetown and Tenleytown substations and received at the Bureau of Standards and at different points in Chevy Chase, D. C., and Maryland.

Radio transmitting and receiving apparatus, with a few minor changes, were used in the public demonstration. A 300-watt transmitting set was used.

GOTHAM TURNS RADIO TO "HIGH BROW STUFF"

Arrangements Perfected in University Extension Course

NEW YORK.—While Radio listening in for amusement has for a long time now carried with it an improving public taste in music and art, the first week of a deliberate and openly avowed intent of using the broadcast for "high brow stuff" has just been concluded here. The result has been so satisfactory that the experiment will be continued.

Arrangements thus to establish a university extension course for the people were made between the Society of Radio Artists and Audiences and the Lecture Bureau of the Board of Education, New York, whereby selected lectures broadcast tabloid lectures from Station WHN, Ridgewood, Brooklyn.

Marriage by Radio is declared illegal in New York state.

STRONGEST PLANT TO BE UNDER WAY SOON

MONTREAL, QUE., CAN.—A dispatch from London announces that the Marconi company is going ahead with its previous announced plans to build the highest power Radio station in the world at Vancouver, B. C., and another station at Montreal, in order that messages may be carried readily from London to Australia through Canada. The estimated cost of the Vancouver station is $2,000,000.

KIDS OF ORPHANAGE JOIN RADIO FAMILY

XENIA, O.—The children of the Old Soldiers' and Sailors' Orphans' home in this city enjoyed a most delightful treat this holiday time when a Radio outfit was presented the home by the Montgomery County Veterans' association. The outfit has been established in the assembly hall in the library and the children of the home and others are enjoying the nightly concerts.

TO SING FOR WORLD VIA WOR

Miss Edith Bennett, the celebrated American born and American trained soprano, who has just been selected from a long list of internationally famous recitalists to sing the world's first America-Europe Radio concert, tentatively scheduled for January 30. Miss Bennett has a voice of rare beauty, power and flexibility. She is also possessed of exquisite artistry and her diction in all languages is almost perfect. Her coming inter-continental musicale will be sung in English, French and Italian. The chairman of special committee of Radio-musical experts that chose Miss Bennett stated that, in his opinion, she was the finest recitalist in existence for broadcasting

Calvin Harris Photo

Oakland, Calif., has an amplifying horn made of 100 feet of spruce one inch thick. It has an opening twelve feet in diameter and is thirty-five feet over all. The bell has an area of 144 square feet, while the smaller end is the size of a nickel.

ASK CASH TO BUILD POLICE RADIO PLANT

WASHINGTON OFFICIALS ACT FOR ALLOTMENT

Would Enlist Aid of Private Stations in Apprehension of Criminals

By L. M. Lamm

WASHINGTON.—Request for an appropriation to erect a powerful police Radio station here to broadcast information of fugitive criminals will be made within the next few days by Major Daniel Sullivan, superintendent of police, and will meet with the approval of the District commissioners.

Commissioner Rudolph, president of the board of commissioners, declared the proposal "a fine thing." Money to establish such a station is not now available and would have to be obtained through an appropriation by Congress. "If such a proposal comes before the board of commissioners I will vote in favor of it," Commissioner Rudolph said.

The cost of establishing an adequate station and maintaining it is being investigated and will be embodied in the report recommending the move which he will submit to the commissioner in charge of police within the next few days, Major Sullivan said. While he had not yet discussed the plan with the commissioner, Major Sullivan said that he did not doubt approval would be forthcoming, in view of the support given his recommendation for the purchase of tear gas guns in police work.

"I feel sure that the commissioners are as anxious as the police department is to have every aid of modern science available in Washington for detecting and apprehending criminals," Major Sullivan said.

Range to Reach Chicago

Radio experts would be consulted by the police chief relative to the establishment of the station, he said, and the advice of army and navy experts as well as private Radio engineers will be asked. The station contemplated would send its messages at least as far as Chicago.

Washington would be surrounded by a network of Radio stations, under the plan, and every road out of the city would be covered by the system. It is planned to enlist through police officials of surrounding towns and counties, the co-operation of private stations in their territories through which they can be communicated with by the Washington police. Beyond this first ring encircling the city, the net will be extended to other towns and larger cities all over the eastern part of the country, and it is hoped eventually, the entire United States.

CONTRACT HOLDS UP WORK ON NEW PLANT

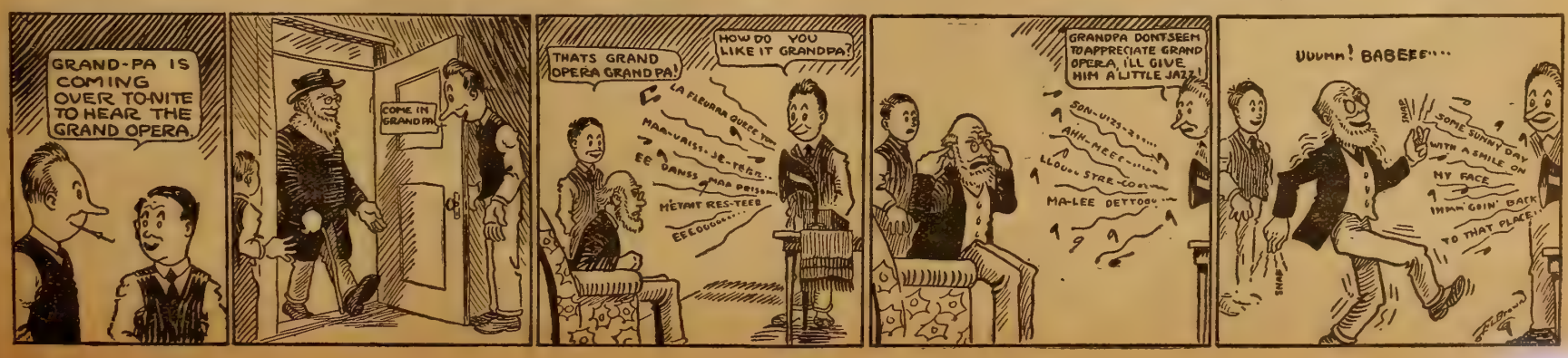
U. S. Waits to Renew Action on Wheeling Station

WHEELING, W. Va.—The government is ready to put up its new Radio station at Langin Aviation field and will begin the work of removing the old station to the new location just as soon as the contract is signed and received here, according to Captain A. E. Simonin, in charge of the local landing place. The two huge Radio towers have already been erected and within three weeks after the contract is signed the new station can be in operation, Captain Simonin pointed out.

Plans for the new station call for an expenditure of some $15,000, which will make the Langin field station compare favorably with any other in the country. The new towers are sufficiently high to permit the proper receiving of all messages during any kind of weather. Fog, heretofore, has had considerable to do with the operation on the old station.

A powerful new Radio station is being built near Varberg, Sweden.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Grandpa Is a "Jazz Baby"



NAA HAS HARD TIME WINNING NOF FANS

REGRET AT PASSING OF ANACOSTIA PLANT

Listeners Encounter Difficulty Tuning Sets on Wave Length of Arlington Station

By Carl H. Buttman

WASHINGTON.—NOF has passed as the government's official broadcasting station, and its big brother, NAA, has come, but there are many fans who hated to see the navy's Anacostia Station go back to its research work. Some find it difficult to get accustomed to NAA at Arlington and to tune it in on 710 meters, the new wave assigned for government broadcasting from Washington.

A hurried survey of the neighboring Radio population indicates how well it liked NOF, but it shows also that some must add a coil to their sets and learn to tune in on longer wave lengths. Out of 83 replies, 61 who have picked up the station since January 3, like the transfer and received the music of the marine and navy bands well enough. Of those who object, 22 prefer NOF and the old 430-meter wave length.

NAA Hears from Fans

Favorable replies to an inquiry were received at Station NAA from New York City, Manchester, N. H., Worcester and Malden, Mass., Wilmington, Del., and Pittston, Pa. Some neighboring fans claimed the broadcasting was too loud, and others too weak. Fort Humphreys, Va., an army station, approves the service as "fine."

It is doubtful if the wave length can be changed to a shorter one, due to the fact that short waves interfere with the regular longer waves used on other sets at NAA for handling official traffic for the government. However, some consolation is found in the fact that the bands are playing at the Marine Barracks in Washington two or three miles away, and a single land line is used for the transmission to the Radio station. This will be improved by the installation of a special line, it is hoped.

Now the musicians perform on Wednesday and Friday nights, in a large barn-like room, too large for the purpose and uncurtained. A sort of transmitting tent is being made, however, which will tend to restrain and concentrate the music for transmission over the line to Arlington, which is certain to improve the concerts.

Want Concerts, Less Politics

Some rather frank expression as to the preference for the concerts was expressed by listeners in who declared that some of the official talks broadcast were a bore. Others complain of a hum and fading, and say NOF was perfect.

Other returns have come to the Public Health Service, which sought to learn how its broadcasts from NAA were received by the Radio public. Out of about 100 replies, over half declared they could not get NAA on the scheduled nights, while thirty-one stated they got the broadcasts "O K." The usual short wave sets were found difficult to tune in on 710 meters but the sets built for longer wave lengths gave less trouble. Generally, the health fans prefer NOF. Sixty out of 80 declared that of four large stations heard regularly they heard NOF best.

It is regretted by the navy that NOF had to be closed, but the work there was experimental and other work must be undertaken. NAA has hardly shaken down to regular work, and experts believe that within a short time improvements in the transmission will be manifest.

Couzens, Pomerene Talk on Air; Harding Notes Read

NEWARK, N. J.—The regular and special program of the annual banquet of the Ohio Society of New York, held in the grand ballroom of the Waldorf-Astoria, was broadcast Saturday night, January 13, from Station WJZ, located here.

The invisible audience heard the address of Speaker Frederick H. Gillette of the National House of Representatives, Senator Atlee Pomerene of Ohio and Senator James Couzens, of Michigan, formerly mayor of Detroit. Ogden Reid, president of the Ohio Society and owner of the New York Tribune, read the message to the society from President Harding, who was unable to attend in person. Mr. Reid, as toastmaster, also introduced the speakers of the evening.

Will Rogers was on the program following the banquet and selections of the Waldof-Astoria's orchestra and pipe organ and a soloist from Ohio were also broadcast.

The pastor nowadays does not necessarily have to attend his annual donation party. In Spokane, Washington, the ladies of one of the churches gave a reception to the pastor, at which Radio addresses were heard from absent ones.

RECEIVING RECORDS? SEND 'EM IN—

INTEREST doesn't lag a bit in the Receiving Records Contest, although many of the records have been boosted to practically unbeatable distances. New DX aspirants desiring to enter the contest are advised to read the rules given with the records on page 4 of the January 20 issue. The complete list of record holders will appear in the February 10 issue. Watch for this. The new records made last week are as follows:

Station—Miles Away—Who Heard It

CFCN—1,775, John W. Hale, Houston, Tex.
CHCC—1,325, Samuel Woodson, Jr., Liberty, Mo.
CKAC—2,700, A. C. Carter, Juneau, Alaska.
CKCR—1,225, Samuel Woodson, Jr., Liberty, Mo.
KDYL—2,075, T. F. Powers, Somerville, Mass.
KDYS—1,700, M. C. Ridenour, Kingwood, W. Va.
KFAD—1,250, Cyril Cornwell, Osage, Ia.
KFAN—1,250, Chas. N. Schwab, Grinnell, Ia.
KFBC—2,125, J. D. Crosby, Stauffer, Pa.
KFBH—1,450, R. B. Reed, Eureka, Kans.
KGN—1,875, Fay Allarding, Lake Odessa, Mich.
KGU—4,650, Eugene Evans, Tippecanoe City, O.
KJJ—1,575, Chas. N. Schwab, Grinnell, Ia.
KOP—2,075, T. W. Smith, Watsonville, Calif.
KPO—2,275, G. Murray, Toronto, Can.
KWJ—2,125, C. J. Lohman, McDonald, Pa.
KZM—2,700, Sarkis Kachajian, Worcester, Mass.
WAAB—1,150, H. K. Cooper, Owego, N. Y.
WAAP—1,325, W. R. Clark, Bridgeport, Conn.
WAEF—1,125, F. P. Cerniglia, Tallulah, La.
WBAX—1,000, Carl Baumeister, Avoca, Ia.
WCAR—1,750, Sarkis Kachajian, Worcester, Mass.
WCAX—1,325, Doyle Getter, Arkansas City, Kans.
WDAS—1,200, Carl Baumeister, Avoca, Ia.
WGF—1,025, E. McDonald, Valleyfield, Que., Can.
WGM—2,175, Allan Harvey, Snohomish, Wash.
WJAE—1,700, A. Moffet, Ottawa, Can.
WJAX—2,000, Allan Harvey, Snohomish, Wash.
WKAF—1,025, Wilbur Squier, Detroit, Mich.
WKY—1,325, T. W. Smith, Watsonville, Calif.
WLAV—2,000, G. A. Gallagher, Berkeley, Calif.
WMAF—1,125, Cyril Cornwell, Osage, Ia.
WNAD—1,500, C. T. Mower, Malden, Mass.
WOAC—1,600, O. P. Klein, Leduc, Alta.
WOAI—1,800, O. P. Klein, Leduc, Alta.
WOAS—1,125, Samuel Woodson, Jr., Liberty, Mo.
WOZ—1,950, Fred Sheppard, Centralia, Wash.
WRR—1,225, O. E. Frazier, Watts, Calif.
WSY—1,950, T. W. Smith, Watsonville, Calif.

Sunday Bible Stories for Kiddies New WGI Feature

MEDFORD HILLSIDE, MASS.—Among the new features added to the broadcasting program of Station WGI of this city is a series of "Children's Hour" Bible stories on Sundays around five P. M., Eastern time. These are read by "Uncle Billy," with an organ accompaniment by E. Lewis Dunham.

Bankers are beginning to realize the value of Radio publicity, as shown by a recent talk from WGI by P. K. Parker, treasurer of the Lynn Institution for Savings, on "What the Mutual Savings Bank Can Do for You."

The Pacific Coast States have a plan which provides for the closing down of all broadcasting stations at 10 p. m., Pacific time, thereby giving listeners in that vicinity an opportunity to hear concerts from the East.

"GOOGLE-SPARKY" COMICS, GO ON AIR

FANS DRAW CARTOONS BY RADIOED DIRECTIONS

Youngsters in Novel Contest Sketch Pictures on Special "Radio Charts"

LOUISVILLE, Ky.—"Barney Google" and "Spark Plug," famous as racing cartoon characters, have been broadcast by their creator, Billy De Beck. It all happened Tuesday evening, January 10th, at WHAS, the station of the Louisville Courier Journal and Times.

How it happened and the way it was worked was as follows:

The creator of "Spark Plug" was visiting Louisville, and a scheme was worked out by those in charge of WHAS. This was developed by printing in the papers a series of crosslined charts that had two charts, one for drawing "Barney Google," and the other for "Spark Plug." The horizontal lines were indicated by the letters of the alphabet while the verticals were numbered from one to 44, beginning at the left.

The contest was arranged for the youngsters listening in, who pasted the drawing charts on pieces of cardboards. Then as directions for lining the drawings were broadcast by Billy De Beck, contestants proceeded with the drawing, listening in, and following carefully the instructions given. Prizes were awarded for the best drawings turned in by the children.

AMATEURS ADOPT EMERGENCY CALL

Prepare to Aid in Storms; "ASA" Takes Place of "SOS"

HARTFORD, CONN.—Radio amateurs expect to have their stations take the place of practically all other means of communication when the next big blizzard strikes the country, and have adopted a special emergency call of "ASA" which will be used, as is the famous "SOS" call of ships in distress at sea.

A communication to this effect has been received here from N. B. Hood, manager of the Rocky Mountain Division of the American Radio Relay League, who explains that the call is to be used only in case of "dire necessity" and that his office "will do all in its power to protect an amateur who uses this call for humanity's sake in case of storm or disaster."

Radio amateurs have frequently been of great help in an emergency especially of late in Colorado, and Wyoming, when in November, two trains were lost between Denver, Colo., and Casper, Wyo., while the snow drifted 15 feet high. Amateur Station 7ZO got through a message to 9ANQ, L. V. Wells at Kansas City and it was finally relayed to Omaha.

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FIVE OF BIRMINGHAM'S CHURCHES JOIN WSY

Station Broadcasts Sermon from City for First Time

BIRMINGHAM, ALA.—The first broadcast direct from a Birmingham church was made on a recent Sunday evening from the North Highlands Methodist church. The connecting telephone trunk line connected WSY, the Alabama Power Company's station, with the church, and the sermon of the pastor, Dr. W. R. Hendrix, was broadcast. The subject of his sermon was, "The Sunday School Teacher in the Building of a Nation." Besides the sermon a musical program rendered by the choir was broadcast.

There are now five Birmingham churches connected with WSY. These churches are the North Highlands Methodist church, First Methodist, First Baptist, Independent Presbyterian and Southside Baptist.

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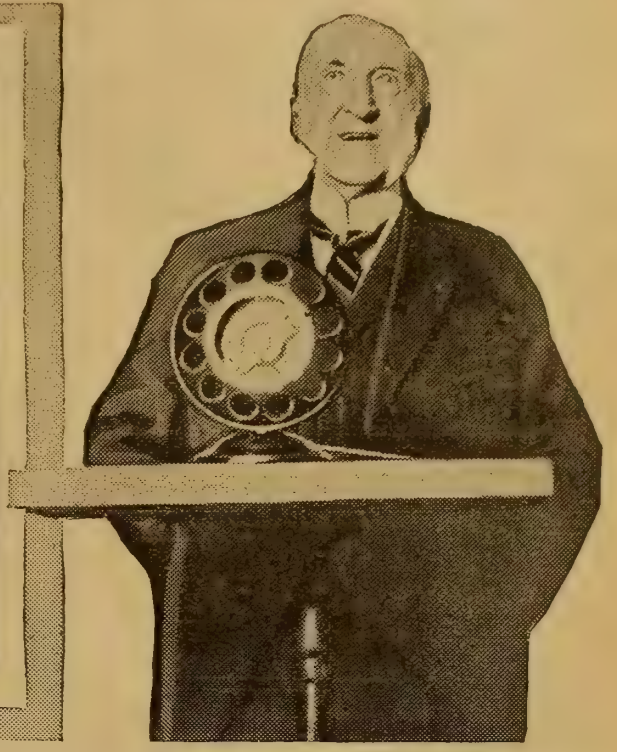
Richmond Hill, N. Y.

NAVY YARD AND CHAUNCEY ON AIR



The Brooklyn Navy Yard Radio station, NAH, has begun the first of a series of broadcast concerts with prominent opera stars and noted concert musicians. Titto Ruffo of the Metropolitan was first of all the operatic stars to sing there, being heard in the opening concert. In the group, left to right, are Lieut. Com. J. W. Reeves, in charge of station; Rear Admiral C. P. Plunkett, Navy Yard commandant; Titto Ruffo; Enid Grange, piano accompanist. On our right—guess! Chauncey M. Depew himself, as he appeared before the microphone at the recent Radio show in New York. He is nearly 89 years now, so took as his subject, "How to Keep Young." He says to banish worry, forget the past and live in the future

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WSB STARTS NEW RADIO UNIVERSITY

EDUCATORS LECTURE IN NIGHTLY "CLASSES"

Unique Chapter Written in History of Radio as Atlanta Plant Inaugurates "School"

(Special to RADIO DIGEST)

ATLANTA, GA.—Another unique chapter on Radio history has been written by WSB, Radiophone broadcasting station of The Atlanta Journal, in establishing a Radio university which will offer instruction to its invisible listeners from the South's ablest educators.

Atlanta being the key city to education in the South, little difficulty will be encountered in obtaining the services of distinguished instructors who will confine their brief lectures to practical discussions of subjects on which they have specialized.

Lectures to Be Easily Intelligible

WSB's "School of the Air" conducts its classes nightly, except Sunday. The lectures occupy the first quarter-hour of the station's nationally popular 7 to 8 P. M. broadcast, the first regular broadcasting period established in the South. Every phase of education is covered in a manner intelligible to all listeners interested in gaining authoritative knowledge on fundamental matters.

Willis A. Sutton, superintendent of Atlanta's public school system and one of the nation's foremost educators, is dean of the "School of the Air" and has associated with him a distinguished group of men and women of letters, all prominent members of the faculties of Georgia Tech, Emery university, Oglethrope university, Agnes Scott college, Cox college, the State college of Agriculture, the city's high schools and grammar schools and other educational institutions of Atlanta and the state of Georgia.

Subjects Cover Wide Field

The course of evening lectures is given by the department of science, history, education, economics, engineering, english, home economics, psychology music, and kindred subjects. The speakers briefly discuss some phase of the general topic from a practical standpoint.

The assignment of the fifteen-minute interlude daily to a variation from the routine broadcasting of music and random lectures has drawn favorable responses from all classes of the Atlanta Journal listeners.

New Chief for Capital Club

WASHINGTON.—William A. Parks has been elected to succeed H. H. Lyon as president of the Washington Radio Club at a meeting in the hall of the American Association of Engineers, 1317 New York avenue. Other officers elected were: G. L. Bidwell, vice president; H. A. Snow, secretary-treasurer; H. A. Wadsworth, assistant secretary-treasurer, and B. S. Flather, chief operator. The membership now includes 115 Radio enthusiasts.

WDAP to Chicago Board of Trade

Drake Hotel Station to Carry Voice of Report Speaker Direct from "Pit" Floor

CHICAGO.—WDAP, broadcasting station located on the Drake Hotel, this city, has been purchased by the Chicago Board of Trade, according to Robert M. Dougal, retiring president of that body. Under the new management the far-reaching voice of WDAP will continue to transmit concerts and other entertainment features.

A new arrangement provides for the voice of the reader (in a glass booth on the board floor) to be carried directly by telephone and Radio without relay, so that farmers receiving the report will hear the reader just as he reads the quotations from the blackboard.

Schedule in Use

The schedule now being used by the Board of Trade-Drake plant on all business days is as follows:

9:30 A. M. Central Standard Time—Receipts and shipments, estimated carlots, local weather report, opening futures market: wheat, corn, oats, rye, barley, pork, lard and ribs.

10 A. M.—Futures quotations, live stock receipts and prices.

10:30 A. M.Futures quotations.

11 A. M.—Futures quotations.

11:30 A. M.—Futures quotations.

12 M.—Futures and cash grain prices.

12:30 P. M.—Futures quotations.

1 P. M.—Futures quotations.

1:20 P. M.—Closing futures quotations and high and low for day, cash grain prices, gross bids for cash grain to arrive.

On Saturdays the closing prices are sent at 12:05 P. M. instead of 1:20 P. M. The visible supply changes are sent when posted.

Concerts and entertainment will be broadcast Tuesday, Thursday and Saturday evenings at 10 P. M., and Sunday evening from 9 to 10 P. M.

All broadcasts are on 360 meters wave length. The station offices, address the Drake Hotel, Chicago, are interested in learning how WDAP is heard during daylight. Hearers are asked to write.

Reroute Italian Waves

WASHINGTON.—Following the recent suspension of direct Radio communication between Italy and the United States and pending the completion of a new high power station near Rome, Radio traffic from Italy to North and South America is being handled via the high power stations of Germany, France, and England. Messages via France or Germany carry a rate of 20 gold centimes less than the cable rate, in the case of full rate telegrams. The same messages via London will be 10 gold centimes less than the cable rate.

Plants Send Same Program at Once

Wires Carry Concert, Broadcast from New York to Boston plant for Transmission

BOSTON, MASS.—WNAC, the Shepard Stores here, and WEAF, the broadcasting station of the A. T. & T. company in New York, recently conducted an experiment in simultaneous broadcasting, the first one ever attempted. Over about 300 miles of copper telephone wire the musical program from WEAF, which was being broadcast from New York on 400 meters, was conducted to WNAC, and broadcast from there on 360 meters. The telephone line was equipped with filter circuits and repeater amplifiers at intervals, and was carefully tested and adjusted by the telephone engineers to eliminate distortion.

WNAC reported that the sounds came in clearly and without a flaw, and were transmitted as easily as a local program. The numbers included selections by the Hotel Ambassador orchestra; Arthur Wilde, 'cellist, formerly of the New York Symphony Orchestra; Nathan Glantz, a celebrated saxophonist; Devora Nadworney, contralto; Raymond Freemantle, baritone, and one novelty number, Edward Avis, famous as a bird mimic.

Music Students' Concert Closes Memory Contest

COLUMBUS, O.—Artist pupils of the Grace Hamilton Morrey School of Music, here, rendered all numbers for the third and final program of the Columbus Dispatch's music-Radio memory contest which was broadcast from Station WBAV of the Erner & Hopkins Company January 15. The music for the occasion included all recognized old classics of song, harp, violin and piano, as they have come down to this generation from the hands of the masters of old; the semi-classical ballads and folk songs that have lived persistently in this age of jazz and turbulence, and a few of the newer, modern selections. The pupils put on the program to prove again that the work of old masters and modern classicists is ever a veritable fountain for the music-thirsty multitudes.

Hundreds of contestants heard the concert and are in hopes that their answers will put them in the class of seventeen, to whom will be awarded prizes aggregating $700.

McMillan Talks for Fans

MEDFORD HILLSIDE, MASS. — Capt. Donald McMillan, Arctic explorer who returned recently from a two-years' exploring trip in the Arctic circle on which he made many important scientific discoveries, broadcast a talk January 18, from Station WGI. His subject was his experience "In The Frozen North."

OPERA, ON TOUR, TO BE HEARD OVER AIR

CHICAGO COMPANY MAY CONTINUE BROADCAST

Management Seeks to Arrange for Direct-from-Theater Service for Radiophans

By Vera Brady Shipman

CHICAGO.—The Chicago Opera Company began its eastern engagement in the Boston Opera House Monday, January 22, opening with Marshall and Raisa in Aida. Efforts have been made to arrange with the eastern broadcasting station to broadcast the operas from the theaters direct. At the time of going to press, Radio Digest had negotiated with the largest stations in the three cities, Boston, Washington and Pittsburgh, and a final decision had not yet been reached.

The operatic schedule in the three cities named includes the best operas on the Chicago company's repertoire.

Probable Schedule Announced

The following was given as the probable schedule by the opera management (with the exception of Puccini operas which are withheld from the air by copyright ruling) any of which operas may be broadcast if eastern stations co-operate with Radio Digest:

Boston: Monday night, Aida; Wednesday matinee, Pagliacci, night, Rigoletto; Thursday night, Love of Three Kings; Friday, The Valkyrie; Saturday night, Il Trovatore. Second week: Monday night, Love of Three Kings; Tuesday night, Parsival; Wednesday matinee, Snow Maiden; Thursday night, The Valkyrie; Saturday matinee, Carmen, night, Jewels of the Madonna.

One half week in Washington at Poli's Theatre beginning Monday, February 5. Monday night, Aida; Wednesday, night, Snow Maiden.

Last half week at Pittsburgh at the Syria Mosque beginning Thursday, February 8: Thursday night, Jewels of the Madonna; Friday, Aida; Saturday matinee, Carmen, night, Pagliacci.

"U" Prexy Starts College Lecture Course by Radio

INDIANAPOLIS, IND.—A college Radio lecture course was inaugurated here recently when Dr. William L. Bryan, president of Indiana University, delivered an address from the local News-Ayres-Hamilton Radio station, WLK. The subject was, "Why More Boys and Girls Are Going to College."

The Radio course was arranged by the university extension division and Station WLK and consists of educational lectures broadcast Tuesday evening of each week.

The lectures begin at 8:30 P. M., Central time, and are short and phrased in simple language. They are becoming increasingly popular with Radiophans in the central west.

SIMPLE DETECTOR SET EASY TO TUNE

AERIAL-A RECEIVING UNIT HAS FEW CONTROLS

Additional Amplification Stages Can Be Added—Appeal Made in Low Cost and Efficiency

Photo Diagram on Page 7

The standard receiving set illustrated on page seven is an Aerial-A, manufactured by the W. E. Supply and Service Corporation of New York, N. Y. It is one of the simplest that has yet been shown and consists of the detector stage only. Naturally, amplifying stages can be added but its appeal is in the low cost and efficiency of reception. It is provided with a minimum of controls, thus permitting the newest of Radiophans to operate it successfully.

The antenna need not have a total length of more than sixty feet, thus permitting its use in many cases where fans are handicapped for sufficient antenna length.

A well-connected lead to the ground is essential. Good electrical connection should be made to the water pipe or equivalent grounding point, and contact should be made by means of a ground clamp securely bolted to the metal surface, which previously has been scraped clean of all dirt and corrosion.

Description of Connections

All connections are made at the back of the cabinet, the base of which projects about one inch, providing for the location of binding posts.

Starting from the left side the first two are for the phone connections. The third post is for the positive side of the 22½-volt plate or B battery. The center or fourth binding post is for the negative connection of both the plate and also the six-volt filament battery. The positive side of the storage battery is connected to the fifth post. The sixth post provides the connecting point for the ground lead, while the seventh or last post is for the antenna connection.

Tuning Controls

But three tuning controls are necessary, two of which are for the wave length adjustment, and the third for the filament control. This permits adjustment of filament lighting to the point of most efficient operation for the tube used.

The lower tap switch knob regulates the inductance in the antenna circuit by means of the coarser taps in the windings, and should be first adjusted after the filament current has been turned on. This permits the locating of the taps where the reception comes in best.

The finer adjustment of wave length is then affected by means of the upper tap switch, connecting to the finer taps of the primary winding. Because of the permissible accuracy of these adjustments no variable condenser is necessary. After these two adjustments have been made, the filament rheostat knob can be readjusted for the best point of operation.

Book Reviews

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

Mischievous youngsters have been having a lot of fun cutting leads and ground wires of Radio sets. This up-to-date variation of the old ringing the doorbells and putting "ticktacks" on the windows is causing much annoyance to the Radiophans.

Radiophan, After Hearing Programs of Nation, Longs for Something New

Arm Chair "Globe Trotting" with Receivers Is Found to Be Delightful Hobby, However, Despite Certainty of Encountering Several Varieties of "Hot Lips" and "Tomorrows"

The Radiophan sits at home comfortably settled in his armchair, with his "Aida" libretto at his elbow and hears every note of Verdi's opera broadcast by KYW of Chicago, while society, elaborately costumed, sits in its boxes, sees and is seen. The Radiophan knows not the divertisement of bright lights, perfume or stunning gowns.

"The first act is over. Kindly stand by for about fifteen minutes."

"This is Station KSD, The St. Louis Post Dispatch." A speech by General Pershing is discovered on the air.

"This is Station WHB, the Sweeny Automobile school, Kansas City, Missouri, the Heart of America."

One travels through the ether waves from Denver to St. Paul. Hundreds of programs are broadcast each evening from all sections of the country.

Programs Much Alike

Programs are nearly all alike. Solos for voice and instruments fraternize with band and orchestra. The youthful soprano from the Kansas City Star sings the same song that the lady from East Pittsburgh sang last Tuesday or the lady from Atlanta will sing next Friday. Violin solos are often hackneyed arrangements.

Why doesn't some enterprising station broadcast a program of DIFFERENT Music instead of the publishers' latest? It may be good for the publishers' business but it is hard on the Radiophan. The listener in enjoys classics or songs of sentiment, but the modern programs have too little of these and too much emotional slush.

Opera Stars and Jazz Vie

Many stations broadcast records. Located where good talent is not always available, the enterprising broadcaster realizes that a good record is infinitely better than a mediocre soloist. Operatic stars vie with jazz releases. You can count on several brands of "Tomorrows" and two or three "Hot Lips."

The Radiophan is not overly critical. He has not paid for his concert and does not expect too much. Besides, if he doesn't like it he can always tune out without the performer having the slightest idea that he was ever there. If he doesn't like a selection he will probably blame it on the "static" and tune off to something else.

Getting two concerts at once is inconvenient. It is a bit uncanny when listening in on a band number from Fort Worth, "The Eyes of You Keep Smilin' Through" from Newark.

Wandering Back to Youth

A harp solo, "Maiden's Prayer," from the Detroit News brings memories of little girls' first music lessons, pigtails and starched petticoats. As you dream and idly play with the dials, Louisville impudently jumps in with Al Jolson's "Coo-Coo."

Davenport follows with "Where the West Begins." Minneapolis answers as "The Call of the North." Winnipeg, Canada's, "Hello, hello, hello," is easily distinguished.

The clock strikes. You have been globe trotting in your chair, "listening in" (in Radio vernacular) to everywhere. One by one the stations have signed off.

"This is Station WMAQ, the Chicago Daily News," closing chimes of "It's Three o'Clock in the Morning" are followed by "signing off at ten o'clock. Goodnight."

But the air is not sleeping. The Drake Hotel, WDAP, Chicago, broadcasts dance orchestras far into the night.

And somebody, somewhere, is always listening in.

RADIO

Manufacturer Direct to You

LOWEST PRICES—HIGHEST QUALITY

Everything guaranteed exactly as represented or money refunded. We pay the postage

Variable Condensers

$4.50 value, 43 plate $1.70
$3.75 value, 23 plate $1.40
$5.50 value, 23 plate Vernier $4.00
$6.00 value, 43 plate Vernier $4.50
$4.50 value, 11 plate Vernier $3.50
$3.25 value, 11 plate $1.25
$2.50 value, 3 plate $1.10

SWITCHLEVERS with large tapered knob 19c
BAKELITE SOCKETS or 3-inch dials 28c
$5.50 value, MOLDED VARIOMETER $4.40
$5.00 value, MOLDED VARIO COUPLER $4.00
3 Coil HONEYCOMB MOUNTING $3.25
2 Coil HONEYCOMB MOUNTING $2.45
INDUCTANCE SWITCH with tapered knob $1.00
Double Blade eliminates use of switch points
COMPOSITION DIALS, 2 or 3 inch 22c

SPECIAL JACKS SPECIAL

These are a standard high grade make but we must withhold name of makers account cut in prices.

Single open . . . 32c Double open . . . 43c
Single closed . . 38c Single Fil 46c
Double Fil 50c

WD 11 BAKELITE SOCKETS 60c
WD 11 ADAPTERS 50c
BATTERY HYDROMETERS 40c
ALL SENSITIVE CRYSTAL 20c

COMPLETE PARTS FOR FLEWELLING CIRCUIT

includes 23 plate condenser, 3 .006 Condensers, 1 Freshman Variable grid leak, 1 panel grid leak, 2 honeycomb coils, a double coil mounting, 2 coil plugs, 8 rubber knob posts, with diagram for construction. Also 1 6x14 Panel. Outfit Complete for only $11.95

COMPLETE PARTS FOR RHEINARTZ CIRCUIT

Includes 1 7x18 Panel, 1 bakelite socket, 1 high grade vernier rheostat, 11 plate condenser, 1 inductance switch eliminating panel drilling for points, 1 23-plate condenser, 3 fine switch levers, one Rheinartz type coil, 8 rubber knob binding posts, 1 variable grid leak, 25 feet wire for construction, mounting base board, and diagram, Complete for only $10.95

We emphasize that we positively guarantee all goods purchased from us; and fill your orders same day as received. Lowest Prices, Highest Quality

Manufacturers Outlet Company

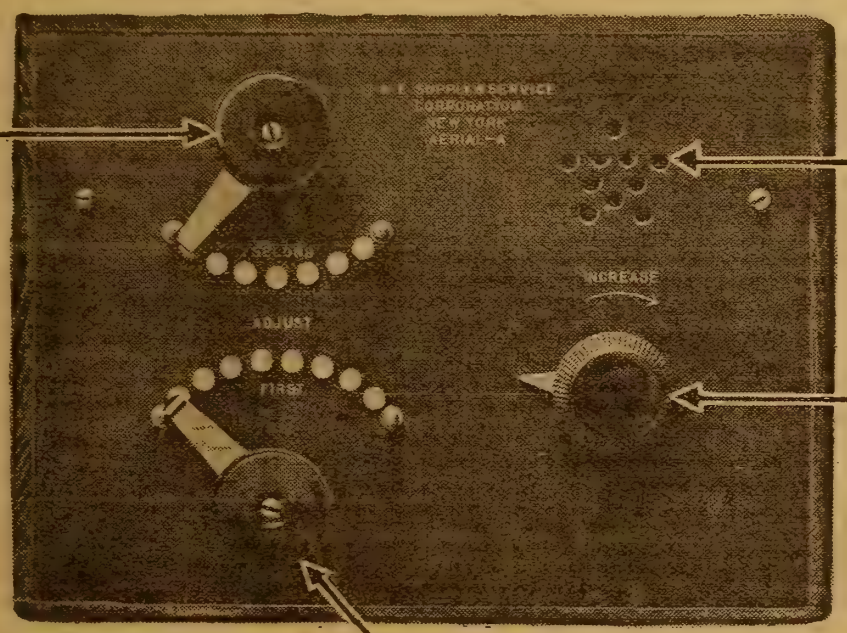
MOCO RADIO PRODUCTS

53 West Jackson Blvd., Chicago, Ill.

Radio Receiving Sets

The Aerial-A Tube Detector Unit

As the eighteenth of the series of standard receiving sets, Radio Digest presents the Aerial-A Receiving Set, manufactured by the W. E. Supply and Service Corporation of New York, N. Y. This receiving unit employs the use of a tuned primary circuit, with detector stage only. The circuit is non-regenerative and extremely simple. Full installation and operation instructions will be found on page six. Although the reader may not possess this particular make of apparatus, it will be well for him to study the diagram and instructions carefully. The points of similarity in standard types of receiving sets will enable the beginner to benefit materially.

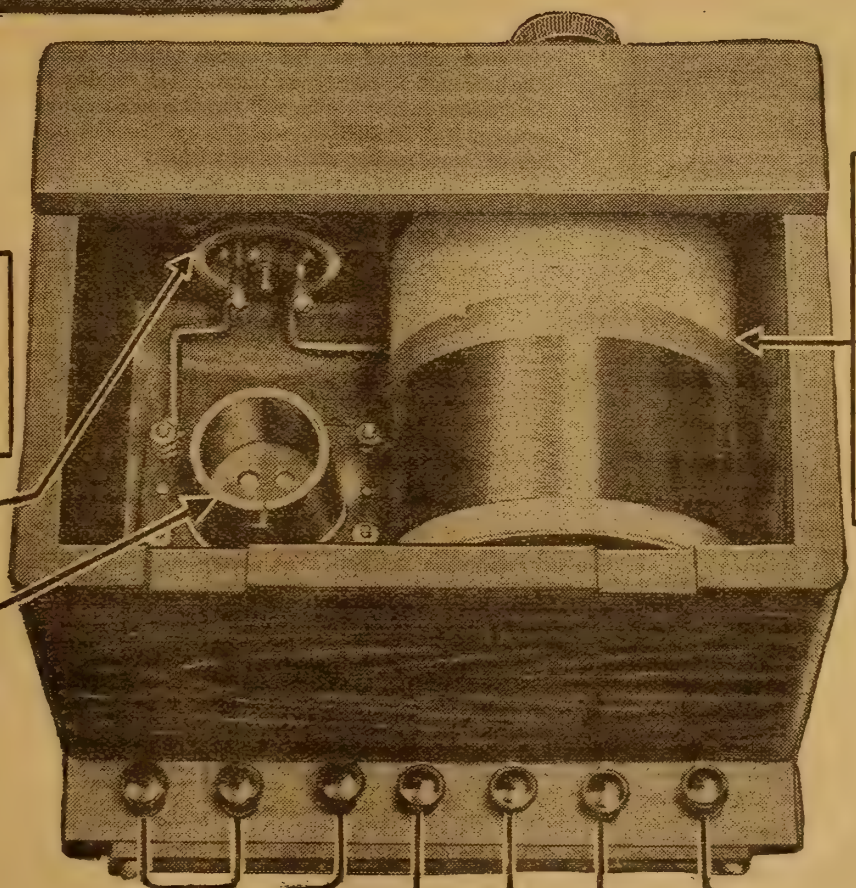


Peepholes to Observe Whether Tubes are Lighted

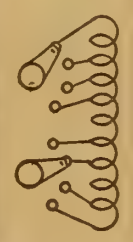
Knob for Control of Vacuum Tube Filament Current

Tapped Switch for Fine Wave-Length Adjustment.

Tapped Switch for Rough Wave-Length Adjustment.



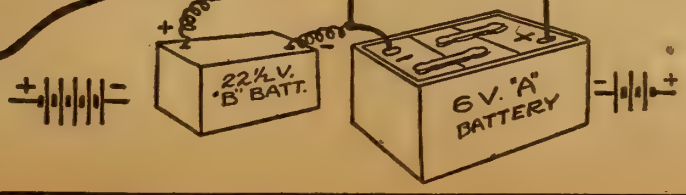
Tapped Primary Coil



Rheostat

Vacuum Tube Socket

Receivers



Ground

Radiophone Broadcasting Stations

Corrected Every Week—Part I

AG1, Presidio of San Francisco, Cal. 50 mi. Signal Corps, U. S. A. Sun, 7-9 pm, instruction. Pacific.

AQ6, Canton, O. 425 only. 75 mi. Hdqtrs. 135th F. Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 480 only. U. S. Army, Camp Travis. Mon, 7:30-8:30 pm. Thurs, 9:30-10:30 pm, music. Central.

AV7, St. Paul, Minn. Signal Corps, U. S. A.

BE1, Tacoma, Wash. 400 only. Camp Lewis, U. S. Army. Third Signal Company.

CFAC, Calgary, Alta., Can. 430 only. 400 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45-9:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Marconi Co. Daily ex Wed. Sun, 3.30-4:30 pm. Daily, 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCN, Calgary, Alta., Can. 440 only. 300 mi. W. W. Grant Radio Ltd. Experimental station. Sat, Sun, after 11:30 pm. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Canada. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily, 8:45-10 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co.

CHCC, Edmonton, Alta., Can. Can. Westinghouse Co., Ltd.

CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHCZ, Toronto, Ont., Can. Globe Printing Co.

CHOC, Vancouver, B. C., Can. Can. Westinghouse Co., Ltd.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.

CHXC, Ottawa, Ont., Can. 400 only. 50 mi. J. R. Booth, Jr. Mon, Wed, Sat, 8:30-10 pm, music, entertainment. Eastern.

CHYC, Montreal, Que., Can. Northern Elec. Co.

CJBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12 m, reports, concert; 8:30-10 pm, concert. Western.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 12:30-1:30 pm, 3:30-5, 8-10, music, news. Pacific.

CJCF, Kitchener, Ont. Can. 420 only. 50 mi. The News Record, Ltd. Thurs, 9-11 pm. Eastern.

CJCG, Winnipeg, Canada. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, concert. Tues, 7-8 pm, music. Fri, 5:30-6:45 pm, music. Sun, 8 pm, every other week starting August 20. Central.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 9:30-10 am, 1-2 pm. Mon, 5:30-6:45 pm. Tues, 8-10 pm. Fri, 7-8 pm. Sun, 3-4 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 1:30 pm, weather; 1:35-2:30, concert; 4:30-4:35, reports; 5:30-6, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCD, Vancouver, B. C., Can. 410 only. 150 mi. Vancouver Daily Province. Daily ex Sun, 8:30-9:30 pm, music, entertainment, news. Pacific.

CKCE, Toronto, Ont., Can. Can. Ind., Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Atlantic.

CKCS, Montreal, Que., Can. The Bell Telephone Co.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDBZ, Bakersfield, Calif. 100 mi. Frank Siefert. Daily ex Sun, 7:30-3:15 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDKA, E. Pittsburgh, Pa. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 3:00, sports; 7:00-9, news, features, markets, entertainments; 9-9:55, concert; 9:55-10 pm, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, 7:30, church service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 250 mi. Southern Elec. Co. Daily 7:30-9 pm, news, weather, concerts, lecture. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 500 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. Savoy Theater.

KDYO, San Diego, Calif. Carlson & Simpson.

KDYQ, Portland, Ore. Oregon Inst. of Technology.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m weather, time. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYV, Salt Lake City, Utah. Cope & Cornwell Co.

KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co. Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, 5-6, church services. 120th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. Frank E. Siefert.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-6 pm, news, reports. Daily ex Tues, Fri, 7-8 pm, reports, music. Tues, Fri, 8-9 pm. Pacific.

KDZI, Wenatchee, Wash. Electric Supply Co.

KDZK, Reno, Nev. 50 mi. Nev. Mchy. & Elec. Co. Wed, Fri, Sat, Sun, 8-9 pm, music, entertainment. Pacific.

KDZL, Ogden, Utah. Rocky Mountain Radio Corp.

KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.

KDZP, Los Angeles, Calif. Newberry Elec. Corp.

KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Daily ex Sun, 7-8 pm, 8:30-9, music, news, cycles, reports. Sun, 7-8 pm, music. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZW, San Francisco, Calif. Claude W. Gerdes.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Sepply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Daily, 7:30-8:30. Pacific.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Daily ex Sun, 12-1 pm, 8-9, music, news. Sun, 3-4 pm, church service. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. Los Angeles Union Stock Yards.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCQ, Casper, Wyo. Motor Service Stn.

KFDA, Baker, Ore. Adler's Music Store.

KFDB, San Francisco, Calif. Mercantile Trust Co.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Daily ex Sat, Sun, 6-7 pm, music. Sat, 8-10 pm. Sun, 4-5 pm. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. Wyo. Radio Corp.

KFDH, Tucson, Ariz. Univ. of Ariz.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDS, San Francisco, Calif. John D. McKee.

KFEB, Taft, Calif. City of Taft.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co., Inc. Daily ex Sun, 4-5 pm, music. Thurs, Sat, 9-10 pm, concert. Pacific.

KFED, Polytechnic, Mont. 100 mi. Billings Polytechnic Institute. Mon, 8-9 pm, lectures. Mountain.

KFEJ, Tacoma, Wash. Guy Greason.

KFEP, Denver, Colo. Radio Equipment Co.

KFFA, San Diego, Calif. Dr. R. C. Shelton.

KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.

KFGG, Astoria, Ore. Astoria Budget.

KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule.

KFHJ, Santa Barbara, Calif. Fallon Company.

KFI, Los Angeles, Calif. 500 mi. Earle C. Anthony, Inc. Daily ex Sun, 1-1:30 pm. Daily ex Mon & Fri, 7:40-8:20 pm. Tues, Sat, 2-3 pm. Sun, 10:45-11 am, 4-5 pm, 7:40-8:20. Pacific.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Wed, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr Mitchell Elec. Co. Tues, Wed, Fri, Sat, 7-8:30 pm, music etc. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger-William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm. Entertainment, news, weather, tides, police reports. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sun, 9-10, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. Mon, Wed, Fri, 5:15-6 pm, reports, code lessons, agriograms. Tues, Thurs, 7:40-8:20 pm, concerts. Sat, 7:40-9 pm, concert. Sun, 2-3 pm, church service. Pacific.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm, Tues, Thurs, Sat. special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 only. 2,000 mi. Oregonian Pub. Co. Mon, Wed, Fri, 8-9 pm, music, lectures, news, reports. Sun, 7-8 pm, church services. Pacific.

KGY, Lacey, Wash. 50 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story Pacific.

KHD, Colorado Springs, Colo. 485 also. 50 mi. Daily ex Sun, 8:15 am, weather. Mon, Wed, Fri, 7-7:30 pm, music, lectures. Mountain.

KHJ, Los Angeles, Calif. 400 and 485 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 7-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. C. O. Gould.

KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, Wed, 12-12:30 pm, sacred music, lectures. Sun, 11:30-12:30 pm, sacred music, sermon. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri. 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLP, San Francisco, Calif. 500 mi. Colin B. Kennedy Corp. Mon, 7:30-8:30 pm. Thurs, 8:30-9 pm. Sun, 4-5 pm. Pacific.

KLS, San Francisco, Calif. 300 mi. Warner Bros. Radio Supply Co. Daily, 12-1 pm. Sat, 7:30-8:15 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 7:15-7:30 pm, news, entertainment. Tues, 7:30-8:15 pm, Fri, 8:15-9 pm, and Sun, 3-4 pm, concert. Pacific.

KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm, news, markets, bedtime story, concert. Thurs, 8-9 pm, concert. Sun, 8-9 pm, church services. Mountain.

KMJ, Fresno, Calif. 200 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 7-8 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 11-1 pm, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. 485 also. 750 mi. Roswell Public Service Co. Daily, 8 pm, news, reports, concerts. Mountain.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Mon, 2:30-3:30 pm. Wed, 2:15-3 pm. Thurs, 4-5 pm. Pacific.

KNT, Aberdeen, Wash. 400 mi. Grays Harbor Radio Co. Daily, 5-5:30 pm, 7:30-8:15, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. College Agri. & Mech. Arts. Daily ex Sun, 11:55-12 m, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 pm, code, 8:20-9 pm, music. Pacific.

KON, San Diego, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.

KOP, Detroit, Mich. Detroit Police Dept.

KPO, San Francisco, Calif. 300, 600 also. 500 mi. Hale Bros., Inc. Daily ex Sun, 11-12 m, 3:30-4:30 pm, concert. Wed, 7:30-8:15 pm, concert. Sun, 11-12:15 pm, church service. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, Sun. 8:30-9:30 entertainment. Pacific.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm, 2:30-3, music, lectures. Mon, Wed, Fri, 10-11 pm, music, entertainment. Eastern.

KQW, San Jose, Calif. 345 also. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8:15-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Daily, 1-2 pm, 6-7. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Every other Sat, 8:15-9 pm. Sun, 1-2 pm, 6-7. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Thurs, 11:30 pm, concerts. Central.

KSL, San Francisco, Cal. 50 mi. The Emporium. Daily ex Sun, 10-11 am, concert, news; 2-3 pm, concert, educational talk. Sun, 2-3 pm, concert and educational talk. Pacific.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Fran. Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 3-3:30 pm, lecture, news; 5:30-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather report. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, concert; 5-6 pm, concert, news. Pacific.

KUS, Los Angeles, Calif. City Dye Works & Laundry Co.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Daily ex Sun, Sat, 4-4:45 pm. Mon, Thu, 8:20-9 pm. Sat, 3-4 pm. Pacific.

KVQ, Sacramento, Calif. 300 mi. Sacramento Bee. Daily ex Sun, 6:30-7:30 pm, news, reports, music. Sun, 6-7 pm, reports, music. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. Herald Pub. Co.

KXS, Los Angeles, Calif. Braun Corp.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYJ, Los Angeles, Cal. 485 also. 1,000 mi. Leo J. Meyberg Co. (Hamburgers). Daily ex Sun, 4-5 pm, concert, markets, weather, news. Mon, Thurs, Sat, 8-9 pm, same program. Pacific.

KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:25 am, 10, 1:20 pm, 2:15, 2:30, markets; 3 (3:30 ex Mon, Wed, Fri), 4, 4:15, 4:30, 5, news, sports (6:30 Mon only, news, reports, sports), 6:50, bedtime stories; 8-9, music; 9, news, sports; 9:05, special. Sun, 11 am, 3:30 pm, 7, church services. Central.

KYY, San Francisco, Calif. The Radio Telephone Shop.

KZC, Seattle, Wash. 100 mi. Public Market & Department Stores Co. Daily ex Sun, 6:45-7:15 pm, music, news, agriograms. Pacific.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. Wenatchee Battery & Motor Co.

KZY, San Francisco, Calif. Atlantic-Pacific Radio Supplies Co.

NAA, Arlington, W. Va. 710 only. 2,000 mi. Official government broadcasting station. U. S. Navy Dept. Mon, Tues, Thurs, 7:15-7:30 pm, lecture. Mon, Thurs, 6:45-7 pm, lecture. Tues, Thurs, 7:45-8 pm, health lecture. Wed, Fri, 8:30-9:45 pm, band concert. Eastern.

PWX, Havana, Cuba. Cuban Telephone Co.

WAI, Dayton, O. McCook Field, U. S. Army.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri. 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.

WAAF, Chicago, Ill. 485 only. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:30 am, 10:30, 10:45, 12:45 pm, 3, 4:30, live stock and weather reports. Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Mon, Fri, 12:15-1 pm, pipe organ concert. Mon, 8:45-9:30 pm, entertainment. Tues, 8-9:30 pm, entertainment. Wed, 1:15-2 pm, pipe organ. Sun, 8:30-4:30 pm. Central.

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Mon, Wed, Fri, 9-10 pm, music. Eastern.

WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun. 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, Eastern. 7:30-8 pm, code instruction; 8-9, special program.

WAAP, Wichita, Kan. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAT, Jersey City, N. J. 70 mi. Jersey Review. Wed, 7-8 pm, concert, lecture. Sun, 7-8, church service, concert. Eastern.

WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45, 10:45, 11:45, 12:45, 1:20, 8 pm, market reports. 8:15-9 pm, music. Central.

(NOTE—The second part of the station schedule list will appear next week.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which RADIO DIGEST has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

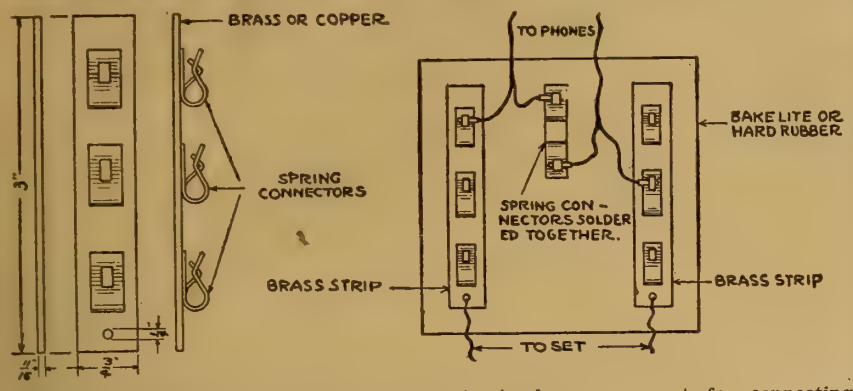
The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of RADIO DIGEST will give one the most complete and accurate list of broadcasting stations obtainable.

Multiple Phone Connector

A Simple and Inexpensive Way of Making Connection

Frequently one wishes to use two or more phones on the receiving set. A simple and inexpensive way of making the connection is by means of the arrangement shown in the illustration. Two pieces of sheet brass or copper measuring about ¾ inch wide and 3 inches long are required. Also, you will need six or more spring connectors taken from old dry cells. If one wishes to use three headsets in multiple, three of the spring connectors are soldered to each of the pieces of brass. If the phone condenser is equipped with binding posts for wire connections, a ¼ inch hole should be drilled through each of the brass pieces near the lower end, and they may then be attached to the phone condenser by using the regular binding posts. The phone cord tips are then attached to the spring connectors.

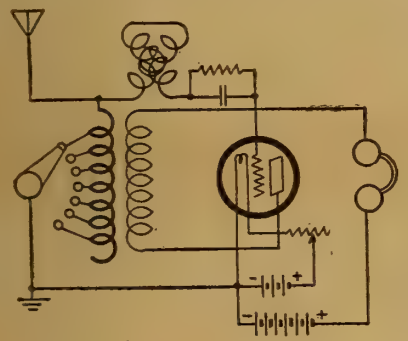
If phone condensers are not used or condenser is not equipped with binding posts, the brass strips may be mounted on a piece of bakelite or other panel material, or to the panel itself and connecting wires from the set should then be attached to the brass strips.



A simple arrangement for connecting phones in series is shown in the second sketch. Here the brass strips are supported on a piece of bakelite in any desired manner. Additional connectors soldered together in pairs are also required. The sketch shows the method of connecting two phones in series.—P. Starck, Sterling, Ill.

Efficient Single Tube Set

Using the hook-up shown with a single wire aerial 80 feet long and 30 feet above the ground and an ordinary ground I have heard fifty different stations, the most distant ones being KLZ and KEAF at Denver, Colorado. I am using a 23 plate condenser and a vernier condenser in parallel with the primary of the vario coupler, but these are not absolutely necessary,



although they make tuning easier. It may appear that the variometer in the grid circuit is not necessary, but I find that without using it, the tube filament must be turned on more brightly to obtain the same results. By using it the life of the tube is lengthened and also the tuning is made easier. When condensers are not used the variometer is absolutely necessary for tuning.

I also found that the plate voltage for the better operation of this set may be found by letting the tube oscillate and then rotate the tickler coil. If a click is heard in the phones, as the tickler is rotated, the voltage is too high. It should be lowered in small steps until the click is eliminated. This will be the best voltage to use. Lower voltage will bring in a weak signal and a high one will be difficult to tune. When the plate voltage is right the set will be easy to tune.

In selecting a detector tube I find that the best one to use may be found by turning the filament rheostat about half way and inserting different tubes, in turn, in the socket. The one which gives the brightest light is invariably the best.

I have obtained better results with this set than any of my friends using a one-tube set, either homemade or otherwise.—John Brown, Youngstown, O.

Antenna Protects House

The antenna will not attract lightning any more than a lightning rod, telephone wire, gutter pipe or tin roof. The antenna, if installed properly, is much less likely to be struck than any other object in the neighborhood. During a thunderstorm the antenna should be grounded, as when it is connected direct to the earth it serves as a medium which permits the static to pass from the air to the ground, as does the lightning rod. There is no risk with a Radio antenna properly installed.

Indoor Aerial Erection

When erecting an indoor aerial, hang up about 100 feet of wire, making the loop as large as possible, with the fewest number of turns. String the wires through the hall and around a room, or they can be given several turns around the ceiling in one room. Connections can be made by using both ends, or the instrument can be connected to one end and a regular ground connection can be used on the other.—A. A. Vawnut, Chicago, Ill.

How to Make "Silver" Dials

Secure a sheet of stiff brass, cut it to the shape desired with whatever diameter is wished and clean it top and bottom with steel wool until it is bright. Having drilled the shaft and supporting screw holes for the knob, make a solution of sulphuric acid and rain water, using three parts of acid to one of water. Pour the acid into the water slowly, employing a porcelain bowl as container. Dip and wash the disc in this solution. Melt some tinfoil in a clean pan and when the foil has completely melted dip the brass disc in it, allowing it to remain for about fifteen seconds. Place it in a pan of water to cool.

The finish is made by rubbing surfaces with a small piece of clean cloth until the "silver" shines up brightly. The marking may be done with a pen and good ink, or indentations may be stamped in the brass disc before silvering. This treatment may be applied to all the brass work on the set with a resulting neatness in appearance. It would be well to give each part a heavy coat of lacquer or good varnish to prevent tarnishing.—R. U. Batty, Chicago, Ill.

MYERS TUBES

Dealers: Write for Discounts

Hudson-Ross, 123 W. Madison, Chicago

MAGNAVOX Radio

The Reproducer Supreme

THE two sizes of Magnavox meet every requirement—from home gathering to large public audience.

To hookup is simple—no extras or adjustments are required.

R-3 Magnavox Radio
with 14-inch horn
(as illustrated)
For homes, offices, amateur stations, etc. . $45.00

R-2 Magnavox Radio
with 18-inch horn
For store demonstration, large audiences, dance halls, etc. . . $85.00

At good dealers everywhere

THE MAGNAVOX CO.
Oakland, Cal.

New York Office:
370 Seventh Ave.

R-A-D-I-O

BUY HERE FOR LESS

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete... $11.45

ORIGINAL TYPE "C" BALDWIN UNITS $4.95

COMPLETE PARTS FOR REG. RECEIVING SETS

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial..... $17.95

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now . $1.75 — $3.10 Value, 5 PLATE, now . $1.25
$3.70 Value, 23 PLATE, now . $1.45 — $2.70 Value, 3 PLATE, now . $1.15
$3.30 Value, 11 PLATE, now $1.35

U. S. A. Signal Corps Aviation Type 194-W Western Electric Phones, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

COMPLETE PARTS FOR FLEWELLING CIRCUIT

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... $12.45

MAGNAVOX, Loud Speaker, Type R3 $34.95

VARIOMETERS GENUINE MAHOGANY, $5 VALUE, NOW $1.95

VARIOCOUPLERS, $4.50 Value, Now $1.75

HONEYCOMB COILS

1,500 Turns	$1.50	750 Turns	$1.00	75 Turns	40c
1,250 Turns	1.50	250 Turns	75c	50 Turns	40c
1,000 Turns	1.25	150 Turns	60c	35 and 25 Turns	40c
		100 Turns	50c		

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TRADE-MARK
Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, January 27, 1923 No. 3

Receiving Not Affected by Legislation

Owners of Receiving Sets Will Not Be Hampered

NO REGULATIONS are planned for receiving stations by the White-Kellogg bill. The whole bill considered and action taken will be devoted to the transmission of all Radio messages and broadcasts. The status of the amateur and the listener in, established by the present law, is left unchanged, except that the rights of the amateur are extended and additional wave lengths are assigned for his use.

Much is left to the discretion of the head of the Commerce Department, as it is believed that Radio has a fast growing future ahead of it which might be jeopardized if too stringent and detailed regulations were enacted into a law. Regulations believed just and necessary today, might within a space of a few months, prove a handicap to the natural development of Radio. Hence broad powers are planned for the secretary of commerce and his appointed advisory committee of twelve members.

Auto Clubs Direct Tourists

Ether Waves to Direct the Autoist on the Road

AUTOMOBILE clubs in the future will become centers of advice to traveling motorists. They are such aids now, but the future will see them sending out advice as to roads and directions while motorists are speeding along the highways. It will be done by Radio.

One inventor has designed an instrument for the automobile by which the driver can keep on the right track to whatever town he desires to reach by means of a method of Radio signaling. Wires strung along the roads carry the signals which are caught by the instrument on the dashboard while the car travels ahead.

This is only a crude beginning to what automobile manufacturers expect eventually to install in their cars. A Radio receiving and telephone transmitting set, compactly mounted on the right side below the dash, can be made to carry on conversation with the nearest automobile club. From the auto club, in this way, the driver can learn the way to his destination, or make hotel reservations, get aid in the event of a breakdown.

Naval Radio Earnings

Service Rendered Is Valuable and Profitable

RADIO in the navy, taken solely as a business proposition, is a money-maker for the Government. Government traffic handled by Radio stations, other than natural communications, would have cost $1,080,800 at commercial rates and was less than a third of the traffic handled the preceding year. This amount added to the commercial receipts would have brought the year's business in naval Radio traffic to $1,708,704 in receipts and savings. When it is considered that the navy in no way competes with commercial stations, but handles messages only where and when commercial stations are not available, the aid rendered in this auxilliary Radio work may be better appreciated.

For the merchant marine alone the naval communication service handled 3,749,483 words during the past year and forwarded press matter to the number of 1,012,279 words.

Will We Have Radio Power?

Wonders of the Future Most Difficult to Conceive

THE mind is hardly able to grasp the wonders of the future that may be accomplished by means of Radio-transmitted power; they are so revolutionary and so stupendous. In no direction does this apply with greater force than in the flights of aircraft, where the safety of the pilot and passengers and the capacity of the craft are so dependent upon a continuous supply of power.

It is within the range of possibility, in fact seems quite feasible, that air-power machinery other than an engine, might make as much as 500 miles an hour with comparative safety. This would make possible a trip through the air from New York to San Francisco between sunrise and sunset, and to intermediate points in a corresponding length of time.

Relieved of the weight of the engine, the plane could be equipped with safety devices, the weight of which now makes these impracticable. Without heavy and costly engines the price of the planes could be reduced to a figure that would make them available for carrying

Condensed

By DIELECTRIC

What marvel in Radio will be forthcoming in the year 1923? Will static be satisfactorily eliminated, thus encouraging the Radiophans to greet summer with a smile? Probably a great many who first knew of the varied entertainment a receiving set would provide, learned to operate one during the fall or winter and when the summer months came, with the unwelcome presence of static, lost considerable enthusiasm. In quite a few instances, I have known men and women to regard Radiophony as something to use and enjoy in those seasons when static was barely apparent, but to discard when sputtering and crashing noises were part of an evening's treat. A real fan fights through everything to gain his end; whether it be to await patiently a lull in the battle of strays in order to catch the station's call letters, or straining every nerve to pick up the faint code letters. I believe static will meet its complete banishment sometime during this year. I also expect to see vast strides in perfecting receiving sets. Let every means be used to further the success of science in each branch of Radio, and every fan actively support all movements tending toward our common good.

Secretary Hoover has a man's size job on his hands in attempting to regulate the multiplicity of details involved in Radio control. It is to be hoped he will receive the loyal support of all factions, for they must necessarily merge their interests in order to reap the full harvest. Strong elements at work with diametrically opposed objections will wreak havoc with what has already been accomplished. We, the Radio public, must not allow any corporate interest, department of government, nor any other agency to lose one iota of gain through lack of co-operation. While Radio is in its infancy is the time for us to permanently secure every advantage for its healthy growth, and this may be done by getting back of Herbert Hoover and upholding him.

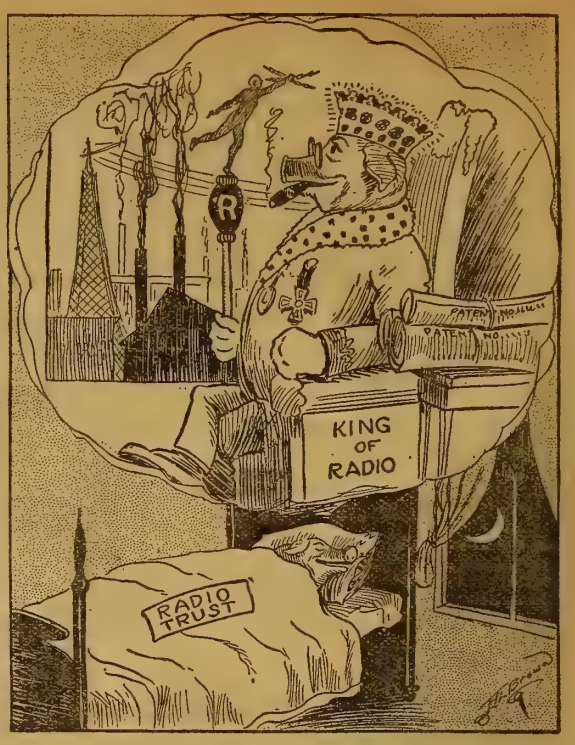
If ever a "bug" is happy it is when he can remove every vestige of sneer from the supercilious, nonregenerated human, and it is possible to find such occasionally. The other day I happened to be standing in a stationer's store examining the material which finds its way into the columns of other Radio journals, just to see what some editors let by, and while doing so an acquaintance stopped to inquire if I was "one of those Radio fiends." Now that was a severe blow, for I am careful to apprise the unknowing that Radio is all things to me and without it I am as a tubeless set in a pauper's den. However, it afforded the opportunity to expound a little. He listened in, purchased a copy of RADIO DIGEST, and will soon possess the requisite equipment to classify as "one of those Radio fiends."

While feverishly working to bring in the program of a distant station you may unconsciously spoil the chances of a fellow fan attempting the same thing. When your tube produces interfering oscillations, someone is sure to suffer the consequences. It is said for the new tube invented by H. P. Donle that such interference is impossible when used in a plain circuit. It is to be hoped that this tube may find its way to market, if it does what is claimed for it. Considerable might be said on the subject of tubes, with especial reference to their selling price; also much might be written about the comparison between domestic and foreign manufactured articles.

At this season of the year the farmers are able to find time for some diversion and to devote a part of their leisure to storing up information about various phases of their work. Short courses in agriculture are provided in many of the agricultural colleges throughout the country, whereby the busy farmer may gain the latest knowledge to be had on the subject of animal husbandry, fruit growing, seed selection, etc. It is not possible for many farm owners to attend these courses of only a few months' duration. To them the use of Radio is invaluable. Receiving sets on farms are coming to be as much a regular part of family equipment, as are automobiles. Weather reports; crop reviews; price quotations on farm produce; general business conditions; each of these topics is sure to find attentive listeners among farmers. Some of the State Experiment Stations are now broadcasting lectures by professors of these institutions giving valuable data for use in the coming season's program of planting. Thus does Radio extend its services to the remote homestead, as well as to the crowded apartment.

Broadcasting stations are besieged with words of advice as to the method and matter to be used in satisfying their audiences. It is perhaps impossible to please each listener in on every program, but members of the Radio audiences are requested to write to the stations signifying their preferences, to which heed is given. When numbers in which you are not interested are being broadcast, it is possible to tune in another station where you may find something more to your liking, then turn back when the attractive feature comes along. The advice which I wish to give repeatedly until it is generally adopted is to announce the identity of the broadcasting station immediately following a selection. There are some stations practicing this to the great satisfaction of their audience. Listeners in wish to know to whom they are listening without being required to wait long periods for the announcement.

I had a long paragraph in mind on my pet topic—silent periods—and it looks as though I should have to keep it there for another week at least. Well, it is a chance to practice what I preach: six days of silence!

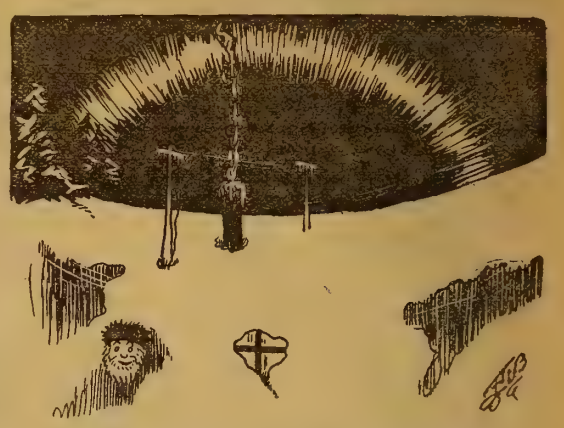


Shall Dreams Come True?

RADIO INDI-GEST

Friend of Isolation

You stay-at-home folks,
With your comfort and jokes,
Who sit while the North winds blow,
With your wives and your chicks
And your bright, blazing sticks,
Or the cheer of your big stoves glow;
Have you given a thought
To the fellow who's caught
Up North in the drear and the snow?
When the heat of your day
Has at last passed away,
And dimmed is your midsummer sun
When you're near by your fan,
Have you thought of the man



Who camps where the heat waves run;
Have you given a thought
To the one who has naught
Of companionship when day is done?
There is many a chap,
Who lives near a trap
Way up 'neath Aurora's bright glow
Who is chilled to the bone
As he dwells there alone,
But who's thankful he has Radio
Like the one who's hard fate
In the heat isolate,
It's a friend there at hand in the snow.

Ethereally Speaking

A California minister recently broadcast a talk upon

the value of the right atmosphere in home life. The home life, like Radio, often has static in its atmosphere.

It Often Sounds Like Soup

A Western writer poetically describes "great aerials that stretch from towers that pierce the sky." Someone should now immortalize the great artists who fill the "soup-bowl" transmitters that repose in the "sky parlors."

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

CHAPTER IV

IT IS generally said that Radio messages travel through space in the form of a wave motion, or that certain concerts come in on a 400-meter wave length. Now as to the meaning of all these terms, wave motion, wave length, frequency, etc. Probably it can be explained and made more clear to all if we use the old familiar illustration of water waves as they exist on the surface of a pond or lake.

If a stone is dropped into a pond of still water, the entire surface of the pond at once becomes disturbed. At the instant the stone strikes the surface, a circular ridge or crest at once forms and expands outward in all directions. Following the crest is a depression or trough in the water. Such a disturbance consisting of a crest and a hollow is called a wave. One important point to remember at this time is that the water does not actually move from the point at which the stone struck the surface, but the disturbance, only, moves outward until it strikes some object or dies out altogether.

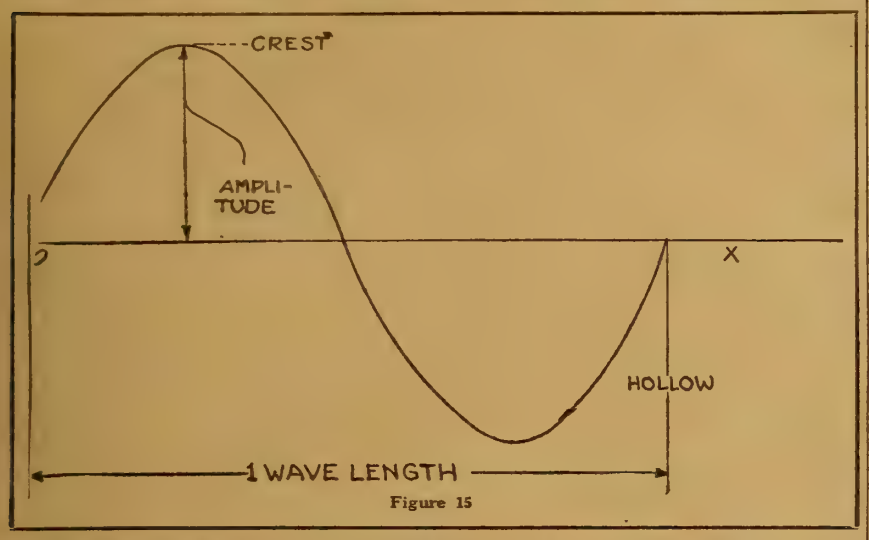


Figure 15

Water Is Medium of Transmission

If the stone were tied to a string and pulled up and down so that it struck the water at regular intervals, the entire surface would soon be disturbed with a series of crests and hollows, all starting out at the point at which the stone struck and all spreading outward in all directions. Such a disturbance is called a wave motion, and the water in which the disturbance takes place is called the "medium of transmission."

The rate at which the stone is moved up and down determines the rapidity with which the waves are sent out, or the frequency. The frequency may thus be defined as the number of waves occurring per second. The greater the frequency, the shorter will be each wave; while the less the frequency, the longer will be each wave. Now by the length of a wave, or the wave length, we mean the distance from one point on a wave to a corresponding point on the next wave.

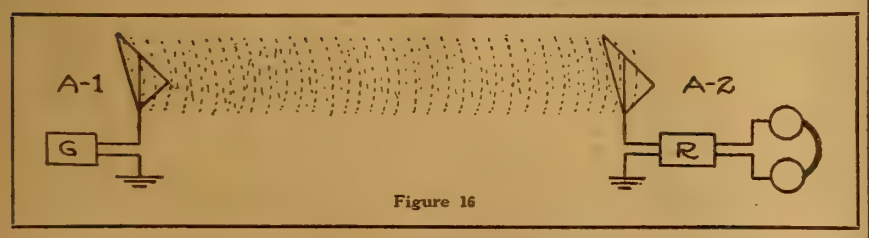


Figure 16

Height of Wave Is Amplitude

Furthermore, if the stone is raised higher so that it strikes the water with a harder impact, then a more severe disturbance will be caused; that is, the waves will still be of the same length, but the crests will be higher and the troughs deeper. This brings in another new term, namely, amplitude. By the amplitude of a wave or wave motion is meant the maximum distance from the position of rest to highest or lowest point on a wave. The amplitude of a wave, it must be remembered, always depends upon the force or intensity with which the object strikes the medium.

If a cork is placed on the water at some point, it will be caused to move up and down in exact accordance with the nature of the wave or disturbance that is passing. The cork will not move toward the shore, but will always remain at the same spot and merely move up and down. This shows that the water does not move toward the shore, but that the wave disturbance only moves through it. The cork, however, will in all respects, respond to the wave motion in the water on which it floats.

Thus in Figure 15 we have illustrated one complete wave length consisting of a crest and a hollow. The horizontal line OX represents the position of rest, and the distance from this line to the highest or lowest part of a wave is known as the amplitude.

Being acquainted now with the nature of a wave and a wave motion in a medium, we are ready to consider the methods by which Radio messages are carried through space.

A complete Radio communication system consists of three essential parts, namely, a sending station, a medium through which the messages are carried, and the receiving station at which the messages are intercepted. The Radio sending station can be compared to the stone which was moved up and down so as to cause a disturbance or series of waves in the surface of the water. The Radio receiving station, on the other hand, can be compared to the cork, which floated on the water. The receiving station, like the cork, responds in all respects to the disturbance of the medium in which it is placed.

What Ether Is Like

From the very nature of Radio communication we know that it is accomplished by means of some form of wave motion. Now our common sense tells us that it is impossible to have a wave motion or disturbance without also having some medium in which it can take place. We know it is not the air which carries Radio messages, for they will travel through a vacuum in which no air exists. Consequently it has been assumed that there is present throughout all space and permeating all objects a medium called the ether, and that it is this ether through which Radio messages are carried. The ether permeates (passes through) all matter like water permeates a sponge. This explains why Radio messages can travel through walls of solid material which physically appear impenetrable. Although no one has as yet in any way come into physical contact with the ether, still for want of a better explanation we will assume that this ether exists and that it is the medium through which Radio messages travel.

Extent of Ether

Various properties or qualities have been assigned to the ether in order to enable us to use it for explaining the various existing conditions. The ether extends throughout all space, even beyond the farthest stars. The ether exists around and through all objects much like water fills a sponge. It cannot be removed from any portion of space, nor can it be pumped out of a container. The ether also offers no opposition to objects moving through it, for the action would be similar to moving a sieve through the air. It is also of an extremely elastic nature, for a disturbance set up at any point in it immediately spreads outward in all directions.

Waves Emanate in All Directions

The Radio sending or transmitting station consists of some form of electromagnetic machinery by means of which a disturbance or wave motion is set up in this medium which we called the ether. These waves emanate or are sent out from the transmitting station by means of a group of parallel stretched wires known as the transmitting antenna or aerial. These waves represent a certain amount of electrical energy sent out "broadcast" through space. In order that electrical energy can be sent out, through space in the form of a wave motion as was just explained, it is necessary that they be of very high frequency. Consequently, the apparatus in the transmitting station consists of a combination of oscillating circuits by means of which high frequency electric currents are generated, and these high frequency oscillating currents then excite the antenna and cause the electromagnetic waves to be radiated through all space.

Travel 186,000 Miles Per Second

The Radio waves leave the antenna and spread out in the form of expanding spheres all of which have the antenna as a center. They travel through space at the enormous speed of 186,000 miles (300,000,000 meters) per second. In other words, a Radio message would travel approximately eight times around the earth in one second if there were enough energy behind it to keep it going.

In Radio measurements the metric system is very extensively used. In the metric system the unit of length is the meter, which is equivalent to about 39.37 inches. Consequently a speed of 186,000 miles per second, if expressed in the metric system, would be 300,000,000 meters per second. A meter originally was chosen as one-ten millionth part of the distance between the equator and either pole of the earth.

Waves in Commercial Practice

The waves used in Radio communication range in length from 75 meters (about 244 feet) to 25,000 meters (about 15½ miles). Since Radio waves travel through space at the enormous speed of 300,000,000 meters per second, the above wave lengths represent frequencies ranging from 4,000,000 to 12,000 per second, respectively. The frequency can always be calculated by dividing the speed of propagation (300,000,000 meters per second) by the wave length. If it is desired to calculate the wave length when the frequency is known, it is only necessary to divide the speed by the frequency.

According to Government regulations, all amateur transmitting stations must operate at wave lengths not exceeding 200 meters. This corresponds to a frequency of about 1,500,000 cycles per second. The shortest wave lengths used in commercial practice are 300 meters, which are the wave lengths used for communicating between ships at sea. Practically all broadcasting in this country at the present time is being done at wave lengths ranging from 360 to 485 meters, the corresponding frequencies being 833,000 and 618,000 oscillations per second. For reliable long distance communication such as transoceanic service, longer wave lengths are in general use, ranging from 10,000 to 25,000 meters. These longer wave lengths are more advantageous to use because they are less affected by atmospheric conditions and changes, and hence are more dependable for long distance transmission. Another important item is that when large quantities of power must be handled such as is necessary for long distance transmission, the sending apparatus is less costly with the longer wave lengths than with the shorter wave lengths.

Heat and Light Cut Range

Radio waves in their passage through space are subject to some very peculiar conditions, most of which are as yet not satisfactorily explained. For example, Radio messages can be transmitted over longer distance and with greater ease during the night than during the daytime.

(Continued on page 12)

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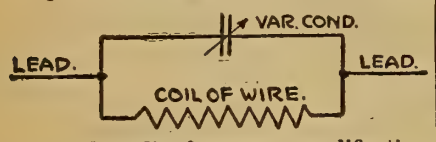
Radio Frequency Helps Bring in New Stations

A stage of Radio frequency will bring in new stations that cannot be heard with just a detector and audio amplification. The tuned type of transformer is easy to construct in the home workshop and gives just as good results when accurately constructed as the core transformer. It is not practical to use more than two stages



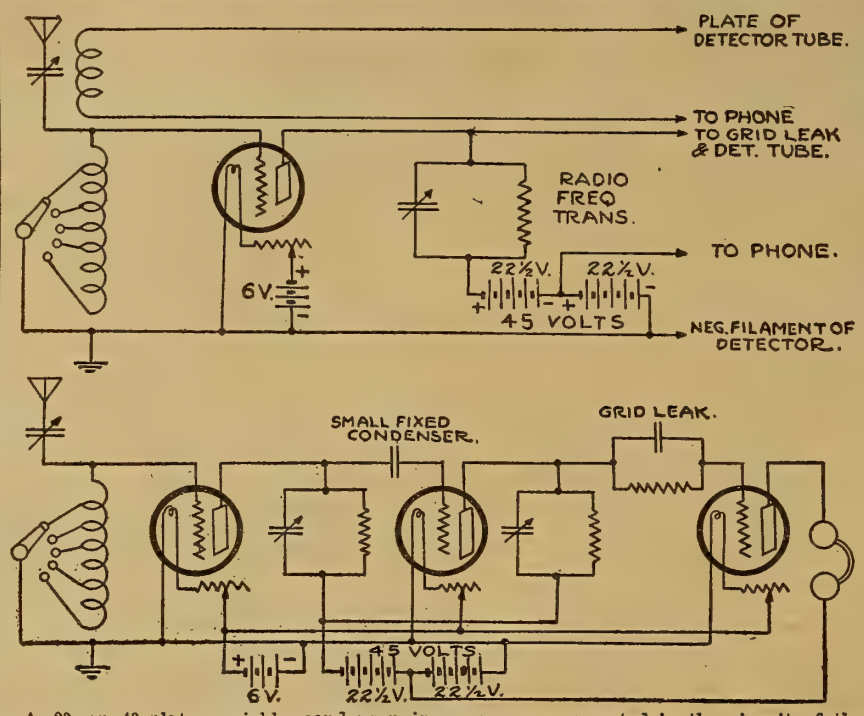
of tuned Radio frequency amplification. The ordinary hard amplifier tubes should be used just like the ones used for audio amplification.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

TWO CIRCUITS USING TUNED COIL



A 23 or 43-plate variable condenser is connected in parallel with a coil of wire wound on a cardboard or fiber tube. This coil consists of about 38 to 40 turns of No. 22 to No. 24 wire on a tube about 3½ inches in diameter.

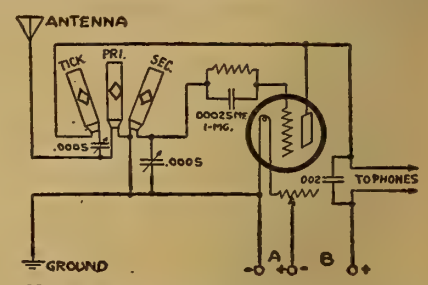
A diagram is given for connecting the transformer coil with the condenser and also for one and two stages of Radio frequency as connected in the circuit of the Radio set. The transformer is simply connected across the circuit of the tuning coil.

This type of transformer is critical in adjustment which is a great advantage as it eliminates interference. It is easy to construct and gives excellent results.—Charles L. Smith, Jackson, Miss.

Honeycomb Coils Used In Reinartz Circuit

The diagram is of the Reinartz circuit using three duolateral coils and mounting. I have been using this hook-up for some time and have been getting far superior results than with the regular Reinartz circuit. Some features to this hook-up is the fine selectivity in tuning out undesirable stations which are operating on practically the same wave length.

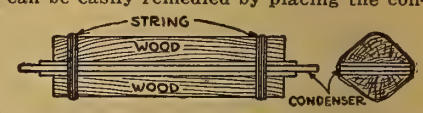
I have picked up stations on the Pacific Coast in the early part of the evenings while the large stations are broadcasting and have had no interference from them. No extra apparatus are required to change over to this hook-up. The diagram is shown with a variable condenser of .0005



mfd. capacity in the tickler coil. This condenser can be replaced by a fixed condenser of the same capacity.—C. C. Dieffenbacher, Memphis, Tenn.

Clamping Fixed Condenser

Those who use the rolled type paper condensers, such as for the grid and phone condensers, may find that considerable noise in their sets will result when the paper comes loose from the tinfoil. This can be easily remedied by placing the condenser between two pieces of wood and clamping the whole in a vise, then tying the ends of the wood securely with heavy silk thread. This will keep the paper and tinfoil pressed tightly and prevent the noise from this source.—William A. Nash, Biddeford, Maine.



A. B. C. LESSONS

(Continued from page 11)

Some say that certain rays from the sun render certain sections of the air conductive and hence enable it to absorb some of the energy of the Radio waves and thus make them less effective. Furthermore, it is also known that the transmitting range, that is, the distance messages can be sent effectively, also varies from day to day due to the various electrical conditions of the atmosphere.

Another annoyance is that on warm days Radio transmission is often interfered with. This is explained by some as being due to the greater quantities of water vapor present in the air. This vapor is frequently heavily charged with static electricity, which not only attracts and absorbs considerable amounts of energy from the ether, but also seems to collect and accumulate on receiving aerials and produce unpleasant sounds in the telephone receivers. It is said that this is the reason that greater ranges can be covered with the same amount of power during the winter than during the summer months.

A very peculiar condition that exists in many mountainous regions is that Radio waves are reflected from the sides of a high mountain or hill and in this maner cause what is known as an "electrical shadow" on the opposite side. This is similar to the sun shining on one side of a billboard, being reflected, and causing a shadow on the other side. Such conditions often cause the various freak messages that are heard occasionally, for the direct and reflected waves combine and produce the most peculiar results.

An important point to bear in mind is that it isn't always static that is the cause of noise or trouble in a receiving set. There may be a broken or loose connection somewhere, or the antenna may be under the inductive influence of some nearby telephone or power line.

The Receiving Station

The Radio receiving station, we were told, corresponds to the cork that was floating on the water in which the disturbance or wave motion was set up. And as the cork responded in every respect to the nature of the waves that passed it, so the Radio receiving station will be influenced and caused to respond to the Radio waves that pass it.

In order that the receiving station will be influenced by the Radio waves as they pass through space, it must be provided with some form of antenna or aerial to intercept the waves and absorb part of their energy. This receiving antenna may be in the form either of one or more parallel wires stretched out into space, or a spiral or coil of wire commonly known as a loop antenna.

As the advancing Radio waves come upon the receiving antenna, they set up in it by the process of electromagnetic induction electrical oscillations of the same frequency. Connected to the receiving antenna is some form of "tuning apparatus" by means of which the antenna can be tuned or adjusted so that it will respond only to a particular wave length and be non-susceptible to waves of other lengths that may be passing through space at the same time.

Receiving Stations Unlimited in Number

It is evident that the number of receiving stations existing within the vicinity of a transmitting or broadcasting station will have but little effect upon the strength of the signals received in any one station, because as the waves advance they will have but very little of their energy intercepted by the receiving antennas.

The electrical oscillations as set up in the receiving antenna, however, are at a very high frequency and far too rapid to affect the human ear and produce the sensation of sound. The receiving station must, therefore, contain additional apparatus for reducing these high frequencies to lower frequencies at which they can be detected as sounds. Furthermore, this reduction in frequency must be accomplished without in any way altering or distorting the incoming oscillations, for otherwise the sounds heard in the receivers will not correspond to those originally sent out at the transmitting station and the received signals would have no meaning. Also, the oscillations are still of an electrical nature and must finally be converted into sounds so that they can be detected by the human ear. This is accomplished by means of telephone receivers, in which we have a sensitive electromagnet that is affected by the electrical oscillations and that in turn moves a diaphragm. This diaphragm by its rapid back and forth motion produces the sounds.

Figure 16 Explanation

In Figure 16 we have illustrated diagramatically the various parts comprising a complete Radio communication system. G is the electrical generating device in which high frequency electrical oscillations are generated. These high frequency oscillations excite the antenna, A-1, and cause the electromagnetic waves to be radiated into space. As these waves move onward they are intercepted by the antenna A-2 of a receiving station. Electrical oscillations of corresponding nature and frequency are set up in the receiving antenna and these in turn affect the receiving apparatus, R. Here the frequencies are reduced and finally sent through the telephone receivers P H, where the electrical oscillations are changed to sounds that can be detected by the human ear. Although all these processes and transformations may seem rather simple to us now, we must not forget that they represent the results of a great deal of time and effort spent in study and research work by some of the world's keenest investigators.

The human ear can detect sounds only up to certain frequencies, above which sounds become inaudible. Since the frequencies used for Radio communication are far beyond those which the human ear can be influenced by, they are generally spoken of as Radio frequencies, while frequencies capable of affecting the human ear are known as audio frequencies, the word audio coming from the word audible, capable of being heard. The dividing line is drawn at 10,000. Frequencies below 10,000 per second are known as audio-frequencies, while frequencies above this value are known as Radio frequencies.

Chapter Five

In Chapter Five will be taken up the complete details of construction and operation of a crystal detector receiving set. Since a crystal detector set is readily constructed at little cost, and since it gives excellent results for listening in to nearby stations, no one who wants to enjoy the thrills of Radio can afford to miss Chapter Five, which will appear in next week's issue.

Radio Study Methods

To obtain the best results in Radio, the amateur, to increase his knowledge, should study in the following order: Construction, arrangement operation, function, care and principles of operation.

Helps for Honeycomb Coil Users

Persons using honeycomb coils wish to try out some other kind of coils as an experiment, such as a regenerative set or a single circuit tuner. It is usually necessary to make a lot of bothersome changes in order to make the experiment. If three Remler stationary plugs are secured and plugged in the regular mounting wires may be attached to the external binding posts on these plugs so that any kind of coils may be used.—Hollis Baird, Canada.

The modern rural school is beginning to take up Radio instruction from the more populous centers. In Hawaii a powerful transmitting plant installed by the public department at Honolulu sends out educational subjects to the schools in the rural districts.

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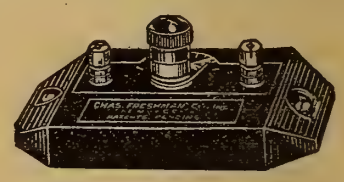

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The By-Pass Condenser in the Reflex Circuit

Part III—Reflex Discussion Gives Three New Hook-Ups

By H. J. Marx

THE key to reflex circuits lies in the proper use of by-pass condensers. For this reason the fan should thoroughly understand their functions and the reasons for their use.

Alternating current when passing through a coil or winding of wire encounters a resistance or choking effect, due to the induction from the magnetic field which is created. As the magnetic field is intensified by the introduction of iron cores, this resistance or choking effect is decidedly increased. Direct current however is unaffected, the magnetic field remains constant and unbroken, therefore no induction takes place.

Alternating current will therefore flow through the primary winding of a Radio frequency transformer, which usually has an air core, an iron dust core, or even in some cases a soft iron core of small diameter. This same current however will not pass through the primary winding of an audio frequency transformer, due to the iron core and increased number of turns of very fine wire.

Then again alternating current will pass on through a condenser whereas a direct current will not.

Audio Primary Must be By-Passed

In reflex circuits the current comes through as an alternating current of high frequency. This current in passing through the plate circuits first goes through the primary of the Radio frequency transformer, where it encounters but little resistance to its passage. The next winding through which it must pass is the primary of an audio frequency transformer. As just explained the resistance is too great. In order to overcome this, the primary of the audio frequency transformer is shunted with a fixed condenser through which the audio frequency current is enabled to pass instead of the transformer winding.

Now to follow through what happens after the current has passed through the series of stages the first time. Whether a crystal or tube detector is used, the current has been rectified and is then a pulsating direct current in form, and of much lower frequency. Having been reflected back to the tubes all over again, it passes through the primary winding of the Radio frequency transformer and encounters very little resistance in passing through it. When it gets to the primary of the audio frequency transformer, it goes through the winding instead of the condenser, as was the case before rectification.

Audio Transformer Secondary Effects

The question may be asked why it is that the secondary windings of audio frequency transformers are not always shunted with by-pass condensers. It will be found that the natural capacity of such a winding is usually sufficient to permit the Radio frequency currents to pass through.

There seems to be a wrong impression that this by-pass condenser should be variable and is added for tuning the primary circuits of the various stages to the proper wave lengths.

The variable resistance sometimes added in the plate circuit, is used for stabilizing the various stages through

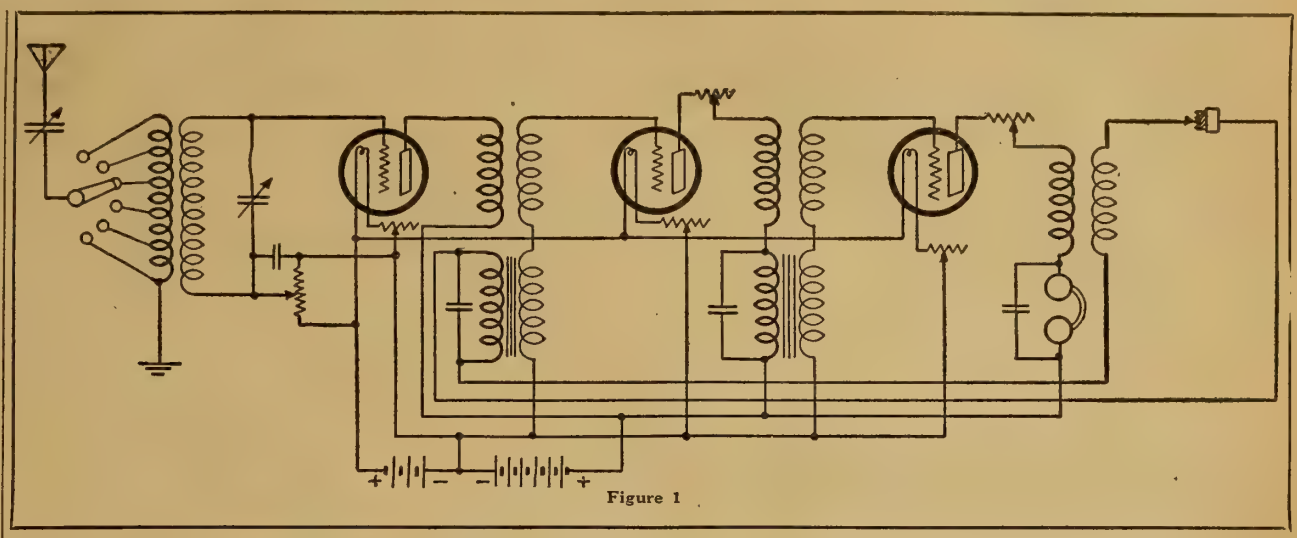


Figure 1

which two different frequency currents are passing.

Hook-Up Figure 1

The Figure 1 three-tube reflex hook-up is very similar to the one published in the first article of this series. Transformer coupling is used throughout, however. Three Radio frequency and two audio frequency are required. A crystal detector is used for rectification of the Radio frequency current. A potentiometer is shunted across the A battery and is used for controlling the potential of the grid of the first tube.

High variable resistance such as potentiometers (400 to 1,000 ohms or even more) are inserted in series in the plate circuits of the second and third tubes. A .002 mfd. fixed condenser is connected from the moving lever of the potentiometer to the negative side of the filament battery. This also acts as a by-pass for Radio frequency currents.

The variable condenser in the primary circuit has a capacity of .001 mfd., while the one shunted across the secondary need not have more than .0005 mfd. All tubes have separate rheostat control.

This circuit will be found selective and simple to operate. The plate voltage should be about 80 volts.

Hook-Up Figure 2

The same type of coupling, with, however, a tube detector, is illustrated in Figure 2. This circuit is likewise three stages of Radio frequency, detector and two stages of audio frequency. A variocoupler, with two tap switches for both rough and fine adjustment, is used for the tuning. A .001 mfd. variable condenser is added in series in the antenna circuit although this may be omitted if the antenna is short. A .0005 mfd. variable condenser is used to tune the secondary circuit. The grid potential of all stages except the detector, is controlled by means of a 400-ohm potentiometer connected across the filament or six-volt battery. A .002 mfd. fixed condenser is connected in between the moving lever of the potentiometer and the negative terminal, acting as a by-pass for any stray Radio frequency currents. Fixed condensers of .002 mfd. capacity are shunted

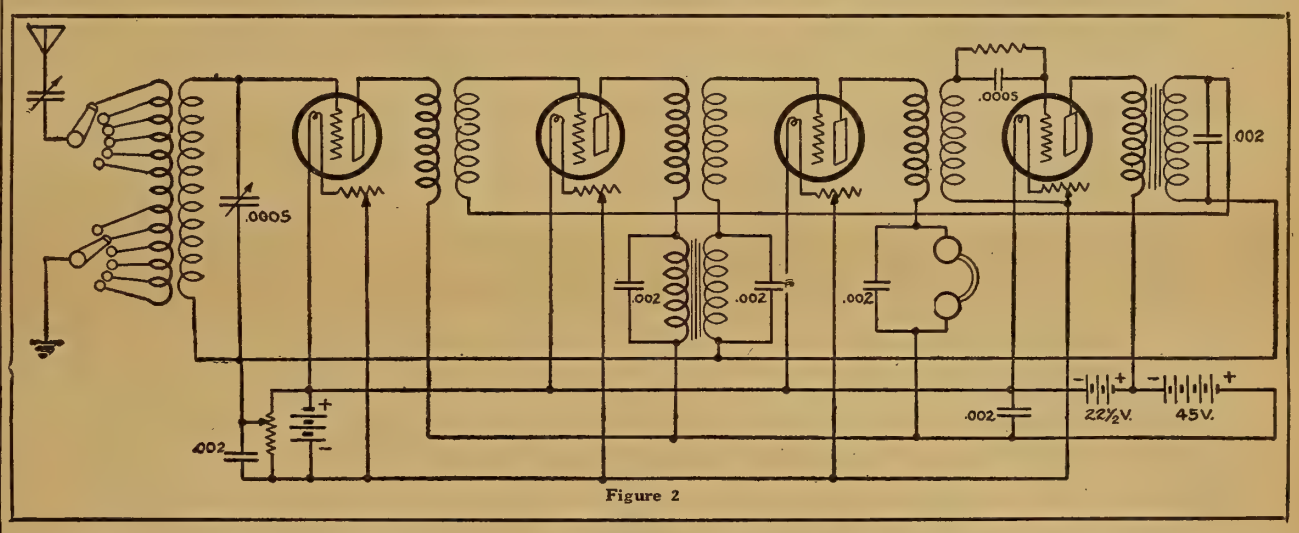


Figure 2

across the secondary of the first audio frequency transformer, across both windings of the second audio frequency transformer, across the plate batteries, and also across the phone or output terminals.

In spite of the apparent complex nature of the set, it presents no serious difficulties in tuning. The potentiometer is apt to be rather critical if its resistance isn't high enough. The secondary condenser is also apt to be critical unless a vernier is used. The plate voltage can be increased to as high as 100 in the amplifying stages but it is best to test out for the voltage giving the best results without distortion or mushing of signals. The filament rheostats will have decided effectiveness in selectivity for distant stations. In fact it would be advisable to use a vernier rheostat for the detector tube. The grid leak used in the detector grid circuit might be of the variable type, so that the best grid reaction adjustment can be obtained. This will vary for the different types of detector tubes that may be used.

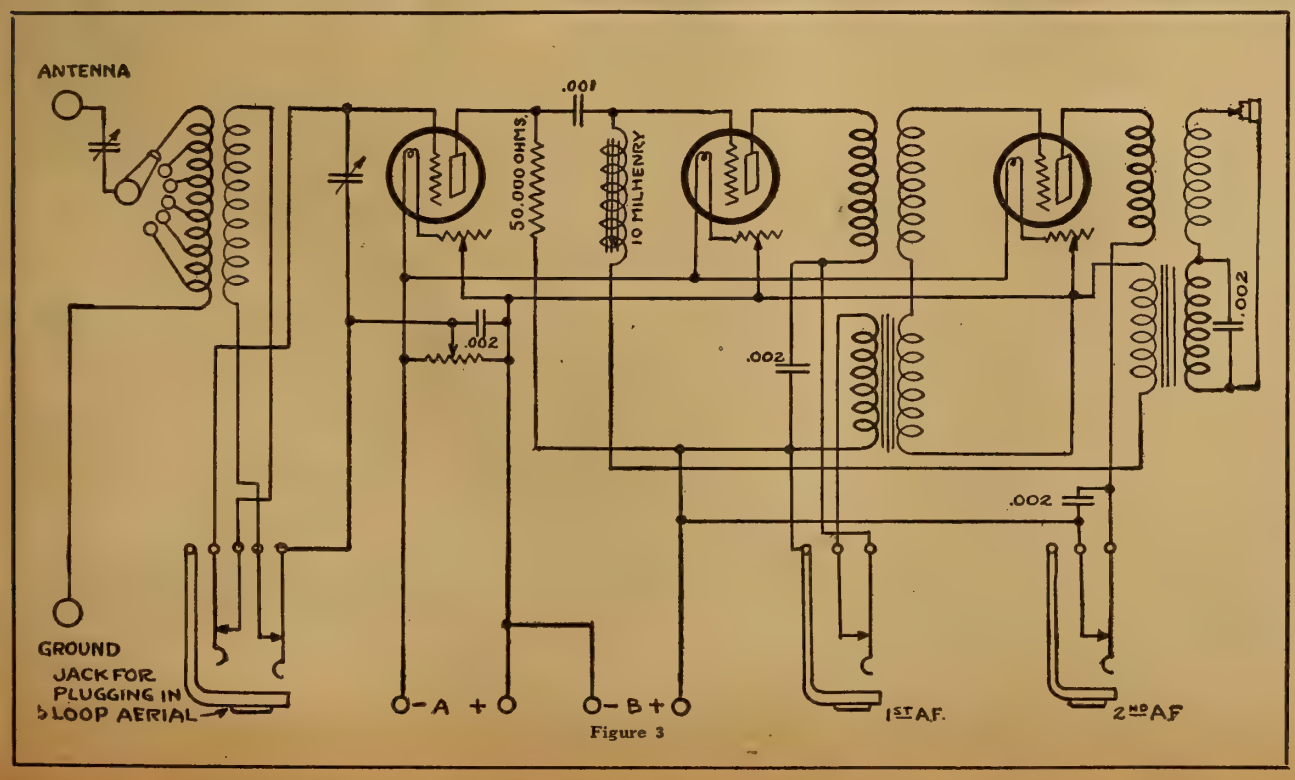


Figure 3

Hook-Up Figure 3

There is no reason why jacks should not be incorporated in reflex circuits. Although not called for in the Figure 3 illustration, filament control jacks may be substituted. If this is done, both jacks should be connected so that current is furnished to all the tubes when a plug is inserted in either jack.

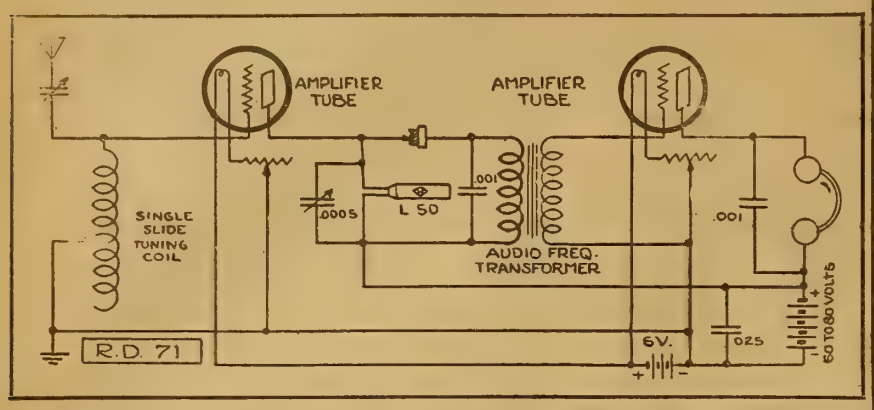
The last two jacks are for plugging in either the first or second stages of audio frequency. The first jack (double-circuit type) permits the use of a loop aerial, automatically cutting out the variocoupler which would then be unnecessary.

The variable condenser in the primary circuit should have a capacity of .001 mfd. The secondary variable condenser is of the vernier type, having .0005 mfd. capacity.

It will be noticed that only the first stage of Radio frequency uses the potentiometer for grid control. The usual .002 mfd. condensers are used for the by-pass of all Radio frequency currents throughout the circuit. When either jack is in use,

(Continued on page 14)

R.F. AND A.F. ON CRYSTAL SET



THIS hook-up was developed to meet the request of a fan who wanted to add Radio and audio frequency to his crystal set. The additional parts required outside of batteries and tubes, are inexpensive and simple.

If necessary (in case of a long antenna) a .001 mfd. variable condenser is added in the antenna lead as shown. A single-slide tuning coil is used for tuning this circuit.

A 50-turn honeycomb coil with a .0005 variable condenser shunted across it permits adjustment of wave length in the coupling between the Radio frequency amplifier tube and the crystal detector. Any standard audio frequency transformer is used in the coupling between the crystal detector and the audio frequency amplifier tube. The .001 mfd. fixed condenser across the primary of the audio frequency transformer acts as a by-pass of Radio frequency strays that may leak through. In the same manner a .025 mfd. fixed condenser is shunted across the plate battery, which should have a voltage of from 60 to 80.

The controls for tuning have been reduced to a minimum so that the tuning of this circuit will be exceptionally simple.

The Reader's View

Ignorant Radio Dealers

It is unfortunate that so few dealers in Radio apparatus know anything about Radio. In buying my outfit, I visited 18 dealers in a city of 150,000 people. Seventeen of the number had absolutely no idea of the distance range of the apparatus they sell nor could they answer intelligent questions concerning cost of upkeep or relative value of different types of aerials.

One of the number was an amateur and "knew his stuff" and told us truthfully what he knew about Radio sets. He demonstrated fourteen makes for us. We bought a ——— set, with ——— loud speaker, and it works fine.

I became very much of a fan and bought a smaller set for my own home. I had the same experience in selecting a small set—dealers knew little or nothing about them, and would not let me try them. A ——— dealer was also ignorant of his stuff but let me take a set on 15 days' trial. I found it to be entirely satisfactory. Have heard plainly, clearly and with little interference a total of 62 stations scattered from Cuba to Portland, Ore., and from New York to San Francisco. I know my set.

On December 18 to 23 I was in ——, ——. There is a broadcasting station there and five dealers in Radio apparatus. I spent not less than two hours with each, and they were all unable to get a single out-of-town station satisfactorily on their demonstrating sets. Not only that, but I distinctly heard them advise prospective customers to do things that any "boob" that has owned a set thirty days knows not to do.

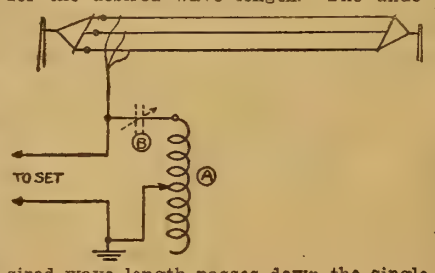
I called the dealer to one side and demonstrated and with his permission made a few changes in his lead-in wire, adjusted plate voltage on his demonstrating set and brought in five distant, out-of-town stations loud and clear through a loud speaker. I am not interested in any way in the sale of Radio apparatus, but at the request of this dealer I looked over four sets that were not giving satisfaction, made necessary changes and adjustments and each of the four sets worked fine on local and distant stations.

Some dealers are preaching the doctrine, "Most any sort of aerial from bed spring, loop, or 50 feet of wire strung around a ceiling will do!" These types of aerials do for local stations, but for distant reception, outside single-wire aerials are so much better with most sets.—S.P.D., Somerville, Tenn., via A. T. & T. Co., New York, N. Y.

Classroom lectures on history are to be broadcast by Radio from the University of Washington.

Interference Eliminator

The illustration shows a hook-up in which A represents a single slide tuner which is tuned to the undesired wave length and the tuner on the set is tuned for the desired wave length. The undesired wave length passes down the single slide tuner and you have no interference. A variable condenser is shown at B, which when inserted will give better tuning than the one slide coil.—Lester V. Hergman, New York, N. Y.



REFLEX CIRCUITS

(Continued from page 13)

the by-pass condenser is automatically connected across the phones.

The plate battery voltage will run from 60 to 100, depending on the types of tubes that are to be used. These all should be hard amplifying tubes. The 50,000-ohm resistance and the 20-milhenry Radio frequency choke coil are obtainable at the Radio stores.

The second and third tubes can be controlled through one rheostat instead of two, if desired, but the first tube should have an individual rheostat.

In using detector crystals for reflex hook-ups, the same conditions apply as in the normal circuits. For this reason no special characteristics are required other than what is normally expected. Many developments have taken place in the last few months so that a number of the bothersome adjustments have been eliminated.

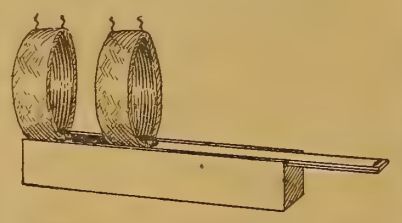
Cardboard Tubes Are Easily Made at Home

It often happens that the Radiophan wants a cardboard tube of a size not available. I find that it is a simple matter to make them. A bottle, dry cell or any other round object, which is 1/16 or 1/8 inch smaller than the outside diameter of the size desired, is used for the pattern. If these are not at hand a section cut from a limb of a maple tree may be used. The tube is made of layers of paper like kraft paper. The paper is cut to 6 or 7 inches wide and about 5 feet long. Apply paraffin to the object on which you intend to wind the paper and prepare a paste by mixing yellow dextrine with water until you have a smooth paste, roll your paper once around the pattern to keep the paste out, then apply the dextrine on the paper and spread it very thin all over it, then roll the pattern along on the paper. If there is not enough paper in the strip add more and spread on the dextrine.

The paper will not always roll straight, but this will not be detrimental as there will be 2 inches for trimming when the roll is complete. When the desired thickness has been reached leave it on the pattern if possible and place it in an oven to dry. When thoroughly dry trim it with tinner's snips, a razor blade, rasp, sandpaper or anything that you may have available for this purpose. When finished you will have a tube equal to anything you can buy.—Edward Gille, Quincy, Ill.

Simple Honeycomb Coil Mounting

The mounting shown in the illustration is original with me, although it is so simple it may have been used many times. In making of the Flewelling circuit I was

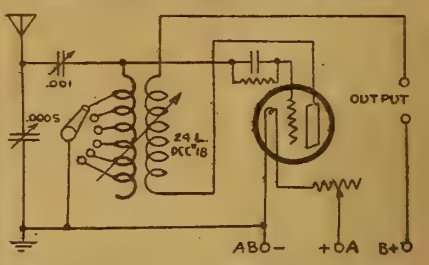


confronted with the problem of mounting the coils in the simplest manner possible, as I have no workshop. I wound two sections of a mailing tube as directed, then cut out a small piece of wood about 1 inch square and about ½ inch thick. The piece was covered with tire tape. The block was strapped to the coil.

A small wood box, such as is used for packing fountain pens, made the mounting. One coil was permanently fastened to the box end and the other to the sliding cover, as shown. The box was then attached to the back of the panel. The tip of the sliding cover was left protruding over the panel at the end. Sliding the cover back and forth provided a means of tuning in the coils. This gives parallel variance rather than angular, and it produces the cheapest mounting that can be procured.—G. E. Lippincott, Philadelphia, Pa.

One Tube Set

The illustration shows a circuit using a detector tube that has given good results. The antenna for this circuit is 10 feet high



and 25 feet long—one wire. The type of a variocoupler used in this circuit is the one fitted with a rotor set on the upper end of the coil.—Le Roy Dolen, Sapulpa, Okla.

Electrical Terms

Universal electrical terms are easily understood by using a simple water analogy. Volts, or potential, the equivalent to pounds pressure. Amperes are equivalent to gallons, measuring volume. Watts are the power units, or volts times amperes. Ohms are the resistance unit.

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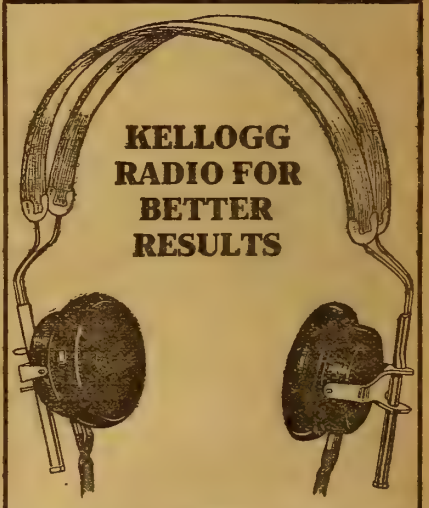

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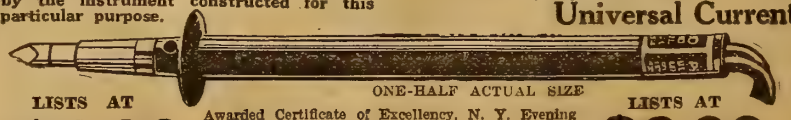

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Questions and Answers

Devoted Entirely to Flewelling Fans' Inquiries

Flewelling Wave Length Range

(1706) JKG, St. Paul, Minn.

Kindly answer a few questions regarding the Flewelling super-regenerative panel set as shown on page 13 of the December 9 issue.

1. My antenna is a single wire, 100 feet long and 25 feet lead-in. How will this work with the coils mentioned in the circuit?

2. What wave lengths will this circuit cover, with said coils?

3. For panel mounting, can the primary coil be stationary, and the tickler movable?

4. With proper primary and secondary coils, would it be possible to receive the Arlington time signals? If so, what size coils would be needed, and what other changes?

5. Have you anything definite, as to what distance has been heard with this circuit?

A.—1. Your antenna construction is rather long but should be effective with the circuit in question.

2. This circuit should cover from two hundred and fifty to four hundred and fifty meters wave length.

3. Primary coil may be stationary and tickler coil moveable.

4. This circuit is not so effective on high wave lengths, and it is doubtful if you would receive Arlington time signals through it.

5. Generally speaking it has a receiving range of up to one thousand miles, although we have had reception reports as high as two thousand miles.

Flewelling for Economy and Range

(1711) HDC, Douglas, Ariz.

I was much interested in your article in the DIGEST, which I read with religious regularity, concerning the Flewelling super-regenerative set for the following reason:

I am a manual training teacher in a town from 500 to 1,000 miles from any good broadcasting stations. I have a homemade Radio-audio set which receives almost everything between here and Portland, Oregon, Davenport, Iowa, Los Angeles, and Houston, Texas. However, complete with tubes and batteries it cost about $100 and is beyond the means of most of my pupils.

It seems as if this hook-up, used with WD-11 tube, should give distance and volume at little cost.

Do you agree with me?

Can a variable leak, which would be easy for a boy to operate, be made having a fiber base and an india ink line with switch points, variable with switch? If so, how wide a line, how great a radius, and how close should switch points be, and how many of them?

Will this set receive 500 miles (Los Angeles), 700 miles (Salt Lake), 900 miles (Fort Worth) on a loop? If so, what size?

I do not understand how antenna and ground is connected to set. If aerial is used is no ground used?

A.—We are gratified to hear from you with such kindly expression of interest in our publication in general and the Flewelling circuit in particular.

In our opinion this circuit employing WD-11 tube, as suggested, certainly is worthy of experimentation. Use 100 volts on the plate of this tube.

Your idea of variable leak is good, although we would not trouble with the contact points. Rather make a line ½-inch wide and 5 inches long on a piece of fiber with india ink, using a sliding or rotary lever on it.

The suggested range could be accomplished with a loop, as reports confirm this. A 10 to 12-turn loop, 30 inches on a side, will be satisfactory.

For antenna and ground take the two leads which would come from the loop antenna. Usually only one of the two is necessary. Connect to the grid side of the 50-turn coil.

Power Amplifier for Flewelling

(1739) CBS, Toledo, O.

I have a Flewelling super-regenerative panel receiver with single tube as illustrated in your December 2 issue. I have also noted in your December 9th issue, that amplification can be added.

As I have a power amplifier and horn, I am wondering if there is any way I can connect this outfit to the Flewelling. If this can be done, I would appreciate a diagram of the filter circuit that should be used in connection with the outfit so as to eliminate the whistle in the set.

A.—The power amplifier and horn can be used with the Flewelling circuit as suggested. It would be advisable, however, to shunt a variable leak resistance across the two input binding posts of the power amplifier, which are connected to the phone terminals of the Flewelling panel. Use separate B batteries on the power amplifier, although the A battery can be common.

Transformer Connections

(1740) HA, Tampa, Fla.

I am going to try out the "one lung" Flewelling circuit. I notice in your description of the amplifier (audio) for this set you connect one end of transformer secondary to positive side of filament instead of negative side.

Why is this done, or is it immaterial? Nearly all hook-ups connect to negative side. I note also that positive side is specified in Mr. Flewelling's telegram. I note that positive side of A battery is used throughout instead of negative as per usual practice. I do not want to belong to the five per cent who do not get results with this circuit so I am trying to get right before I start.

What effect does a grid condenser of too large capacity have on signal strength?

A.—It is immaterial which method of connecting audio transformer to filament is employed, although it might be well in executing any circuit to follow the details of its originator. A number of hard tubes will be found to give better results when connected as shown.

A grid condenser having too much capacity will have a choking effect on received signals.

Tin Pan Music

(1737) FW, Detroit, Mich.

I put up a Flewelling circuit and it works fine on WWJ and WCX, which are only one-half mile from me, but when their concert is over and I try for long range I get Atlanta, Kansas City, Newark, Chicago, New York, Minneapolis, Pittsburgh and Schenectady, but the signals are mushy. I can hardly understand them as the music sounds like some one pounding on a tin pan.

I intend rewiring it again and using two steps of audio frequency amplification and also a crystal detector so I can receive WWJ and WCX on the crystal. Would you please send me a diagram of the Flewelling circuit, with a crystal detector and also two stages of audio. I would like to have it drawn so I would have a jack for the crystal, one for the detector and a jack for each step of audio; four jacks in all. I want to use one A battery and two B batteries, 100 volts for Flewelling and 100 volts for audio amplification.

My aerial is in a nest of telephone and high tension power lines, but I have it running at right angles with the power lines. Would this help to make my signals mushy?

A.—Having constructed your antenna at right angles to high tension lines there should be no interference from this source. the mushiness of signals indicates an incorrect value in grid leak. This may be determined and overcome through experimentation. Use the best variable grid leaks you can make or buy.

A crystal detector would not function in the circuit you are employing.

A diagram showing two stages of audio frequency amplification for the Flewelling appears on page thirteen of the December 9 issue. This will be helpful to you.

Kind of Tubes to Use

(1744) GWK, Hope, N. D.

In the December 2 DIGEST, page 13, you give the Flewelling single-tube set saying to use a hard vacuum amplifier tube. Now, on page 13 of December 9 issue you say to use two amplifier vacuum tubes. Then in the reading of it, you say the elimination of the whistling must be accomplished through the detector circuit. Now what I want to know is, do I use three of the same tubes to make a two-stage audio frequency amplifier? Let me know if you use a detector tube and what kind of tube it is.

Could I use a variocoupler in place of the honeycomb coils?

A.—In the Flewelling circuit hard tubes should be used throughout for both detector and amplifier. The employment of a variocoupler instead of honeycomb coils will be entirely practical.

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$1.00 Sockets	.35
$1.00 All Moulded V. T. Sockets	.25
DIALS:	
$1.00 Genuine Bakelite Dials—3-in., 45c; 4-in.	.55
VARIOCOUPLERS:	
$7.00 Guaranteed Genuine Bakelite Pioneer Variocoupler, silk wound	4.75
$4.25 Variocoupler, guaranteed high quality	2.25
$8.00 Moulded Variocoupler, highest quality	4.50
$5.00 Shamrock Variocoupler	2.59
TRANSFORMERS:	
$5.00 Acme Transformer	3.40
$3.00 Radio Frequency Transformers	1.65
$6.50 Wessco Audio Transformers, highest quality guaranteed	3.25
VARIOMETERS:	
$6.50 Pioneer Variometer, Genuine Bakelite silk wound	4.50
$6.60 Wessco Variometer, highest quality guaranteed	3.25
$4.50 Variometer, guaranteed high quality.	2.40
$6.50 Moulded Variometer, highest quality..	3.50
BATTERIES:	
$8.75 Westinghouse Storage B Battery	4.75
$24.00 A Battery, 100 Amp., 6 V	16.75
$19.00 A Battery, 20 Amp., 6 V	11.75
$14.50 A Battery, 60 Amp., 6 V	8.75
$3.00 Battery, 22½ V. Variable, highest quality guaranteed. Large size	1.45
$1.75 B Battery, 22½ V. Variable, highest quality guaranteed. Small size	.75
CONDENSERS:	
$5.00 23-pl. Variable Condenser	1.65
$3.50 43-pl. Variable Condenser	1.95
3-plate Vernier Variable Condenser	.70
50c Mica Condensers	.25
Thordarson Grid Condenser	.15
Bronze Bus Bar, tinned, ft.	.02

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$1.50 Microstats	.85
Spaghetti, per length	.07½
PHONES:	
Special Electric Soldering Iron, 2 heats	4.95
20c Bezel	.15
$3.00 Brandes Phones	5.75
$8.00 Dreyfuss Phones	[illegible]
$5.00 Murdock Phones	3.55
$1.00 Freshman Variable Grid Leak	.75
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100 ft. coil No. 14, 7-strand pure copper Aerial Wire	.50
Magnet Wire 20 per cent. off list.	
RHEOSTAT:	
$1.50 Thordarson Vernier Rheostat	1.10
$1.00 Rheostat	.32
Homecharger De Luxe	13.25
Johns-Manville Blk. Com. Tubes, 3-in.	.25
DETECTORS:	
$ .75 Crystal Detector	.35
$ .40 K. D. Crystal Detector	.16
$1.50 Multi Jack	1.15
$1.50 Twin Adapter	1.15
$1.25 Universal Plug	.75
BATTERY CHARGERS:	
$18.00 Westinghouse Battery Chargers	13.25
$19.50 Westinghouse Battery Chargers for A. & B. Batteries	16.00
70c Open Circuit Jack	.40
85c Double Circuit	.45
75c Battery Hydrometer	.35
KNIFE SWITCHES:	
Knife Switch S. P. S. T.	.14
Knife Switch S. P. D. T.	.22
Knife Switch D. P. D. T.	.35
Wooden Horn	6.00
Contact Points	[illegible]

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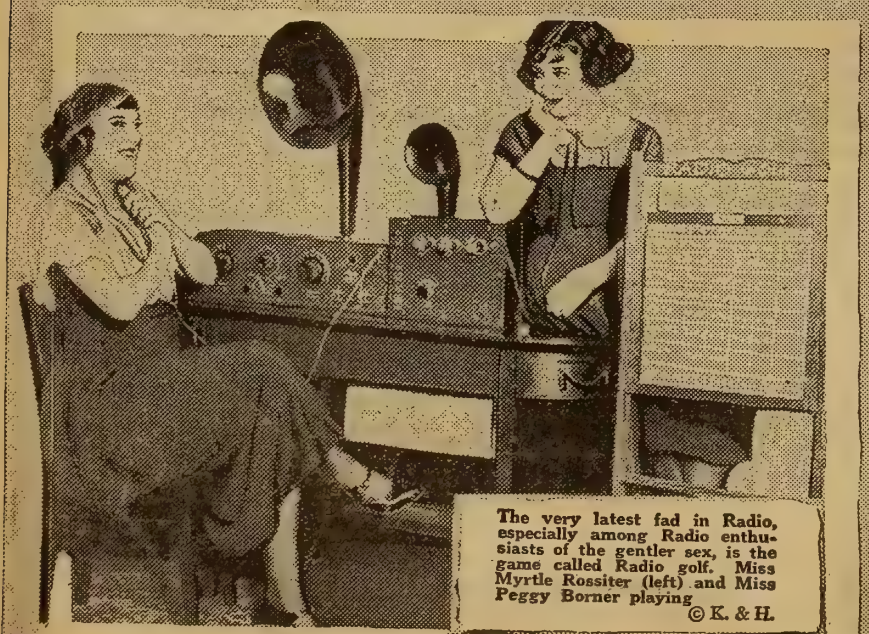
Radio Illustrated

Electrical inventions in the last few years have greatly reduced the work about the house and now comes the ether wave machine that fills the air with music and advice about household affairs while the housewife is at the few remaining duties necessary to keep the house in order © K. & H.



The very latest fad in Radio, especially among Radio enthusiasts of the gentler sex, is the game called Radio golf. Miss Myrtle Rossiter (left) and Miss Peggy Borner playing © K. & H.

The picture is that of William Keating of St. Paul, Minnesota, who has built a small crystal set on which he has succeeded in picking up stations for several hundred miles from the city. Crystal sets, as a rule, are not adaptable to long distances, but young Keating has had unusual luck in picking up such broadcasting stations as St. Louis, Mo., Louisville, Ky., and Davenport, Ia. Keating's hook-up is very simple and similar to those used by most Radiophans © Int.

Flewelling Tells "How"; Q. & A. on Reinartz

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

TRADE-MARK

Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, FEBRUARY 3, 1923 | No. 4

SEE TOLL PLANT CHAIN

POPULAR ARTISTS BEFORE WJZ MICROPHONE

Ada Mae Weeks, who plays the leading role in "The O'Brien Girl," is shown here singing "Learn to Smile" at WJZ, in Newark

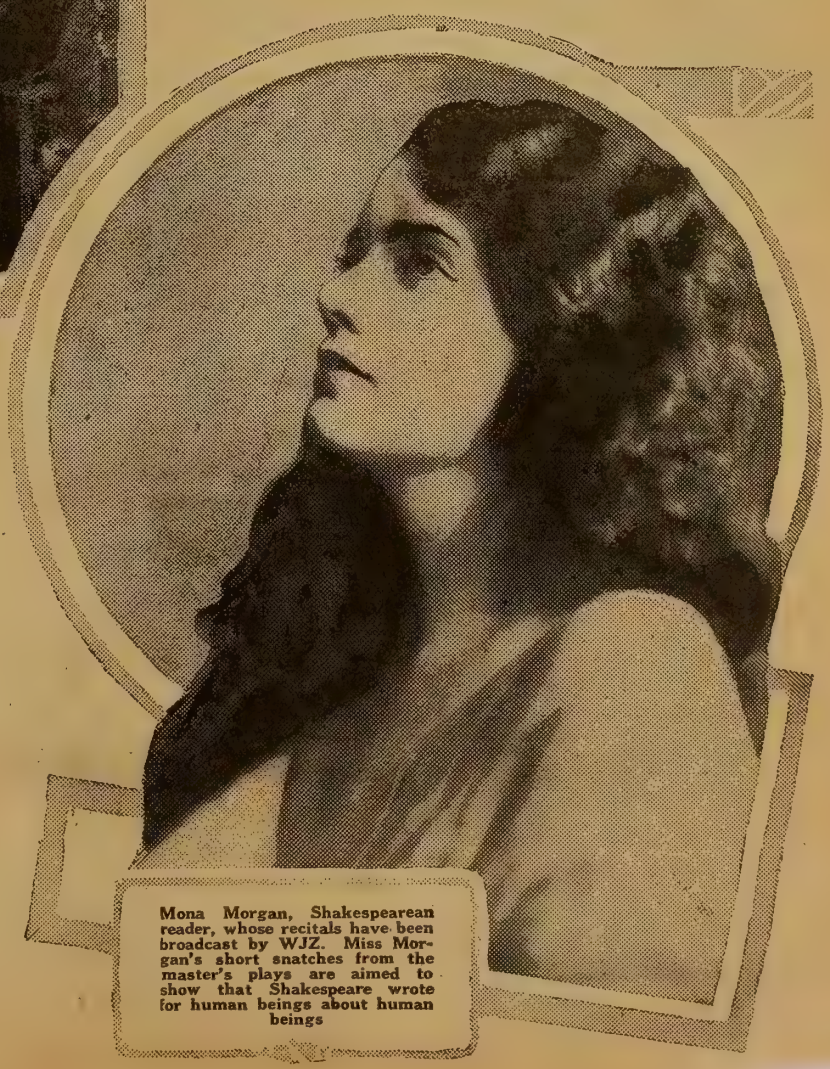
PLANS FOLLOW $25,000 TEST OF SIMULTANEOUS BROADCASTING SERVICE

American Telephone and Telegraph to Establish First Station in Boston—Two Plants Send Same Program at One Time During Tryout

(By F. N. Hollingsworth, Special Correspondent)

NEW YORK.—An experiment in Radiophone broadcasting, the first of its kind ever attempted, has resulted successfully—so successfully, in fact, that the world's greatest telephone corporation is about to launch the establishment of a chain of Radio test laboratories and Radio toll stations that will extend from the Atlantic to the Pacific coasts, both north and south in two

(Continued on page 2)



Mona Morgan, Shakespearean reader, whose recitals have been broadcast by WJZ. Miss Morgan's short snatches from the master's plays are aimed to show that Shakespeare wrote for human beings about human beings

HEAR PHILADELPHIA STATION IN HAWAII

SENSITIVE RECEIVING SET BRIDGES 5,100-MILE GAP

Government Operator at Pearl Harbor Picks Up "Laughing Record" from WIP Plant

PHILADELPHIA, PA.—Using super-sensitive receiving set, H. B. Smith, a government Radio operator stationed at Pearl Harbor, Hawaiian Islands, while "listening in" October 18, picked up Station WIP, Philadelphia, approximately 5,100 miles distant, making a world record for long-distance receiving. Word has just been received here of the feat. Station WIP is located in the Gimbel Brothers' store here.

"I heard what sounded like someone laughing," said Mr. Smith in reporting the reception, "and thought at first that an operator in some broadcasting station nearby had made some kind of a blunder, for the sound came in clear and strong. Then, to my astonishment, I heard the sign-off, 'This is station WIP, Gimbel Brothers, Philadelphia,' At another time I heard the 'bedtime stories' broadcast by this station.

Heard "Laughing Record"

Station WIP checked up the various items of musical programs broadcast the day preceding that named by Mr. Smith and found that at 3:25 P. M., Eastern

(Continued on page 2)

PA TO BE RADIOED TO RADIO SON CASH

PRINCETON.—Princeton undergraduates may send home for money via Radio at no cost to either them or "the governor," according to a recent announcement by the Princeton Radio club. It has arranged with amateur Radio operators throughout the United States and Canada to relay messages from Princeton to their destinations free of charge.

"Gentleman Jim" Corbett Tells of New "Pug" Rules

NEWARK, N. J.—The first public reading of the new Roosevelt boxing Rules were given from Station WOR by James J. Corbett on January 9. A special committee of noted sporting editors and ring celebrities was on hand at the Radio station to hear "Gentleman Jim's" proposed code and several recognized boxing experts expressed opinion of the rules, broadcasting these immediately after the sending.

WJZ Crosses Ocean Again

NEWARK, N. J.—Carl Rollins' voice carried across the Atlantic Ocean recently when he sang "When Knights Were Bold," at Station WJZ. He received a letter from Morgan Edwards, amateur of Southampton, England, stating that his solo was picked up there.

SEE TOLL PLANT CHAIN

(Continued from page 1)

lines. This experiment, preparations for which covered several months, was that of simultaneously broadcasting from a New York station on a 400-meter wave length and from a Boston station on a 360-meter wave length. The results are declared by experts to have been flawless.

WEAF-WNAC Program Three Hours Long

The New York station was WEAF, of the American Telephone & Telegraph Company at 14 Walker street, New York city, and the Boston station was WNAC, of the Shepard Stores, on Winter street, Boston. The program was three hours long, and comprised a number of orchestral selections, saxophone and cello solos, contralto and varitone vocalists, and most unusual of all, a bird mimic, whose imitations of bird songs and notes were as clearly and flawlessly heard as though he were in the same room with the listeners.

From the New York station was run a long distance telephone circuit of approximately 300 miles, equipped at intervals with repeaters or amplifiers and special filters, which equalized the circuit so that the sound came into the Boston station as clearly as it entered at the New York end. To equalize a telephone circuit means that whatever goes into it at one end comes out exactly the same at the other end, or wherever it might be tapped.

If the lines had not been equalized, the high notes of the saxophone or the low tones of the piano might have been the only ones heard distinctly at the Boston end when broadcast.

Problem Delicate; Four Circuits Used

From a technical standpoint, the control of a broadcasting station 300 miles from New York by means of telephone lines is a most delicate problem. Four circuits were used to stage this feat. The first was the "regular" circuit, which carried the broadcast program. The second was an emergency circuit, which could be plugged in should the regular one fail through storm or other interference. The third was a local circuit, used in Boston, for a big side issue program, which will be touched upon later in this article. The fourth was the "order circuit," by which the telephone and Radio engineers in New York and Boston kept in touch with each other and noted progress of the experiment. There were fifteen experts handling the matter at the Boston end.

Four of these experts were stationed at the Copley-Plaza hotel, about a mile from Station WNAC. Here, in the big ballroom, was installed a "public address system," consisting of four huge loud speaker horns with 50-watt tubes as power amplifiers. A bankers' convention was being held there at the time, and this evening program was rendered to them by combined Radio and telephone as a special entertainment.

100,000 Radiophans Listen in

Owing to the care exercised in adjusting the filters and repeaters, there was no distortion; every note coming over as clear as the original. At least a hundred thousand Radiophans, throughout New England and along the Atlantic seaboard, listened in on this remarkable program. Station WNAC has records of being heard as far south as Porto Rico, and Commerce, Texas, as far east as the Azores, and as far west as Montana. Therefore one can imagine the possibilities of this combined broadcasting.

The expense of the test was $25,000, but telephone officials say it would have been well worth double that to get the results they obtained.

A. T. & T. Co. Plan First Link

Within a very short time it is expected that the American Telephone & Telegraph Company will establish in Boston their own test laboratory and Radio toll station. With the New York station it will constitute the first link in a chain that will be established very soon west, north and south along lines in big cities to the Pacific Coast.

Nothing definite had been decided until the big test of January 4, but immediately thereafter word came from New York that the Boston station will be established within a few months. The project will not stop in Boston, however, but the chain will be gradually pushed westward. Already hundreds of letters and telegrams have been received at Station WNAC telling of picking up the New York concert, which was duly announced as a simultaneous broadcast, in the usual matter-of-fact way that the Shepard station has. The letters also mentioned the broadcast's remarkable clearness.

What System Holds for Future

In time, say experts, the country will be covered with Radio toll stations, so that a big concert in New York, or the inaugural address of a President, or the speech of some silver-tongued orator may be broadcast by contract to any part of the country. Arrangements can then be made for loud speakers installed in some big auditorium where the audience can sit and listen to an evening's program without ever seeing the participants. San Francisco will be able to hear the Metropolitan opera, by contract with the company itself and the telephone company with its Radio toll stations as the intermediary and transmitting agents.

Political parties can have the greatest campaign orators in the country speak to ...lred audiences simultaneously, at perhaps no more expenditure than would be involved in their traveling expenses, and at a great saving of his time and nervous energy.

$100 FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 24 at midnight. Awards will be announced in the March 17 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $40.00; Second, $25.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded each tying contestant.

5. Judges will be the Technical Staff of Radio Digest.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The article should tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants on request.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Tufts Students Broadcast Songs and Mandolin Tunes

MEDFORD HILLSIDE, MASS.—On Tuesday evening, January 23, the Tufts College Glee and Mandolin Clubs broadcast from station WGL a program of glees, mandolin numbers and readings most pleasing to the listeners in who appreciate college music. Tufts College is known throughout the East as the "Singing College," and musical organizations go far to bear out that name.

Broadcast programs sound clearer on a crystal or nonregenerative than on a regenerative set, but the latter brings them in louder.

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Radio Digest, Illustrated, Volume 4, Number 4, published Chicago, Illinois, February 3, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter April 27, 1922, at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

E. T. Flewelling, Writing Exclusively for the Digest, will tell in Part II of his series, to appear next issue, more about the successful construction and operation of his famous flivver super set. Can you receive 1,500 miles using only a wire twenty feet long laid behind the picture molding in a room? Try it with a Flewelling.

How to Make a Panel Reinartz Tuner will be told by Harry J. Marx in the next issue, February 10, of Radio Digest. Its a toss-up between Flewelling and Reinartz when it comes to popularity. Both circuits are wizards for results, however, so we will leave it to the Radiophan to choose.

Lambdin Kay and His WSB Radio Owls are in direct opposition with the ideas of Station WOAI of San Antonio, Texas. Read both sides of the story in the next Digest. Do you favor such broadcasting station organizations, or do you fall in line with WOAI and oppose them?

The Receiving Records Contest will appear in full, revised to date, in the February 10 issue. The contest has been travelling along for many months now, but still records are broken every week. When will the maximum distances be reached?

A-B-C Lessons for Radio Beginners, by Arthur G. Mohaupt, will tell next week all about the construction in general of tuning apparatus, such as loading coils, variometers and variocouplers. Turn to page 11 and read the fifth chapter now.

Part III of "Radiophone Broadcasting Stations" with the State, City Index will be found on page 8 of the February 10 issue. This original feature of the Digest is the most accurate, complete, and in fact, only reliable directory of broadcasting stations, published.

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CLOSE 1ST CONTEST BUT OPEN NEW ONE

FLEWELLING FANS URGED TO RUSH PAPERS IN

Prizes Raised—Lack of Time and Contestants Cause for Closing First Contest without Awards

By the Flewelling Contest Editor

Get your Flewelling Contest manuscripts in to Radio Digest before midnight February 24! Because no papers were submitted up to the first closing date, January 27, announced for the first contest, it was erroneously extended two weeks. As such an extension is not allowable according to the postal regulations, the first contest was therefore closed on January 27 without award.

Prizes Increased

But, a second contest is now open. Increased prizes (see rules on this page) should make the efforts of the contestants more intensified.

Any manuscripts received too late for the first contest will be, if the constestant desires, considered as entered in the second contest.

Read the rules and do your best to win one of the eight prizes offered.

Awards will be announced in the March 17 issue.

BOSTON HEARS OPERA BY PHONE FIRST TIME

Chicago Singers, En Tour, Present "Aida"—Radio Digest Aids Plans for Service

BOSTON, MASS.—Grand opera was broadcast by Radio from Boston for the first time January 22, when Station WNAC, the Shepard Stores, sent out the opening opera "Aida", given by the Chicago Opera company at the Boston Opera House. The company is completing a two weeks' season in Boston. By arrangement with the Chicago management, Radio Digest cooperating in the plans, microphones were installed in the opera house and the great artists who took part were heard perfectly.

"Aida" was selected for this first experiment in opera by Radio from Boston, as it can be appreciated without the visualization afforded by the costumes and scenery, which might be necessary with some other operas. A special request was issued to Radio listeners to write to Ralph Flanders of the New England Conservatory of Music their comments on the opera and its Radio qualities, so that he can make a report which will have much to do with plans for similar projects in the future.

WIP HEARD IN HAWAII

(Continued from page 1)

time, a "laughing record" had been broadcast from a phonograph. Checking up the time of reception at Hawaii it was found this broadcast would have been heard in Hawaii at 9:25 A. M., the exact time reported by the Radio operator.

In other words, it is possible to broadcast music in Philadelphia at noon so that residents of Honolulu, Hawaii, can "eat their breakfast to music."

Station WIP, Philadelphia, uses a 400-meter wave length. The antenna is of the inverted L type, supported on the 100-foot towers on top of the store, and is composed of four phosphor-bronze wires of seven strands each, each 175 feet long, spaced eighteen feet apart.

The transmitting apparatus comprises four 250-watt tubes, two used as oscillators, and two as modulators.

Czechs Investigate Radio

WASHINGTON.—"Radio" development in Czechoslovakia has not yet passed the stage of infancy according to dispatches from Consul Winans, at Prague. He states, however, that the government has already taken an active interest in Radio development and in view of a more extensive and popular acceptance of this form of communication at home has sent a special commission of experts to study the progress made in other countries. Whether a transmitting station will be erected in Czechoslovakia will depend upon the findings of this commission.

Invents Radiophone Log

NEW ORLEANS, LA.—Louis J. Gallo, a young artist here, received word recently that patent papers for his invention, the "Radiophone Log," have been granted. The device enables all Radio listeners to find the exact distance of the reception of signals. It is in the form of a number of maps, made up into a pad, with all cities having broadcasting stations located, and their distances.

The listener tears off a perforated rule and lays it on the points of broadcasting and receiving, and the scale then shows the airline distance between these points.

'INDUSTRY'S FUTURE UP TO TUBE FIGHT'

SAYS OUTCOME OF SUITS TO FIX DESTINY

Chief of De Forest Company Declares Victory by R. C. A. Will Throttle Progress

(Special to RADIO DIGEST)

NEW YORK.—On the question of the De Forest Audion bulbs being used by independent manufacturers of Radio equipment, Charles Gilbert, president of the De Forest Radio Telephone & Telegraph Company, has issued the following statement:

"In response to requests for a statement regarding the outlook on the future of the Radio industry, I feel that from a trade point of view there is nothing of greater importance at this time than a consideration of the patent litigation begun by the Radio Corporation of America against J. H. Bunnell & Co., and A. H. Grebe & Co.

"The point at issue in this suit is the right of independent manufacturers to make use of the De Forest three-element vacuum tube.

De Forest Policy VS. R. C. A. Idea

"It goes without saying that if the Radio Corporation should be successful in this suit against the independent dealers the outlook for distributors, retailers and the buying public in general would be a dark one were it not for the fact that the only other concern in the United States that has the right to make and sell vacuum tubes is the De Forest Company.

"Independent dealers and manufacturers may well be interested, therefore, in the announced policy of the De Forest Company, which is that the purchaser of the De Forest tubes should not be compelled to buy complete sets in order to obtain tubes.

"R. C. A. Policy Would Throttle Progress"

" The policy of the Radio Corporation, on the other hand, if successfully carried out would, in the opinion of the De Forest Company, have a throttling effect upon the progress of the art and the industry.

"Independent distributors, retailers and the buying public naturally wield a great influence in the direction of public policy, in so far as it affects the use of vacuum tubes, and should not be at all backward in their support of the policy taken by the De Forest Company."

College "Credits" Given for "Air School" Study

Ohio Institution Plans to Offer Regular Courses

MARIETTA, O.—The Marietta College faculty has decided to make a test of broadcasting college education. A set of continuous lectures will be broadcast, each professor handling his own course and "students" will be granted regular college credit providing they cover assigned reading and furnish satisfactory reports, pass examinations and incidentally, but necessarily, pay certain fees.

Each student will be permitted to take one or as many subjects as he or she desires, but it will be necessary to get in touch with the college by correspondence, register and be supplied with certain information.

This new feature is an addition to the extension department of Marietta College and is under the supervision of Dr. A. C. Watson, head of the department of psychology. An efficient broadcasting station has been installed in the science building, the call letters of which are WBAW.

Aids Fire Fighters

PARIS, FRANCE.—In the case of a large fire in Paris recently, an airplane, equipped with Radio, circled above the flames and gave information that was valuable in extinguishing the fire.

PROBE FOR VIOLATION OF SILENT HOUR RULE

CLEVELAND, O.—It is the earnest hope that the broadcast listeners in appreciate the quiet hour recently established in Cleveland for better broadcast reception, and if any violent interference is experienced, the trouble should be immediately reported to the proper authorities, so that the interference can be investigated, according to an announcement by the Cleveland Radio association.

PERMITS TUMBLE TO LOWEST MARK EVER

CHICAGO.—The lowest number of broadcasting stations ever licensed during one week was recorded when only two Class A plants, one a college and the other a newspaper, were granted permits the week ending January 13. The two new broadcasters using the 360-meter wave length are WRAM, Lombard College, Galesburg, Ill., and WQAF, Sandusky Register, Sandusky, O.

'NIGHTIE RADIO' ENTICES SLEEP

Mme. Julia Cummings' Radio set is the "last thing" in more ways than one, for not only has she taken the lead in including it in the boudoir furnishings, but tunes in a dreamy waltz from WJZ just before retiring. And, believe Mme. Cummings, who is a New York modiste, Radio waltzes go hand in hand with Morpheus

© K. & H.

WOC Jumps Atlantic to Paris; Distance 4,700 Miles

DAVENPORT, IA.—Station WOC of this city reports having been heard in France, a distance of 4,700 miles. J. L. Luntley, an amateur, living at Colombes, department of Seine, using a homemade receiving set, heard part of a talk by Maj. Dent Atkinson, delivered Dec. 16, according to a letter which was recently received.

Supervise Road Construction from Capital Through Air

CHICAGO.—Radio is now employed to supervise highway construction. A demonstration of the method used by the North Carolina state highway department in directing road activities from the capital was one of the novel features shown at the thirteenth American Good Roads congress, held in Chicago, January 15 to 19.

DEAF "HEAR" RADIO BY TOUCH DEVICE

FEEL CONCERTS THROUGH VIBRATING BAR

Londoner's "Ossiphone" Enables Afflicted to Listen In Through Bones

The deaf will feel concerts broadcast by Radio!

That is, if the invention of a Londoner can be adapted for use in connection with the Radio receiving instrument.

This Londoner, S. G. Brown, has invented what he calls an ossiphone, a device which will enable a deaf person to hear through his bones.

The invention consists of a small rectangular box, the greater part of which is taken up by an electromagnet, with an iron bar between the poles. The bar is such that it can be made to vibrate when the slight impulses of Radio are sent through the magnet.

Extending from the magnet and bar is a key with an ebonite knob. When the instrument is connected to the phone switches of a Radio receiving set a deaf person can hear the concert merely by placing his knuckles against the knob.

Similar to Telephone

When it is desired to hear another person in the same room a transmitting instrument, called an "aural box," is used in connection with the ossiphone. The aural box is connected through a set of dry cells to the ossiphone. Speech entering the aural box can be heard in the same way broadcast sounds are heard, through the ossiphone.

There is, however, one kind of deafness which, Brown says, his ossiphone cannot overcome. That is the deafness that is due to disease of the aural nerves leading to the brain. For this, it is said, no instrument has as yet proved successful.

Transmits Through Bones

But where deafness is due to merely a physical cause, affecting only the outer or even the middle ear, the ossiphone has proved successful. Instead of merely energizing, or magnifying, sound, this instrument transmits the sound vibrations through the bones of the body to the aural nerves that have remained unharmed, and through these to the brain.

Scientists, who have put this instrument to test, say it has produced very satisfactory results.

Ask 30,000,000 Yen to Develop Jap Radio

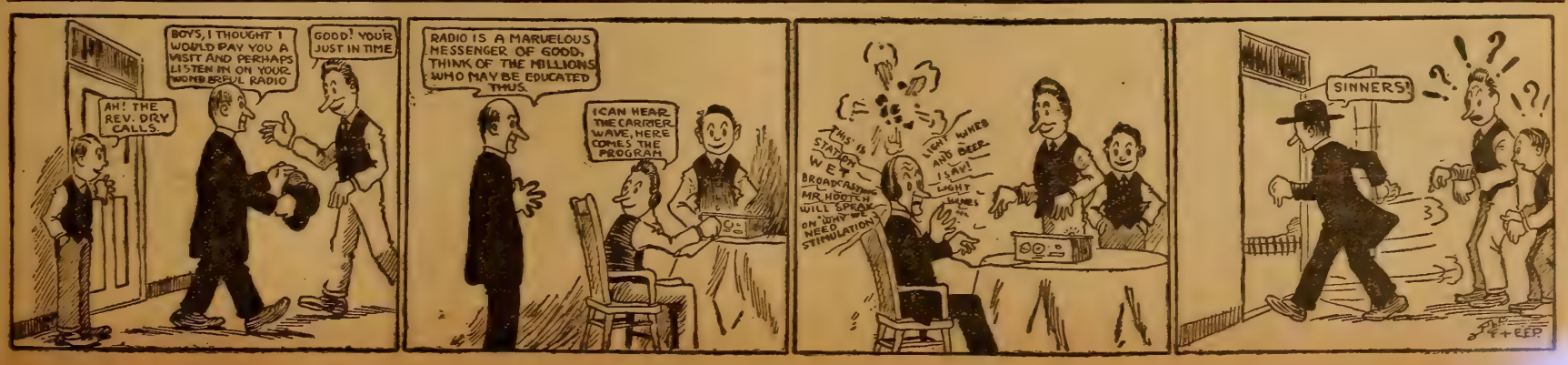
Government to Grant Request of Communications Office

WASHINGTON.—In order to develop commercial Radio on a large scale, the Japanese Department of Communications has requested an appropriation of 30,000,000 yen, which, it is said, will be granted by the Government, according to a report received by the Department of Commerce from Commercial Attache Abbott, at Tokyo. The organization of a private company to manufacture Radio apparatus, build stations, and do a general communication business, has been suspended, as it conflicts with existing Japanese law. If the appropriation is secured, the Department of Communications hopes to become a party to the agreement in regard to exchange of patents existing between the Marconi, Telefunken, Telegraphie sans Fils, and the Radio Corporation of America.

A little ammonia immediately applied to acid spots on clothes will neutralize the acid and prevent it from burning a hole in the cloth.

A single wire antenna of moderate dimensions, say, 75 feet long, is more effective in selective tuning of a receiving station.

THE ANTENNA BROTHERS — Spir L. and Lew P. — When Ether Waves Are Wet



GERMANY BUILDING VAST ETHER CHAIN

ERECTS LARGE PLANTS TO REPLACE CABLES LOST

Excellent System of Radio Communication Makes Teutons Independent of Other Methods

WASHINGTON.—While the activities of England, France and Holland in the field of Radio has been concentrated since the war on the establishment of communication with their dominions and colonies, Germany, deprived of all overseas possessions, has been building up within her own borders a system of Radiotelegraph and Radiophone stations that is second to none in the world.

The loss to Germany of her ocean cable system, built up at great cost during the fifteen years preceding the war, made her dependent on neighboring countries for all her international communications except that portion that she could handle by Radio. The logical result has been the increased use of high power Radio stations for overseas communications, especially to the United States.

Has Two Transatlantics

At present the central office of the Gesellschaft fur Drahtlose Telegraphie, located in the Oranienburgerstrasse, Berlin, controls the two great transmitting stations, Nauen and Eilvese, and the two receiving stations, Gelton and Hagen. Both the transmitting stations work on schedule, Nauen with New York, Moscow, Madrid, Rome, and Bucharest; and Eilvese with Rome and Madrid. Both have transatlantic press schedules as well.

Extensive changes are now in progress at Nauen, designed to increase its power and the flexibility of its operating plant. Separate antennae are being constructed for the American, the Asian and African, and the two European circuits; and a special arrangement is planned for the new Buenos Aires circuit which is to be opened to public correspondence within the next few months. The corresponding station at Monte Grande, near Buenos Aires, is to be maintained and operated by a combination of French, English, German and American Radio companies.

How Chain Is Organized

The German Post Office station at Koenigswusterhausen, near Berlin, transmits to London, Budapest, Sofia, and Saraijevo, and its receiving station at Zehlendorf makes up the return circuit. Norddeich, a coastal station used for hydrographic reports, shipping news, and weather reports, completes this group which is known as the Main Stations Group (Hauptfunkstellen). Although communication is maintained with the foreign cities mentioned the Main Stations group operated principally within Germany.

The feeder stations of this system, or "leading stations" (leitfunkstellen) operate an interior service as subsidiaries of Koenigswusterhausen. The stations located at Dortmund, Breslau, Duesseldorf, Frankfort on the Main, Hamburg, Hanover, Koenigsberg in Prussia, and Munich, are each equipped with two sending and two receiving installations. Dortmund operates a special service to Rotterdam as well.

Start Public Radiophony

Public Radio broadcasting was inaugurated in Germany September 1, 1922, the Post Office Department and the Express Service uniting to establish the service. Subscriptions, open to the public, are based on the extent of the service rendered, and the only additional cost is the installation charge.

The apparatus used may be employed for either telegraphic or telephonic reception, vacuum tubes being supplied. In accordance with the distance from the broadcasting station, amplification in varying stages is provided.

Koenigswusterhausen is the broadcasting station and subscribers to the service are now located in 176 cities and towns. The material furnished so far has been confined to economic news, such as bank statements, exchange quotations, stock market listings, etc.

Hidden, Radio Controlled, Man-o'-War Target for Shells in Naval Games

Battleship "Iowa" to Be Modern, Crewless Flying Dutchman in World's First Indirect Fire Practice to Be Held at Panama Bay—Radio and Planes to Assist Aiming of Guns

By Carl H. Butman

WASHINGTON.—Indirect firing of 14-inch guns from a battleship at a man-o'-war under way but out of sight over the horizon, will be undertaken for the first time in history in March at the naval maneuvers in Panama Bay. The target will be the Radio-controlled Iowa of Spanish War fame, unmanned and unarmed, but operated by an officer aboard the U. S. S. Shawmut several miles away.

Radio will bear two very important parts in the battle practice of the fleet this year. The maneuverable target ship will be sent out to sea under Radio direction, and then when she is out of sight indirect fire at her will be undertaken by the aid of Radio observation and airplane spotting.

Law Makers Plan to Attend

The Iowa is a 25-year-old warship, which has served more than her time. For the past two years she has been known as Coast Battleship No. 4 and honored here and abroad as the first Radio-controlled ship of war. Her actual bombardment with heavy gun-fire from the Mississippi, designated as the attacking vessel, has occasioned considerable interest not alone in the navy but in congress.

Secretary Denby's invitation to the members of the Senate and House naval affairs committees to witness the tests has brought a flood of requests for transportation to Panama Bay in March for the scheduled bout. A program of several varieties of battle practice gives promise of unusual spectacle, seldom witnessed except in actual warfare, and then only by officers and men in the engagement.

Iowa Is Modern "Flying Dutchman"

Literally the Iowa is a modern, steam "Flying Dutchman" without skipper or crew. Some time ago far-sighted Radio engineers of the navy developed a special method of Radio control for the Iowa, based, it is believed, on the inventions of Benjamin F. Miessner. Today this works perfectly. The ship's water and oil tanks are filled, her oil burning boilers and engines are started by a skeleton crew of caretakers. The control ship takes her over, and the crew abandons ship. By means of Radio her engines are speeded up and slowed down, her rudder is thrown to port or starboard or maintained at a desired angle, and she performs within a fraction of a second at the will of the "master mind" aboard the control ship, which may be as far as ten miles distant.

A special feature of the equipment prevents the Iowa from running away, stopping her if the control is broken or the aerials are shot away. If no Radio control signal reaches her electro-mechanical brain for so long as fifteen minutes, the fires are extinguished, the engines stopped and everything shuts down. This enables the crew to board her again, repair any defects and start her on another cruise.

Five Tests Planned at Panama

Five basic problems of gun-fire will be undertaken with the old Iowa as a moving target, in an effort to equal war-time conditions as nearly as practically possible. Towing a target for gun-fire restricts the angle of fire somewhat to avoid hitting the towing vessel. With the Iowa under Radio control, and the Shawmut a safe distance away, this objection is overcome.

As it is not desired to sink the Iowa, special projectiles will be used. They will have very thin walls and super-sensitive fuses. These shells will be filled with high explosive charges, and it is expected that when direct hits are made they will all explode on the armor plate of the vessel and break up rather than penetrate her.

If she is hit many times at weak points, she may sink, but the navy desires that the tests be made without any such mishap. The Iowa's Radio control apparatus is of considerable value, being the world's first remote-control system for a full size sea-going vessel. Then, too, future Radio-control development in the navy will undoubtedly be based upon this, the first Radio warship.

Naval Radio in New Orleans Gives Southern Sky Reports

NEW ORLEANS, LA.—The naval Radio station here is now broadcasting weather reports from the office of R. A. Dyke, assistant forecaster, to all points throughout the South. All reports are in code. Heretofore the weather bureau has taken advantage of the naval sending station only for the broadcasting of river reports. The forecasts are for Louisiana, Texas, Arkansas and Oklahoma. Reports of the stages of the Lower Red, the Ouachita and Mississippi rivers are still being sent out every night. The bulletins for marine interests which have been an institution for the last six months will be continued at two-hour intervals ending at midnight.

The bureau has announced as its schedule, 75th meridian time, wave length, 1,832 meters, spark; 10:30 A. M., state, river and weather forecasts; 11 A. M., localized bulletin for shipping interests; 5 P. M., storm, hurricane and cold wave warnings, when indicated, with general weather summary.

The weather bureau announced that the move to extend their weather report service is due to the increasing interest in Radio throughout the South, and to the success the only other forecasting station, Denver, has had with a similar service.

NEW CONCERN LISTS $1,250,000 CAPITAL

Baldwin Reorganizes with Filing of Incorporation Papers

SALT LAKE CITY.—Rumors of the reorganization of Nathaniel Baldwin, Inc., manufacturers of Radio telephone equipment, culminated recently when articles of incorporation for "Baldwin International Radio, Inc.," were filed with the county clerk here.

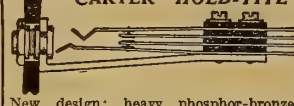
The new concern is capitalized for $1,250,000, divided into 1,000,000 shares of common and 250,000 shares of preferred stock, par in both cases being $1.

Incorporators are Nathaniel Baldwin, president; David Neff, first vice president; Thomas J. Yates, second vice president; Harden Bennion, third vice president; Lawrence Clayton, secretary-treasurer; Lester F. Fisher and George H. Budd, directors.

The purpose of the incorporation, according to the articles, is "To carry on the selling of and conducting sales agencies for the products of the Nathaniel Baldwin Incorporated in all countries of the world except the United States and its possessions, and excepting the countries of Japan, Australia, New Zealand, and all Asiatic countries south of and including China and east of and including India, including all Asiatic islands with the exception of any and all United States territory."

Business reports show that the widespread use of Radio is affecting the mining industry in certain sections of the country, the supplying of crystals alone having become a growing industry.

CARTER *"HOLD-TITE"* JACKS



1 to 5 springs; price 70c to $1.10

New design; heavy phosphor-bronze springs; no spacer washers required. Write for Bulletin on these Jacks, "TU-WAY" Plugs and other Carter products.

CARTER RADIO CO., 209 S. State St., Chicago

FLEWELLING

ALL PARTS NECESSARY

DEALERS: WRITE FOR DISCOUNTS

HUDSON-ROSS

123 W. Madison St. Chicago

FRESHMAN

VARIABLE GRID LEAK

With Micon Condenser $1.00 Without Condenser $0.75

MICON .006 Tested Mica Condenser $1.00

All especially adapted for use with the new FLEWELLING "SUPER" CIRCUIT

At your dealers—otherwise send purchase price and you will be supplied promptly without further charge.

CHAS. FRESHMAN Co., Inc.

97 Beekman Street, NEW YORK CITY

PRICE ONLY $2.50

Your Set Deserves One

FISCHER 180° COUPLER

Affords a Guaranteed Range of 600 Meters. Mechanically Perfect, Complete with Soldered Leads, Positive Pigtail Connections. Genuine Bakelite Tubing and Fahnestock Clips.

At your dealers—otherwise send purchase price and the Coupler will be sent without further charge.

G. H. FISCHER & CO.

317 Cypress Hills Road GLENDALE, L. I., N. Y.

WE ALSO MANUFACTURE LARGE AND SMALL VARIOMETERS AND VARIOCOUPLERS WRITE FOR CATALOGUE

"THE wise man does not esteem a person more highly because of what he says."
—said Confucius.

The wise radioist is not misled by extravagant claims—he knows that only a Grebe Receiver can come up to his expectations.

Doctor Mu

Licensed under Armstrong U. S. Pat. No. 1113149

GREBE RADIO

A. H. GREBE & CO., Inc.

Richmond Hill, N. Y.

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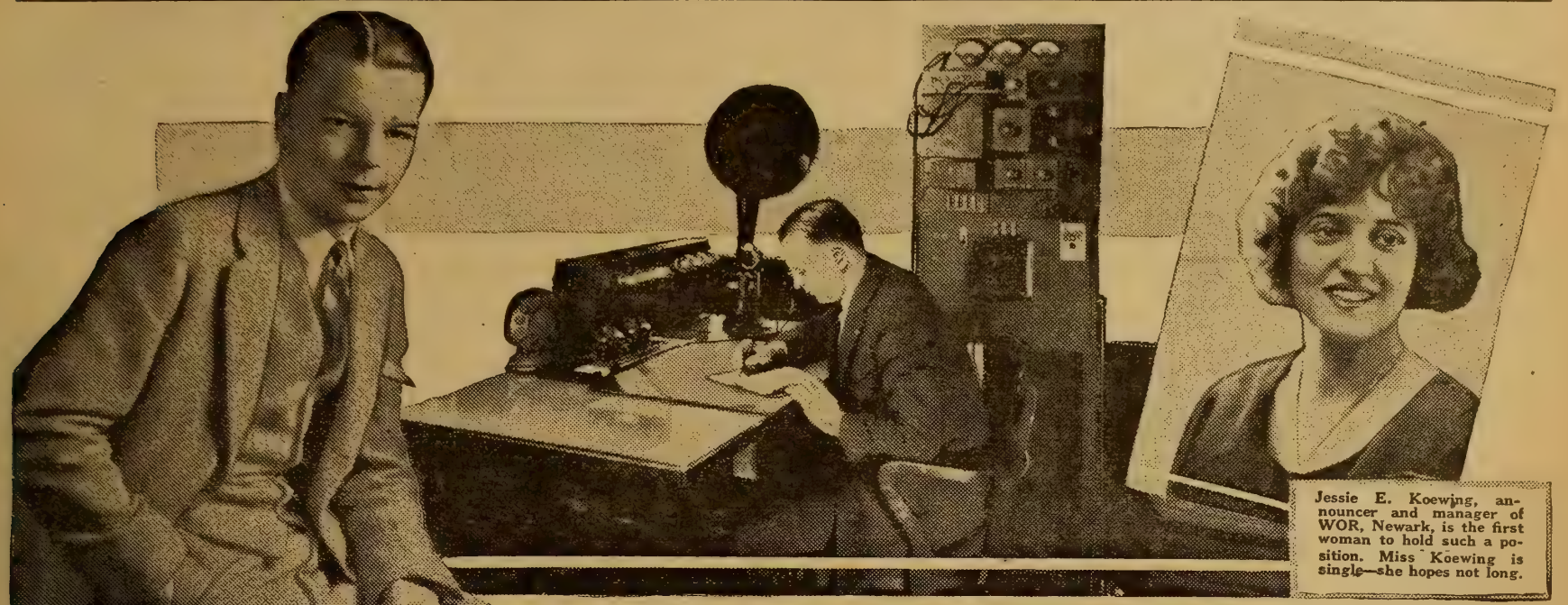
EVER HEARD THEM? HERE THEY ARE



Jessie E. Koewing, announcer and manager of WOR, Newark, is the first woman to hold such a position. Miss Koewing is single—she hopes not long.

To the left is Elmer G. Johnson, announcer of WJAX, Cleveland, whose voice is so pleasant, one fan, a woman, said she'd "stand by" two hours if he said to. Above is James M. Thorburn, engineer of the station

WJAX, "Wave from Lake Erie," Wins Fame for "Crack" Market Broadcasts

Voice of Elmer G. Johnson, Announcer of Cleveland Station, Familiar to Every Radiophan in America—Commercial Reports, Station's Primary Interest, Supplemented by Entertainment

By P. A. Price

"This is WJAX—the wave from Lake Erie!"

Judging from letters received by the Union Trust Company, of Cleveland, Ohio, which operates Station WJAX, the above salutation must be familiar to every Radiophan in the United States and Canada. And on this page is "WJAX," himself, in the person of Elmer G. Johnson.

He is tall, of athletic build, and good looking as you can see for yourself in the photograph taken especially for the readers of the Digest. Mr. Johnson was too modest to say very much about himself, but from one source and another it was discovered that he hails from Iron Mountain, Michigan, with Detroit as an adopted home before he came to Cleveland. He is twenty-four years of age; is fond of football and baseball; pounds a wicked key on the piano and, during the war, was Radio operator on the U. S. S. Maine, and later instructor in the government's Radio course at Harvard University.

Voice Microphones Well

Johnson's voice carries wonderfully well on the mysterious Radio waves, and it is a pleasant voice to hear. One Cleveland clubwoman was heard to remark, "When WJAX says, 'stand by for two minutes, please,' I am willing to 'stand by' for an hour!" And down in Ohio an elderly lady, who admits eighty summers, calls him "her man," and tunes in all his broadcasts. And mash notes! But Johnson is discreet as well as modest, though they do say he receives them in bunches.

The gentleman at the desk in the other photograph is James M. Thorburn, Radio engineer for the Union Trust Company, and the power behind the throne. Mr. Thorburn was Radio operator on the U. S. S. Mayrant during the war and saw service across the Atlantic. Mr. Thorburn was, at one time, operator aboard Henry Ford's private yacht Sialia. That's the name; not "Lizzie" as we started to write it.

WJAX Work Primarily Commercial

WJAX is primarily a commercial Radio station. Its most important program is the broadcasting of market quotations and financial news four times daily for the special benefit of bankers and business men of the fourth Federal Reserve district, and it was one of the first stations in the United States to realize the importance of Radio to the commercial world and to use Radio for the transmission of important business information.

WJAX capitalized upon the importance of the time element in the transaction of business, and the United States government, realizing that the Union Trust Company was pioneering in the legitimate use of Radio for business purposes, gave special permission to use a wave length of 485 meters for daily broadcasting. The concert programs are sent out upon a wave length of 360 meters.

Powerful Plant Reaches Out

This station is one of the most powerful in the United States. The output is 500 watts and the antenna current on the 360-meter wave length is 7.5 amperes and, on the 485-meter wave length, it is 10 amperes. WJAX has been heard at the four extreme corners of the United States—Maple Grove, Maine; Key West, Florida; San Diego, California, and Seattle, Washington—according to letters and postal cards received from Radiophans at these points, with reception noted from every State in the Union. Letters from points outside the United States have been received from St. Johns, Newfoundland; Island Lake, Manitoba; and Edmonton, Alberta, in the Dominion of Canada.

Others letters have been received from San Juan, Porto Rico; Havana, Cuba; The Bermuda Islands; Limon and Tampico, Costa Rica; and Nurgo Laredo, Mexico. The S. S. Heredia wrote from Costa Rica, and the S. S. Searchlight from Tampico. The operator on the Searchlight picked up WJAX first off the Great Bahamas, and listened in each day until Tampico was reached.

Broadcasts Symphonies

In response to the many calls upon WJAX for concerts and entertainments, this station is putting on two entertainment programs a week, on Tuesday and Thursday evenings. Probably the biggest item of importance in relation to the evening broadcasting is the fact that WJAX is broadcasting the entire season of symphony concerts given by the Cleveland Orchestra. It has also broadcast the Cleveland Public Auditorium organ, one of the greatest pipe organs in the United States and owned with the Public Auditorium, by the people of Cleveland, Ohio.

Two thousand letters were received from almost as many points in the United States, as a tribute and appreciation of the organ recital that was broadcast on the evening of November 28, 1922. Such letters, more than anything else, testify to the fact that good music is always appreciated, even in this day of jazz. The musical programs are not always heavy; there is a plentiful mixture of dance orchestration and everybody within the range of WJAX is perfectly satisfied.

Here's hoping that "The Wave From Lake Erie" will continue to inundate the country, and that the pleasant voice will continue to greet us with "This is WJAX."

Nearly 12,000,000,000 words flashed through the air from German Radio stations in 1921.

100,000 HEAR COUE'S 'DAY BY DAY' LECTURE

WASHINGTON.—During the visit in Washington of M. Emile Coue, one of his lectures was broadcast from a local station through the efforts of the Washington Post. It is estimated that close to 100,000 persons listened to him, making a record audience for the Frenchman. The lecture was broadcast on a 360-meter wave length.

GRANT RIGHT TO BIG PLANTS IN BRAZIL

45-Year Concession to Install and Operate World Station Goes to News Agency

WASHINGTON.—A concession to install and operate, for a period of 45 years, Radiotelegraph and Radiotelephone stations for international communication has been granted the Sociedad Anonyma Agencia Americana, a Brazilian news agency, under a decree dated November 14, according to Assistant Trade Commissioner Cremer at Rio de Janeiro. The concession includes the operation of Radiotelephone stations for communication within the national territory but excludes Radiotelegraphy in that field.

The Sociedad Anonyma Agencia Havas, by a decree dater October 9, has secured an extension until March 31, 1923, of its original concession for a Radio station, dated August 2, 1920.

The Radio Nacional Sociedad Anonyma recently elected a board of directors of five members, among whom are the society's president and secretary. This company was organized to control the international Radio service of Brazil, but the capital subscribed to date is insufficient for more than a preliminary investigation. Its existence, however, is an obstacle to the establishment of this high-power intercontinental Radio service planned by a group of foreign Radio companies.

The new station at Praia Vermelha was opened to international service on November 28, but is a receiving station only.

"Father" of Art Amazed at Gotham-London Talk

LONDON ENGLAND.—Senator Guglielmo Marconi, who was one of the listeners to a recent Radiophone talk between New York and London, said the result was one of the most remarkable in his experience. People in a room of the Western Electric company's factory in North London heard J. I. Carty, vice president of the A. T. and T. company, as distinctly as if he was only across the street, and when a Magnavox was used the voice was heard in all parts of the room. There is no installation on this side powerful enough to enable a Radiophone reply.

More Clubs Should Do This

COLUMBUS, O.—Letters commending the proposed Radio bill in congress, designed to allow broadcasting stations of different districts to transmit on varying wave lengths, were written and mailed to Senator Frank B. Willis and Congressman John C. Speaks, of Columbus, at the last meeting of the Columbus Radio club.

ICE SKATERS GLIDE TO AIRPHONE MUSIC

STATION CFCA FURNISHES TUNES FOR SPORT

Toronto Star Plant Even Supplies Mobile Receiving Car—Makes Round of City's Rinks

TORONTO, ONT., CAN.—At Withrow Park rink, here, a crowd of about one hundred skated to waltzes and fox trots broadcast by The Toronto Star's Radio station, CFCA, and received by the well-known white Radio car with the stove-pipe aerial.

"Here she comes," some boys shouted; immediately the white truck hove into sight. Everybody seemed to recognize it at once, although there had been no advance announcement that the car would be used in this way.

Help Put Car in Position

There was a great rush of voluntary assistance, when the car was being moved across the ice to what was considered the best corner. Young people who apparently were unaware of the bitterly cold wind that swept the park, made the district resound with hearty shouts as they pushed the car into the desired position.

The operator tuned in as the announcer at CFCA was calling out "Swanee River Moon." Instantly the scores of skaters had deserted the white truck. The first strain of the waltz was the signal for a flash of skates, and everybody was off on a swinging gait.

Entertainment During Intermissions

Followed other "hits" that set the crowd off to a fast pace. As at all well ordered rinks there were "intermissions," when no music was being played. But these intermissions were different. There was music, but not suitable for skating. The crowd stood around and enjoyed these "off" numbers.

The Star Radio receiving car is making a tour of the prominent rinks of the city, "playing" at one each evening.

House Loud Speakers Cost $25,000; Plan Investigation

WASHINGTON.—The rules committee of the House has ordered a favorable report on a resolution which provides for the appointment of a committee to make an investigation regarding the voice amplifier system which has been installed in the hall of the House of Representatives. It is understood that the company installing the system of loud speaking which has several times been connected up with Radio for broadcasting purposes, is asking $25,000 for the system as installed at present.

Radioman Ends Life

NEW ORLEANS, LA.—Frederick Mauberret, Radio expert and operator for the United Fruit Company, committed suicide by shooting, January 9, at his home here. No reason was assigned by relatives. Mauberret was 37 years old and unmarried.

On officer of the Portuguese army has developed a system of operating call bells by Radio which is intended to do away with prolonged watching for calls at Radio receiving stations.

CANADA'S AIR COPS CUT INTERFERENCE

1,850 STATIONS CONFLICT VERY LITTLE

Silent Period Observance Keeps Amateur Plants from Jamming Broadcast Phone Programs

(Special to RADIO DIGEST)

OTTAWA, CAN.—Canada today has 1,800 licensed amateur Radio transmitting stations in addition to the fifty licensed commercial and broadcasting stations. But with this number in the air at various times every day there is little confusion or interference, according to the officials of the Radiotelegraphy branch of the Department of Marine and Fisheries here.

Every person operating a Radio outfit in the Dominion of Canada is required to take out a license. Receiving stations are on a flat license rate of one dollar a year and these licenses are being secured through the post offices throughout the Dominion.

When sending licenses are issued the licensee is given a specified wave length on which he may transmit. Amateur transmission stations are kept down to a wave length which cannot interfere with the work of commercial and broadcasting stations.

Inspectors in Every City of 15,000

In order to check the wave length which the amateur stations are using, inspectors are being appointed in every city that has a population of 15,000 or over. These inspectors have been placed on a part time basis for a small salary and are required to spend their evenings listening in to the various signals and gauging the wave lengths on which they are sent. These inspectors have also been authorized to deal with complaints from receiving stations whose work is interfered with by any amateur sender.

Ether-Cops Keep Air Lane Clear

The first twenty-five of these ether-cops, as they are called, have already been appointed and the results have more than justified the efforts by the officials. Amateur senders have cheerfully complied with the new regulations and during the forbidden hours, 7:30 to 10:00 P. M., which are reserved for the broadcasting stations sending concerts and various reports, there has been of late little difficulty with persons who formerly delighted in jazzing up the air to the discomfiture of thousands of Radio fans.

The expense of maintaining the ether-cop brigade, which is composed chiefly of ex-service men who took up aerial communication work during the war, is more than met by the money received from license fees.

New receiving licenses are being issued every day in increasing numbers and indications are that during the last few months more people have taken to Radio than had ever thought of it previously.

Jersey "Bug" Gives House Dance with Ohio Music

COLUMBUS, O.—A cheering "pat" on the back for Columbus' newest Radio broadcasting station came recently when C. H. Lane, an amateur of Newark, N. J., called WPAL, the Superior Radio and Telephone Equipment company, Columbus, to tell the operator that a dance was being held at his home to music being broadcast from the Columbus station. He said that he had picked up stations in 14 different states that evening but that the Columbus program was coming in clearer than any of the others.

One of the stations in the East is broadcasting a portion of the works of Nathaniel Hawthorne. The readings are given by Miss Hildegarde Hawthorne, a direct descendant of the novelist.

"KNOW WHAT IS IN YOUR SET"
EXPERIMENTAL RADIO
By R. P. RAMSEY, Ph.D.
Professor of Physics, Indiana University
A collection of radio experiments for experimenters and students, mimeographed. Tests, calibration, measurements, construction, and use of radio apparatus. Sixty-two tests and exercises. References to all standard books on wireless. Price $1.50. Postage and packing 10 cents.
UNIVERSITY BOOK STORE, Bloomington, Ind.

Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C of Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

Becomes Gulf Medic Center

NEW ORLEANS, LA.—Medical service to vessels at sea will be sent by Radio from Marine Hospital Number 14, via the Algiers Naval Station. The call is NAT. This order, given by H. S. Cummings, surgeon general of the United States Public Health Service, places New Orleans in the position of medical center for Gulf seafarers. Service is free and is intended for ships carrying no ship's surgeon.

Broadcasters Delay Meeting

CHICAGO.—The meeting of the National Broadcasters league, which was to have been held here in the First Regiment armory, in January, has been indefinitely postponed. The broadcasters had planned to meet in conjunction with the Radio exposition which was scheduled for January and which was also indefinitely postponed.

HEAR DAUGHTER SING IN FAR AWAY ATLANTA

Parents of Songstress Listen in on Special Concert

NEW ORLEANS, LA.—The parents of Mrs. William H. Wrigley, Atlanta songstress, recently heard their daughter's voice borne on the air waves from the Georgia city. The New Orleans Daily States informed her parents, Mr. and Mrs. Emmett Walsh, of New Orleans, that Mrs. Wrigley and her husband, W. H. Wrigley, also a vocalist, were on the program for the evening, and that the concert was being given especially for the singer's father and mother to hear. Mr. and Mrs. Walsh went to the Daily States office, and heard the program clearly, with occasional interpolations in the voice of Mrs. Wrigley asking, "Mama, are you listening?"

Mr. Walsh wired the Atlanta Constitution station, WGM, acknowledging the success of the stunt.

In Canada the Royal Canadian Horse Artillery has met with great success in its maneuvers by directing artillery fire from an airplane by means of Radio communication.

RADIO MAILING LISTS
12,400 Radio Dealers, covering U. S. by states Per M $ 7.50
1,614 Radio Mfrs., covering U. S. by states. Per list 15.00
1,757 Radio Supply Jobbers, covering U. S. by states. Per list 15.00
260 Radio Stations Per list 4.00
257 Mfrs. who make and assemble complete Radio Sets Per list 4.00
25,000 Radio Amateurs & Mfrs. of Radio Stations. Per M 7.50
Ask for price list covering Canada and England.
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"ALL-AMERICAN"
Amplifying Transformers
Two years of successful use all over the world guarantees permanent satisfaction. Radio and Audio Frequency.
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Saves you 50% of the usual cost and you get an unconditional
WRITTEN 2 YEAR GUARANTEE
Best battery buy on the market today. Thousands of satisfied users.
6-Volt 40 Amp. $8.50 | 6 Volt 60 Amp. $10.00
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Ask about our rubber containers
WORLD BATTERY CO.
60 E. Roosevelt Rd.—Dept L. CHICAGO, ILLS.

RADIO
Manufacturer Direct to You
LOWEST PRICES—HIGHEST QUALITY
Everything guaranteed exactly as represented or money refunded. We pay the postage.

This Week's Leader 3,000 Ohms Double Headsets
Supersensitive, newly constructed, latest design. While we have them, only..... $3.45

$1.00 VERNIER DIAL CONTROLS 42c
75c TRIPLE PHONE CONNECTORS 42c
Screw on binding posts.
PHONE PLUGS worth $1.00. Our price..... 34c
SERIES PARALLEL SWITCHES 35c

Newest Crystal Receiving Set
Not a Toy—20th Century Wonder—Recently designed after German army type, sensitive and effective for 15 or 20 mile range, entirely new and original. It will pay you to buy one of these just to experiment with. Wonderful results obtained. Includes sensitive earpiece and full instruction for operation and installation. This set $4.45

GREWOL DETECTORS (Fixed) $1.65
BALDWIN TYPE C UNITS WITH LONG CORD (Original) $4.80
BATTERY HYDROMETERS 40c
WD 11 ADAPTERS 50c
3 COIL MOUNTINGS $3.25
WD 11 SOCKETS 60c
SWITCH LEVERS 19c
2 COIL MOUNTINGS $2.45
MOLDED VARIOMETERS, $5.50 value $4.40
MOLDED VARIO COUPLERS, $5.00 value..... $4.00
COMPOSITION DIALS, 2 or 3 inch..... 22c
BAKELITE V. T. SOCKETS 42c
RHEOSTATS, condensite base-tapered knob..... 78c
POTENTIOMETERS, high grade—tapered knob..... $1.30
VARIABLE GRID LEAKS, panel type..... 40c
RUBBER KNOB BINDING POSTS, per doz..... 45c

LOOK! Variable Condensers LOOK!
$4.50 Value 43 plate..... $1.70
$3.75 Value 23 plate..... $1.40
$5.50 Value 23 plate with vernier..... $4.00
$6.00 Value 43 plate with vernier..... $4.50
$4.50 Value 11 plate with vernier..... $3.50
$3.25 Value 11 plate..... $1.25
$2.50 Value 3 plate..... $1.10

ANTENELLA AERIAL SOCKETS $2.00 value...$1.45
We sell quality goods only and at the lowest prices. Don't delay, send your order now, while these low prices are in effect.
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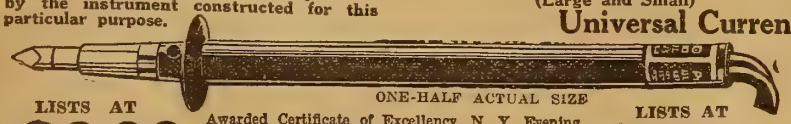
DELICATE SOLDERING
Both the manufacturer's and amateur's problem on all fine work is readily solved by the instrument constructed for this particular purpose.
The Post Soldering Iron
Platinum Heating Unit
Interchangeable Tips
(Large and Small)
Universal Current



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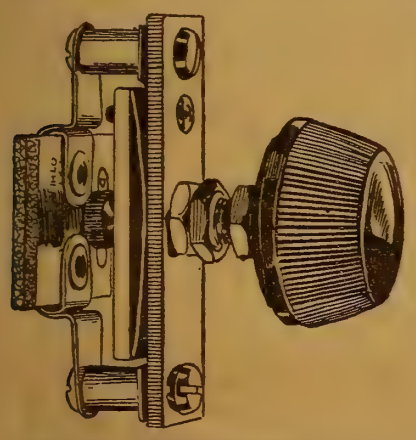
LISTS AT $6.00
Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute
LISTS AT $6.00
From your dealer or write
POST ELECTRIC COMPANY, Dept. 509, 30 E. 42nd St. NEW YORK

The Radiophonist's Mart

THE CRL adjustable grid leak is designed for mounting on the panel through a single hole. Its use permits the adjustment of the grid potential to the exact value that provides the maximum signal strength. By turning the knob the resistance of the leak can be changed gradually and smoothly to any desired value from approximately ½ to 4 megohms. Not only is this grid leak particularly well adapted for the Flewelling circuits, but it also permits the adjustment for best results in any type of circuit and tube.

It has a bakelite base on which is mounted a fabric strip, the ends of which are connected to the two binding posts. This strip is impregnated with a high resistance compound of tested permanence. The current from the grid leaks along this strip, the amount being regulated by adjusting the area of contact of the strip with a curved phosphor-bronze spring that is held in position by a compression block. This compression block is operated by a screw attached to the operating knob.

As the knob is turned to compress the spring, a larger area of the spring comes in contact with the fabric strip and the resistance between the binding posts is decreased. More current leaks across and the negative potential of the grid is decreased. Turning the knob any other direction decreases the area of contact between the spring and the strip, cuts down



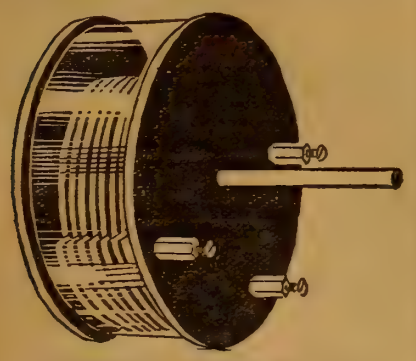
Exact Value Obtained With This Grid Leak

the current leakage and permits a higher negative potential between the grid and the filament. The potential that provides the maximum signal strength is thus obtained with ease and certainty.

These leaks can be obtained equipped with a condenser, as shown in the illustration, or without if desired. The entire instrument takes up a space on the back of a panel 2¾ inches long by ¾ inches wide. They are manufactured by the Central Radio Laboratories of Milwaukee, Wis.

VARIABLE condensers of the rotating plate type are usually too bulky for compact cabinet mounting. On that account many an amateur seeks an instrument that will fit in a space available on his panel without interference with other apparatus of the set. Another objectionable feature of the rotating plate type has been the difficulty of keeping the plates in alignment and avoiding short circuits, especially where sets are to be portable.

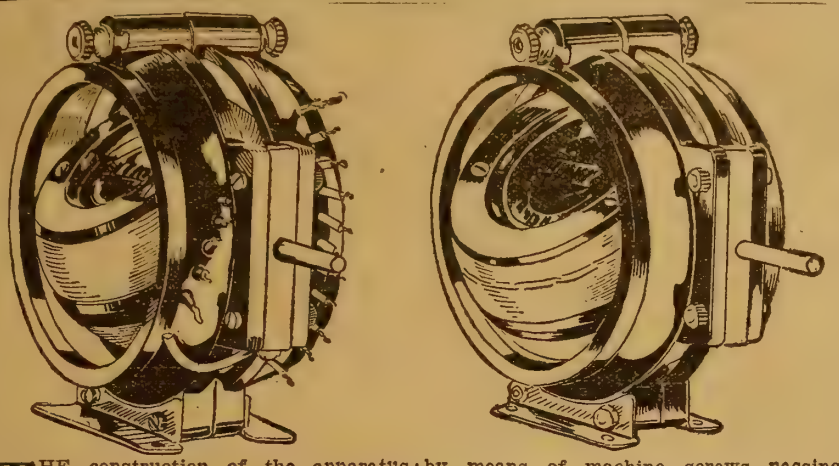
For the condenser shown in the illustration, the manufacturers claim not merely compactness and perfect insula-



Insulated Shockproof Variable Condenser

tion, but in addition, shock-proof features. The plates instead of being air-spaced, have dielectric separators between which the rotating plates slide. In addition, the necessary spacing has been reduced to a minimum. A large circular composition disk at the front and rear and a transparent celluloid covering between the disks makes the condenser dust-proof. The condensers are made in all standard capacities by the Stahl Rectifier Company of Chicago, Illinois.

Compact Variocoupler and Variometer



THE construction of the apparatus shown in the illustration presents such compactness and perfection in workmanship that it deserves special mention and recommendation to the Radiophan. Not merely these points, but also the rather unusual feature of using bank windings with its effective reduction of self-capacity, must be taken into consideration. The framework is considerably smaller than most of the molded type of instruments in spite of which both the variocoupler and variometers are very compact in form. Two metal angle plates with a highly nickel-plated finish are fastened to the base for mounting. In the event that the instrument is to be used for the panel mounting, they are easily taken off and fastened on the shaft side and will hold the instrument to the panel by means of machine screws passing through four holes in the angle plates.

The shafts have a firm natural bearing in the brass spacing plates located at each end which have a highly polished nickel-plate finish. The rotors in both instruments turn very freely without friction and are very well balanced. In the variometer the clearance between stator and rotor windings has been reduced to a minimum. The variocoupler primary is amply provided with taps permitting both rough and fine adjustment. Each tap has been tinned so that soldering presents no difficulties. In addition, a projecting tap wire has a short spaghetti sleeve protecting it and reducing the tendency of breakage to a minimum.

The Dayfan variocouplers and variometers are manufactured by the Dayton Fan and Motor Company of Dayton, Ohio.

ONE of the simplest and yet most unusual forms of new pieces of Radio apparatus that has been called to our attention is the small unit shown in the illustration. When used in connection

Makes Loud Speaker Unit from Any Phone

with a single receiver of any of the standard high grade headsets it permits its use for loud speaking purposes at absolutely minimum cost. This base or stand is set on the inside of any bowl-shaped receptacle (which can be borrowed from the kitchen) and the receiver is set upon it. The space inside of this unit then acts as a sound chamber. The bowl reflects the sound waves and sends them out in the same manner as the complete loud speaker that this company manufactures. This unit is manufactured by the States Electric Company of Newark, N. J.

IMPROVED REINARTZ CIRCUIT

My highly improved and copyrighted circuit brings in all important stations on both coasts and the Mexican border without any distortion or other noises.
We dance to music from Atlanta received on one loud Baldwin unit.
Build one of these supersensitive sets from my blueprints and specifications. Price 50c or with a perfect and complete double wound spiderweb coil $3.00 by mail.
No other windings used.
Photo of my set on a glass panel with every order.
Everything clearly shown. Cheap and easy to build.
Easy to operate.
S. A. TWITCHELL, 1925 Western Av., Minneapolis, Minn.

Body Tuning for 10,000 Meters

I recently discovered a unique method of tuning in long wave stations such as WSO, POZ, and many others on wave lengths around 10,000 meters, by means of a standard short wave receiver with two stage amplifier and using the capacity of the body as part of the tuning. The method is simplicity itself, but a correct technical explanation of that upon which the method is based may be more difficult.

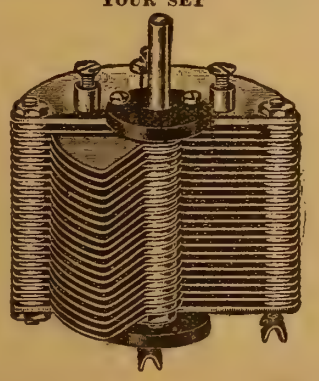
Disconnect the "B" battery-tap to the detector tube from its binding-post and hold the bare end lightly between the fingers, the tubes, of course, having been previously lighted. Immediately the bird-like tones of many long wave C.W. stations will be faintly heard, and if the current to the two amplifiers is carefully adjusted and the proper pressure applied to the "B" battery-tap, the signals will come in as clear and loud as if using a regular honey-comb set. It does not matter to what wave length the tuner is adjusted, nor whether the detector tube current is on or off; the "birdies" come in just the same.

The explanation of this phenomenon is probably that the body's large capacity acts in conjunction with the large inductance furnished by the transformer windings to form a tuner corresponding to these high wave lengths, and that the amplifier tubes act as a detector.—Merrill C. Orswell, Wallaston, Mass.

Be sure and insulate your lead-in as well as your aerial.

INCREASE YOUR RANGE

BY ADDING A PERFECTLY CONSTRUCTED VARIABLE CONDENSER TO YOUR SET



11 PLATE.....$1.25
23 PLATE..... 1.40
43 PLATE..... 1.75

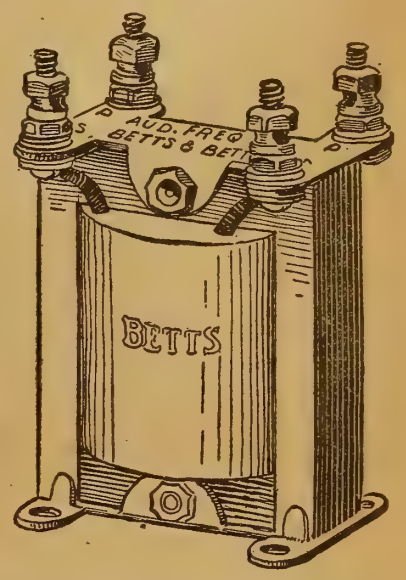
Mail Orders Filled Same Day
Postage Extra No Personal Checks Accepted

B. K. Ford & Co. 4343 West Fifth Avenue CHICAGO, ILL.

AS A rule, the average audio frequency transformer is found to be large and clumsy in appearance. The transformer shown in the illustration is manufactured by Betts & Betts Corporation of New York city, and is manufactured in two types—W-400 and W-401. Although very small, compact and neat in appearance, still the efficiency is exceptionally high. The type W-401 has a black covering over the coil windings and possesses a higher ratio than the type W-400 which has the yellow covering. All parts have a polished nickel-plated finish. Bindings posts are provided for the four primary and secondary connections. The four lugs on the base are windings for securely fastening the transformer for either base or panel mounting.

For best results the outside of the primary winding of the transformer primary is connected to the plate of the detector tube, either directly or through the wing variometer according to the arrangements of instruments in the wing circuit. The inside end of the primary is connected directly to the positive side of the B battery.

The inside end of the secondary winding of the transformer secondary connects with the positive side of the A battery filament line leading to the amplifier tube, and the



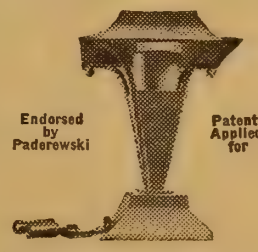
An Efficient Transformer of Small Construction

outside end of the secondary connects directly to the grid of the amplifier tube.

If using a second stage of amplification, the same directions are followed, except, of course, that the primary outside terminal of the transformer will connect with the plate of the first amplifier tube. Third and fourth stages will be added in the same way.

R. F. TRANSFORMERS
SCHINDLER $2.00 LIST
IT WORKS—THE PRICE IS RIGHT
DEALERS WRITE FOR DISCOUNTS
DUNGAN RADIO CO. 68 West Washington Street CHICAGO

THE ACOUSTICAL AMPLIFIER
BEL-CANTO
TRADE-MARK



Clear, resonant, mellow-toned as an old violin, the **BEL-CANTO AMPLIFIER** gives, in its original richness, the living voice of the artist, or the most delicate tones of an orchestra. Paderewski, the world's most famous pianist, says of it: "You are indeed to be congratulated upon your ingenious invention."

Adjusted for the following circuits: Regenerative two stages of amplification for stations within 50 miles. For long distance reception, 5 tube radio and audio frequency circuit. Special extra sensitive phone unit, ample cord and plug, **$30**, F. O. B. New York.

BEL-CANTO CORPORATION
417 East 34th Street NEW YORK CITY

Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAX, Crafton, Pa. Radio Service Corp.

WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WAH, Eldorado, Kans. 485 only. The Midland Refining Co. Daily ex Sat, 10:30 am, 1:30 pm, markets, weather. Sat, 1 pm, same. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 50 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. James Millikin Univ.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4 pm. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30 pm, news, reports, concerts. Central.

WBAQ, Mishawaka, Ind. Lyradion Mfg. Co.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Daily, 11-12 am, 4:30-5:30 pm. Thurs, 7:30 pm on Eastern daylight saving.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Mon, Wed, Fri, 10-11 pm, concert, lecture. Sat, 11-12 pm, concert. Sun, 10 am, 4-5 pm, church service. Central.

WBS, Newark, N. J. 100 mi. D. W. May, Inc. Mon, Wed, Thur, 7:30-8:30 pm, reports, music. Sun, 9-10:30 am, 1-3 pm, church service. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. City of Chicago.

WBZ, Springfield, Mass. 400 only. 500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 3 and 8, church service. Eastern.

WCAB, Newburgh, N. Y. 150 mi. Newburgh Daily News. Daily ex Sun, 1 pm, 2, 3, 7. Mon, Fri, 10:30 pm. Eastern.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Bodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Sun, 2-4 pm music. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 100 mi. Wesleyan University. Wed, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:15 pm, music. Wed, 8-9:15, concert. Sun, 3-4:30 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. St. Olaf College. Thur, 11 pm, music. Sun, 8:30 pm, music, concert, lecture. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.

WCAQ, Defiance, O. 200 mi. Tri-State Radio Mfg. Co. Daily, 11:30-12:30 pm, 3, baseball; 6-6:30, baseball, concert; 8, special program. Central.

WCAR, San Antonio, Tex. 200 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Sun, 11 am, church service. Central.

WCAS, Minneapolis, Minn. 200 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8-8:45 pm, music, lectures Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm. Tues, Thurs, 3-3:30 pm, music, news. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, reports, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Texas. 485 also. 300 mi. Mine & Smelter Supply Co. Daily ex Sun, 10 am, news, reports. Tues, Thurs, Sat, 7:30-8:30 pm, music. Mountain.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Daily ex Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40, bedtime story; 8:15, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, time, weather; 4-4:30 pm, 8-9, music; 10:05, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Tues, Thur, 11:45 am, 1:45 pm, 6 pm, 10 pm, dance music. Sat, 10 pm, 2 am, dance music. Sun, 8:30 pm, 9 pm, 10 pm, concert. Central.

WDAQ, Brownsville, Pa. 200 mi. Hartman-Riker Elec. & Mach. Co. Daily ex Sun, 10:30-10:50 am, music; 12:50-1:10 pm, music, news, weather; 5:05-5:30 music. Tues, Thurs, Fri, 9:15-10 pm, concert. Sun, [illegible] Eastern.

[illegible]phia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Wed, Fri, 7:45-10 pm, music. Sun, 10:30-12 m, 5-6 pm, church services. Eastern.

WDAV, Muskogee, Okla. Daily Phoenix.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Kenneth M. Hance. Daily ex Sun, 12:15-12:30 pm. Tues, Thurs, Sat, 7:30-8:15, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDV, Omaha, Neb. 100 mi. John O. Yeiser, Jr. Daily 7-8 pm. Tues, Sat, 12-1 am. Fri, 10-10:45 pm. Sun, 2-4 pm. Music. Central.

WDY, Roselle Park, N. J. Radio Corp. of America.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 am, markets, music; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news sports. Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:30 pm, 1:30, 3:15, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. 300 mi. Univ. of S. D. Mon, Wed, Fri, Sat, 7:30 pm, music, lectures. Central.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, Ohio. Ohio State Univ.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Thur, Sat, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. Will Horwitz, Jr.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45. 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program, 8:15-9:15 pm. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. Elec. Supply Co.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 485 also. 500 mi. Hutchinson Elec. Service Co. Daily ex Sun, 1 pm, markets etc. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 1:15 pm, 3:15, 7:30, reports, music. Tues, Thurs, Sat, 8-9 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 12:40 pm, markets. Wed, 8:30 pm, concert. Wed, Sat, 11 pm, concert. Central.

WFAW, Miami, Fla. Daily Metropolis.

WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Daily ex Sun, 10 am, reports; 1:16 pm, news; 2, reports; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:10 pm; Sun, 3:30 pm, organ recital. Sun, 4 pm, chapel. Eastern.

WFO, Dayton, O. 485 also. 300 mi. Rike-Kumler Co. Daily ex Sun, 9 am, 11, 4 pm, music, news, reports. Mon, Wed, Fri, 8 pm, concert. Sat, 11:30 pm, concert. Central.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, baseball; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 8 pm, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAT, Lincoln, Nebr. 100 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program, concert. Sun, 3-5 pm, sermon, Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 200 mi. Am. Radio and Research Corp. Daily ex Sun, 7 am, setting up exercises; 9:30, 11:30, 3:25 pm, music; 10:30 am, 1:30 pm, 3, 6, 6:30, reports, news. Mon, Wed, 7 pm, entertainment. Tues, 8:30 pm, fashion talks, concert. Thur, Fri, 9 pm, concert. Sat, 8 pm, concert. Sun, 4 pm, concert; 6:30 pm, reports; 7:30, church service; 8:30 concert. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. Atlanta Constitution.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 300 mi. Interstate Elec. Co. Mon, Tues, Wed, Sat, 8-9 pm, music, talks. Central.

WGY, Schenectady, N. Y. 400 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 11:55 am, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 600 mi. Univ. of Wis. Daily ex Sun, 11:58-12 m, time signals; 12 m, weather; 12:07 pm, agricultural bulletin; 12:20 pm, educational lecture. Tues, Fri, 8-9 pm, news, lectures, music. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 485 also. 100 mi. Marquette Univ. Daily ex Sun, 10:58 am, time; 11:20, weather. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAF, Pittsburgh, Pa. 200 mi. Radio Elec. Co. Daily ex Sun, 11:30-12 m, 3-3:30 pm, music, news, Sun, 9-10, music. Eastern.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. John T. Griffin.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm, 4:30-5:30, 10-11, Sat, 10-11 am, 2-2:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 9:15-9:45 am, 12:30-1 pm, 3:45-4:15, 7:30-8:30. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 9:30-10 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Dewey L. Otta. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, Sat, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Daily ex Sat, Sun, 12-1 pm, 4-5, music, agriograms. Sat, 12-1 pm, music, entertainment. Eastern.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 1:30 pm, 6, reports, sports. Mon, Wed, Sat, 8 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. ~~400 and~~ 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sat, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Ridgewood, N. Y. Times Printing & Pub. Co.

WHX, Des Moines, Ia. 50 mi. Iowa Radio Corp. Daily, 5:30-6:15 pm. Wed, 8-9:30 pm. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeLortin. Tues, 9-10:30 pm, Thurs, 12-1 am, music. Sun, 10-11:30 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:15, 12 m. 1:50 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 100 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Sun. Daily ex Sun, 3:30-4 pm, reports, news, music; 8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Sat, 8-10 pm, concert. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 2:30-3:30 pm. Daily, 1:30-2 pm, 7-7:30 pm. Tues, 7-12 pm. Fri, 7-9:55 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 200 mi. American Radio Co. Mon, Wed, 8:30-9 pm. Central.

WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 1,200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAL, Portland, Me. Victor Radio Corp.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star and Peoria Radio Sales Co. Daily ex Sun, 11:30 am, markets, weather; 1:30 pm, closing markets, agriograms, bond news; 6:15, sports. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thur, 8-9:30 pm, music. Sun, 11-12 m, pipe organ, 12-1 pm, church service.

WJAQ, Topeka, Kans. Capper Publications.

WJAR, Providence, R. I. The Outlet Co.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 2-2:30 pm, 5:35-6, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm; Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7-8:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 25 mi. Denison Univ. Tues, Thur, 5-6 pm, educational lectures. Sun, 5-6 pm, religious stories. Central.

WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.

WJK, Toledo, O. 300 mi. Service Radio Equipment Co. Daily ex Sun, 2-3 pm, reports. Mon, Wed, Fri, 7:30-9 pm, concert. Sat, 2-5 pm, sports, news. Sun 11-12:30 pm, 7:30-8:30, church services. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 15 minutes hourly from 9 am to 6 pm; 12-12:30 pm; 7-10:15 pm. Miscellaneous program of highly varied nature. Sun, 3-10:15 pm, music. Eastern.

WKAA. Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. Star Pub. Co. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAG, Louisville, Ky. Edwin T. Bruce.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. Brenau College.

WKAZ, Wilkes-Barre, Pa. 300 mi. Landau's Music Co. No definite schedule. Sat, 8-12 pm, dance music. Sun, 11 am, 8 pm, church service. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. Oklahoma Radio Shop (Daily Oklahoman). Daily ex Sun, 12 m, weather; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WL2, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAF, Lincoln, Neb. Johnson Radio Co.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30-12 am, music, market reports; 1:30-3 pm, music, farm news, styles; 3:30-4:45, markets, music; 6-7:30, farm news, children's hour. Thur, Fri, Sat, 8-9:30 pm, concert. Sun, 4:30-5:30 pm, church services. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, Sat, 7:45-8:45 pm, music. Sun, 3 pm, church service.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAO, Scranton, Pa. 100 mi. 485 also. R. C. Ehrhardt and J. H. Jones. Mon, Wed, Fri, 7:15 pm, bedtime stories, reports, 8-9:45 pm, music. Sun, 7:30 pm, music; 8:30, church services; 9:15, music. Eastern.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAR, Marshalltown, Ia. 50 mi. Meikel Music Co. No definite schedule.

WLAS, Hutchinson, Kan. Hutchinson Grain Radio Co.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. Hutton & Jones Elec. Co.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

TURN TO RADIO IN FIGHT ON "DOPE"

New York Police Broadcast Lecture on Narcotics; Advice to Addicts Listening In

NEWARK, N. J.—Deputy Commissioner Dr. Carleton Simon, head of the Narcotic Squad of the New York Police Department, delivered a lecture entitled, "Narcotics and Society," at the Bamberger broadcasting station, WOR, of this city, on the night of January 19.

Dr. Simon told of the work being accomplished by his world famous narcotic squad and he expounded a few of his original theories pertaining to the enactment of more comprehensive laws to govern the manufacture and sale of drugs of all sorts. He also explained some of his own highly successful methods of treating drug victims.

Advises Chance Addicts Listening In

The Commissioner concluded his address by offering some fatherly advice direct to the secret narcotic addicts of the eastern states. He will inform them as to where and how they may obtain effective treatment without publicly exposing their sad plight.

In an interview regarding the broadcast, Dr. Simon said:

"This is indeed an opportunity which I have long sought. For many months I have been trying to devise some practical method of soliciting the wholehearted cooperation of the good citizens of this section of the country in our all-important anti-narcotic movement and also to establish some sort of direct communication with the clandestine drug users in and around New York, and I think I have found exactly what I was looking for.

Believes Radio Talks Will Aid Move

"Unless I am badly mistaken, Radio will enable me to accomplish a vast amount of lasting good through the series of monthly broadcastings of which this was the first.

"You may be sure that many secret addicts were listening in to my first talk. The majority of these unfortunates desire to be cured but they are afraid to openly seek expert medical advice. I sincerely hope to save a great many of these poor men and women through my series of Radio talks."

The vacuum tube used in Radio is the most sensitive electrical device ever invented.

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RECEIVING RECORDS? SEND 'EM IN—

NEXT week the Receiving Records Contest fans will be supplied with the revised list of record holders again. The list grows longer, as do the various mileages, with the increasing cold of winter and improving Radio reception conditions. For the uninitiated the rules will be repeated next week. Records were made or taken by the following Radiophans during the past week:

Station—Miles Away—Who Heard It

CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CHCA—1625, T. S. Wildman, Nichols, Ia.
CKCK—1625, L. Genack, Springfield, Mass.
KDYX—4150, W. E. Long, Sterling, Ill.
KFAD—1600, D. L. Kalter, Dayton, O.
KFBB—1050, R. Henry, Butler, Mo.
KFBQ—1025, B. H. Seydel, Tacoma, Wash.
KFCF—1775, R. A. Deger, Dayton, O.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KGG—1550, T. S. Wildman, Nichols, Ia.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KYJ—2025, V. V. Tompkins, Cleveland, O.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAH—1275, A. G. Hilton, Bicknell, Calif.
WCX—2050, A. G. Hilton, Bicknell, Calif.
WDAP—1875, M. J. Bevilockway, Lomita Pk., Calif.
WFAS—1875, B. H. Seydel, Tacoma, Wash.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WMAF—1250, R. Henry, Butler, Mo.
WNJ—2375, B. H. Seydel, Tacoma, Wash.
WOAZ—1050, O. E. Frazier, Watts, Calif.
WPAB—1250, J. Skinner, Corsicana, Tex.
WQAQ—1025, R. A. Deger, Dayton, O.

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FLEWELLING
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ALL THE NAME IMPLIES
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Designed to fit all tubes and valves, such as the WD-11, WD-21, French and British valves.

Note the 4 prongs at base; uniform in design—to fit any tube socket.

Not alone is the design of the KING QUALITY ADAPTER "Universal" but the construction is durable in every respect. The split tube contactors bring about perfect contact; the entire assembly is solid so that the tube or valve, when inserted, will remain rigid, and will set deeply into the tube socket to which the tube is to be adapted.

The 4 terminal prongs at the base of the adapter are of uniform design, and will fit any tube socket as easily as the standard Radiotron tubes.

Split tube contactors result in perfect contact, sets deeply into tube socket.

KING QUALITY
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R-10—Price $1.00

Every Radio product that bears the KING QUALITY name represents the Best in design, operation and appearance. Lower in Price, Highest in Quality.

Write today for bulletins of KING QUALITY Radio Apparatus prices, etc.

RADIO APPARATUS DIVISION
King Sewing Machine Company
Buffalo, N. Y.

Notes on Transformers

Amplifying transformers should be placed at right angles and should not be placed nearer than four inches from one another. The primary and secondary terminals should be made correctly to the plate, grid and filament leads. Otherwise the transformer will work inefficiently.

Many broadcasting stations have decided to suspend operations certain nights each week so that owners of sets may hear concerts from outside points.

KELLOGG RADIO FOR BETTER RESULTS

KELLOGG SWITCHBOARD & SUPPLY COMPANY
Chicago

Prize Girl Violinist Plays for Station WGI

MEDFORD HILLSIDE, MASS.—Carmela Ippolito, violinist, played for the Radio audience of Station WGI here, January 27. Miss Ippolito was accompanied by J. M. Sanroma, member of the faculty at the New England Conservatory of Music and concert pianist of note. Mr. Sanroma won the prize Mason and Hamlin grand piano in the annual competition at the New England Conservatory recently.

Variocoupler for Flewelling Super

Obtain or make a 180 degree type variocoupler similar to the Remler coupler but remove the rotor from its shafts and in its place insert a honeycomb coil of 75 or 90 turns. Good results may be obtained from a rotor of cardboard tubing upon which may be wound about 80 turns of D.C.C. wire, approximately number 24 B. & S. gauge.—Albert R. Miller, Jr., Spring Valley, Minn.

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Chicago Radio Apparatus Co.
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REINARTZ CIRCUIT
EVERY PART COMPLETE

1 Reinartz wound coil, 1 coil base, 1 tube socket, 1 Vernier rheostat, 1 23-plate .005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 25 switch points and nuts, 8 binding posts, 1 variable grid leak 1.002 MFD phone condenser, 25 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions..... $10.00

FLEWELLING CIRCUIT
EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and diagram and complete instructions..... $11.00

ARMSTRONG REGENERATIVE CIRCUIT
EVERY PART COMPLETE

1 Litz wire variocoupler, 2 variometers, 1 tube socket, 3 3" dials, 1 Vernier rheostat, 6 binding posts, 1 inductance switch, 20 feet bus bar wire, 1 high-grade RADION panel $12.00

3 Plate Variable Condenser; value, $1.75; special at $1.05
13 Plate Variable Condenser; value, $2.50; special at 1.20
23 Plate Variable Condenser; value, $3.50; special at 1.35
43 Plate Variable Condenser; value, $4.50; special at 1.65
13 Plate VERNIER Condenser; value, $5.50; special at 3.75
23 Plate VERNIER Condenser; value, $6.00; special at 4.00
43 Plate VERNIER Condenser; value, $6.50; special at 4.25

FILAMENT RHEOSTAT—Condensite base; value, $1.10; special at $0.70
FILAMENT RHEOSTAT with 2⅛" dial; value, $1.50; special at ..... .85
Potentiometer with knob; value, $1.75; special at 1.00
Potentiometer with 2⅛" dial; value, $2.15; special at 1.15

V. T. SOCKETS—Nickeled brass sleeve, composition base; value, $1.00; special at. $0.50
Ball Bearing Inductance switch; value 75c; special at. ..... .30

BEST QUALITY JACKS, Single circuit; value, 65c; special at. ..... .30
Double circuit; value, 90c; special at. ..... .45

VARIOCOUPLER—Celeron condensite and Litz Wire wound secondary; value, $4.50; special 3.25

THREE INCH DIALS—Unbreakable—heat resisting composition—high finish; special. .30
TWO INCH DIALS—Same design—for rheostats and potentiometer; special. ..... .25

EXTRA SPECIAL—3000 OHM Telephone Headsets; $8.00 list; reduced to. 3.50

RAYMOND VERNIER RHEOSTATS—Value, $1.50; special ..... .95

ALUMINUM LOUD SPEAKING HORN—Nickel plated—highly polished; $8.00 list.. 3.75

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WILLARD RADIO COMPANY
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Radio Digest Illustrated

TRADE-MARK

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, February 3, 1923 No. 4

Self Operating Sets a Possibility

Radical Changes in Sets Yet to Come

WITHIN a few years Radio operators as we know them today may be as scarce as horse car drivers or American bartenders. The world is rapidly drifting into the automatic age. Automatic operation has just been introduced into the telephone field and Radio is also drifting into this direction. There has been developed recently an automatic recorder which is the first step toward operatorless Radio.

The automatic transmission and reception of Radiotelegraph signals of importance since it points the day to greater speed. Greater speed means more traffic and cheaper transmission, which eventually will bring about a reduction in the world rate. Then, too, it will bring transatlantic Radio into more intense competition with the cable systems.

Identify Announcers' Voices

Stations Told by Mannerisms of Articulation

ONE of the interesting phases of Radio reception is the study of the voices of the various announcers on the air. The veteran fan can soon tell each station call before it is announced by the sound of the voice of the operator.

Atlanta, for instance, is a high pitched call, much as if Lambdin Kay were yelling at the top of his voice, "This is the Atlanta Journal!" Schenectady, on the other hand, is a soft, full, well-modulated voice, giving the impression that the announcer is making no special effort, but merely talking conversationally with mouth close to the transmitter.

There is hardly a fan who doesn't laugh each time to hear St. Louis announce. "This is the St. Louis Post Dispatch," is uttered by a man's voice, but in a woman's tone. Its effeminate touch is a distinguishing mark that cannot be mistaken.

In Kansas City, the Sweeney Automobile School, WHB, has an announcer with a strong voice but rather husky, and except for the relative strength of the two stations, is much like WOC at Davenport. Davenport, however, never misses a chance to keep the fans in touch with the fact that WOC is "transmitting". This is probably better appreciated by listeners at a distance than near the station.

Donald Campbell's voice at KYW comes in full and clear and is well-known to all fans, while Ralph Shugart at WDAP has a somewhat hesitating voice that at times seems to be drawled out.

Politicians Keep Out

Microphone Not Popular with Vote Solicitors

AT THE time of the 1921 elections politicians overlooked the few stations that then operated. But the sentiment that Radio stations were valuable in campaigning had been crystallizing and gaining headway month by month until the 1922 elections found all the handshakers, back-slappers and vote-seekers ready to make their debut on the air. National and local figures, great and small, beat a tattoo on broadcasting doors.

But the politicians discovered a strange thing in their first contact with Radio. The campaigners, jolly good fellows all, were rosy with smiles as they rushed to get their voices on the air. But they did not always find a willing response. "Politicians Keep Out" was the sign to be read on almost as many studio doors instead of the "Welcome" that all had expected to find. The broadcasters neither kept all politicians at arms length, nor did they gather them fondly to their breasts. And in practically no instance was any single political party given exclusive use of the microphone.

A canvass of the situation resulted in that there was not a single instance where broadcasting has brought into being an absolute unbiased and impartial medium through which public expression may be given to subjects that have public interest, whether local, state wide, national or international.

Broadcasting a political speech on state affairs would be dry stuff for the listener in another state. There would be no need to make an appeal for votes out of his own territory.

Condensed

By DIELECTRIC

Perhaps the problems that most perplex the public are concerned with broadcasting. Some of the people, undoubtedly the larger part, are not worrying about this phase of the new mode of entertainment, preferring to leave the matter in the hands of the broadcasters.

A symphony orchestra has no peer in the music world, unless it be a stringed quartet, and either of these are faultlessly transmitted through the microphone. Stations WEAF, in New York City, and WJAX, in Cleveland, O., have broadcast programs from two of the finest orchestras in the country. I hope to see the time when concerts will be broadcast all over the land from symphony halls and academies of music, providing the very best musical provender to eager audiences. The United States occupies a unique position in the matter of musical talent, having within its boundaries the foremost artists in every branch of music. Unique also in the perfection of its broadcasting facilities and variety of entertainment offered, I cannot believe that we will be without easy access to the best in music for very long.

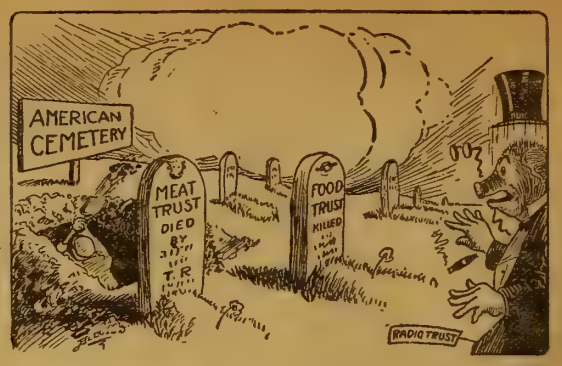
National Radio Week accomplished far more than the casual observer might think. Not only has it stimulated the slothful to partake actively of its countless benefits; stirred the fan to renewed efforts in bringing in new recruits and thus widened the circle of Radio—enlightened citizens; but it has led the broadcasting stations to strengthen and broaden their programs, so that they have included features hitherto untouched. I can picture the emotions of listeners-in who perhaps never had heard the masterpieces of oratorio composers, and several stations gave their audiences an opportunity to listen to Händel's Messiah as rendered by choruses numbering upwards of a hundred voices, nor had they had the privilege of hearing the famous ancient chimes from Old Trinity church in New York City. Such a glorious experience it is to have in your home what thousands of grateful listeners could never know without the marvelous aid of Radiophony. Don't let us forget to express appreciation to our benefactors.

At least one candy manufacturer profited by the DX owls early on the morning of January 1, when Station WDAP, Chicago, presented a five-pound box of candies to the first "owl" in each State to wire them that they were listening. I believe a certain gentleman in St. Louis, Mo., was about thirty seconds ahead of a gentlewoman, in the same State, to dispatch a telegram and thus become the winner for that State. Possibly the box was shared between them. It must have been somewhat of a wrench to a hard working DX-er to take the time necessary for wiring, when he or she was so anxious to locate a distant station and start the new year with a record. Incidentally, let me explain that a "gentlewoman" is one who is willing to listen by the hour without begrudging the time lost from conversing.

What other medium presents so perfect a means of spreading information as does Radiophony? It is unfortunately true that specious arguments may be broadcast on any subject, which to the unthinking may seem undeniable. An instance of this kind came through the air when Turkey was made to appear without blemish in the suave language of a native son, and if ever a self-respecting tube howls it must be when forced to receive such an address. It is equally true, fortunately, that useful and authentic information may find a large audience through the instrumentality of a microphone. I believe the majority of talks given over the Radio are of a helpful nature. Those responsible for the character of programs presented are often hard pressed for suitable talent. We should consider this when making our criticisms.

A great many of you readers of Radio Digest have heard grand operas through your receiving sets as broadcast by station KYW in Chicago, and for some this has been the first time performances by a leading opera company have been heard. Pictures of artists whom you have heard sing with the Chicago company have appeared each week in this paper, aiding to form a mental picture of the actors on the stage. What I am interested to know is, how many of you have attended an operatic performance, either here in Chicago or elsewhere, since listening in to these broadcasts. Will you write to me in care of the Editor, stating that after hearing operatic music by means of Radiophony you attended a performance? Such information will be very much appreciated and may be valuable in encouraging other companies to allow their performances to be broadcast.

Appeals for charitable purposes have found Radio to be a decided help in reaching a large number of interested people. A few Sundays ago, Dr. Stires, rector of Saint Thomas Episcopal Church in New York city, asked for funds to be contributed to the United Hospital fund and his request was carried by Radio to thousands outside his congregation. The response from those who were listening to the services that morning from their homes has been gratifying, I am told. Similar pleas have been made from other men in other places with equally assuring results. At another religious meeting recently, the Radio audience was asked to set aside an amount of money to be given to their local church, since they were not present to contribute to the offering then being taken. Perhaps few followed the suggestion, but nevertheless Radio made possible the spreading of the idea. The audience to which you may appeal for anything is tremendously enlarged when broadcasting.



RADIO INDI-GEST

A Little Light on the Subject

Dear Indi:
Do you happen to possess a Bake-light?

ELECTRIFAN.

My friend Electri:
No, but I can furnish you with an ampli-fire.

—INDI.

Putting the Bakers Out of Business

The New York Evening Mail tells of a broadcast star who sings twenty roles. The Office Squirrel says he doesn't think it possible to sing that much pastry, although he has heard of a man who yodeled six plates of soup.

Our Q. & A. Department Will Not Tell—

If the rheostat offers resistance will the lightning arrester?

If the battery gets "charged" will the crystal detector?

If we'll all have to learn to talk French when we get in daily communication with Parisian amateurs, or if they will have to learn English?

She Sang It Before She Even Started

Miss Henrietta Warbler, dramatic soprano, was singing from Station PDQ. Came through the ether—

"Miss Warbler's next number will be 'Last Night'."

OTTO METER.

He Wears a Silk Hat Over the Headset

"Spiffins is the most henpecked man in the world."

"How come?"

"His wife makes him put on evening clothes to sit home and listen to the Radio opera."—BUFFALO EXPRESS.

Try This on Your Antenna

The Office Squirrel says that a good safety first slogan for the Radiophan might be "Live Wire—Dead Fan!"

Fair Grounds Radio

A Washington paper asks, "What is a state fair without Radio?" Our answer is, "Only fair."

Probably Has Some High Power "Bottles"

The Office Squirrel notes that President Harding is supposed to have a secret transmitting set in the White House cellar, and hastens to query whether that is all the secret stuff to be found in the head executive's basement.

Attention, Policemen

Si (reading): "Big feat by Radio."

Hi: "We don't want none. We got all the big feet in our family now that I can buy shoes fer."

A Mixed Chorus of Radiophans

"Mr. Will Howler, tenor, will sing 'Who'll Take My Place?'" said the announcer.

(Ed. note:—After hearing a few measures, almost everyone invisibly present offered to substitute.)

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

CHAPTER V

MOST people are interested in Radio to the extent of having a Radio receiving set installed in their home and being able to listen in to the concerts, speeches and other forms of entertainment that are now being broadcast from numerous stations throughout the country every evening. To obtain the best results from this outfit, the operator must know how to adjust the various parts properly; and to be able to do this intelligently, he must know what the functions of the various parts are and how they operate with respect to each other.

In this chapter we will, therefore, take up a detailed discussion of the Radio receiving station, its component parts, and how each operates. Again we will find that everything is based upon a few fundamental electrical principles; and if we recall these as explained in the previous chapters, we will see how simple it really all is.

Operation of a Set

A receiving station, as the name suggests, is a group of apparatus used for the purpose of intercepting the Radio waves sent out at a distant transmitting, and rendering them intelligible to our senses. There are thus a number of operations to be performed by the receiving station. Among these are the following: In the first place, the station must be capable of intercepting the ether waves as they pass through space and of absorbing part of their energy. Secondly, since it is generally desirable to receive only the waves from one station at a time, the receiving station must be capable of being adjusted or tuned to the wave length at which the particular station desired is operating.

Set Reduces Frequency

After the station is tuned and the oscillations are being received, these incoming oscillations are at a Radio frequency and far too rapid to be capable of being heard by the human ear. The third operation to be performed by the receiving station, is thus to reduce the Radio frequency oscillations to an audio frequency. Furthermore, this must be accomplished without in any way affecting the general nature of the oscillations, otherwise their messages cannot be interpreted by the receiving operator. After the oscillations have been reduced to an audio frequency, they are still of an electrical nature, and hence must be converted from electrical current waves to sound waves capable of affecting the human ear. This comprises the fourth function to be performed by the apparatus. Finally, the station must also be provided with some form of protective device to shield the operator from danger from lightning or other electrical sources.

Functions of Parts

A receiving station must thus perform five essential functions, besides the additional operations that may be necessary in order to be able to obtain certain special operating characteristics. For intercepting the Radio waves and absorbing part of their energy, the receiving antenna or aerial is employed. For adjusting the receiving station to the wave length of the desired station, special tuning devices are needed, such as variable inductances and variable condensers. The Radio frequency oscillations are reduced to an audible frequency by means of a special piece of apparatus known as the detector. This detector may be either of the crystal type or of the vacuum tube type. Converting the audio frequency electrical oscillations to sound waves is accomplished by means of telephone receivers. To guard the operator against harm by lightning, a device known as a lightning arrester is used. There is, however, very little danger in this respect, and it is really much less than it is thought to be generally.

We will now discuss each of these essential parts in detail and see how they are constructed and how they operate. Finally we will be ready to consider them as a group, and learn how the entire equipment is assembled, installed, and operated.

Receiving Antenna

The antenna, or aerial as it is often called, constitutes that part of a receiving station which intercepts the ether waves and absorbs part of their energy. In order that best results will be obtained, it is necessary that the utmost care be expended in the erection of the aerial; for if the aerial is defective or leaky, endless trouble will only be experienced, no matter how perfect or of what good qualities the receiving set itself may be.

The antenna of a Radio transmission station must be of special dimensions and construction in order that the station will operate at the desired wave length, but for a receiving station the exact dimensions are not so very important, although there are certain limits above or below which operation of the receiving apparatus cannot function to the best advantage.

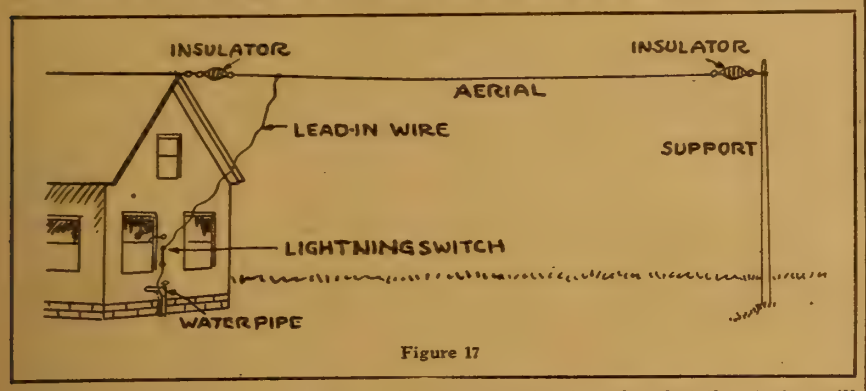


Figure 17

Best Form of Antenna

The best form of outdoor antenna to use for a receiving station is a single wire stretched between two convenient supports. This single wire antenna should be at least 40 feet long but not greater than 100 feet, for if the dimensions are above or below these values, additional apparatus must be added to the receiving apparatus, and this extra equipment will cut down the efficiency of operation.

It has been found that a single-wire antenna gives best results in that less interference need be contended with in case several transmitting stations in the same vicinity are operating at or nearly at the same wave length. Another important advantage of the single-wire aerial is that static, Radio's greatest enemy, has less chance to cause trouble. It seems that static appears to collect on the aerial, and hence the greater the network of wires comprising the aerial, the more surface is offered for static to accumulate on.

Of course, it is also true that with an aerial composed of several wires the received signals will be somewhat stronger than with a single-wire aerial, but this strength does not increase at the same rate as the number of wires is increased. However, in the long run it is generally preferable to sacrifice some of the signal strength in order to reduce the amount of interference and the intensity of static.

Material for Aerial

Since the quality and intensity of the incoming messages depend to a very great extent upon a properly constructed aerial,

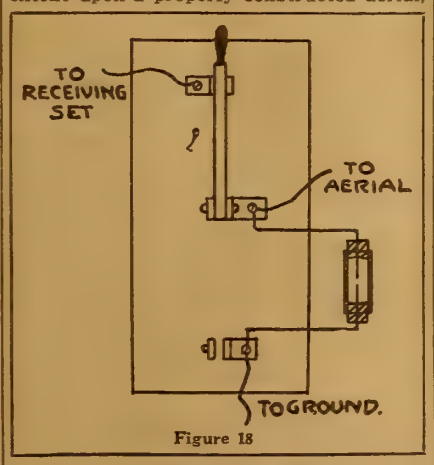


Figure 18

it is very important that only the proper materials should be used and that it be erected in a safe and well-insulated manner. The single-wire aerial as used for receiving purposes would be from 40 to 100 feet in length and supported at any convenient height—generally the higher the antenna the more effective it is. Copper or bronze wire, No. 12 or 14 in size, gives best results, although aluminum wire can also be used effectively.

Iron wire, however, is very inefficient and should be avoided if possible; for on account of its higher resistance, the electrical losses in it are greater with the result that the signals are greatly weakened. Stranded wire, it is claimed, gives somewhat better results than solid wire, for a greater amount of surface is exposed.

Supporting Aerial

The antenna wire can be stretched and supported between any two convenient points, at a height of at least 30 feet above the ground. Better results are always obtained if the aerial is stretched between a building and a pole or another building, as is shown in Figure 17, than if it is supported on a roof. The effective section of an aerial should preferably be kept from under the branches of a tree, for the leaves in swaying with the wind have a tendency to affect the wave length of the antenna and thus interfere with the tuning of the apparatus.

The ends of the antenna wire should always be well insulated from the supporting structures so as to prevent leakage to the ground. Various forms of antenna insulators can be purchased, although porcelain cleats as used for exposed wiring serve the purpose very well.

Lead-In Wire

The outdoor antenna is electrically connected to the receiving apparatus within the rooms by means of an insulated wire known as the lead-in wire. This lead-in wire is fastened to the near end of the antenna (the joint being soldered so as to insure good and permanent contact), and is run directly to a "lightning switch" located near the point at which the wire enters the house. This lightning switch serves to protect both the apparatus and the operator in case the aerial is struck by lightning. It consists of a single-pole, double-throw (S.P.D.T.) knife switch mounted in a vertical position on an insulating base, as is illustrated in Figure 18.

The wire coming from the aerial is connected to the middle clip, while to the upper clip is fastened the wire leading to the receiving apparatus, and to the lower clip the wire leading to a good ground connection. By thus throwing the switch into the upper position the aerial is connected to the receiving apparatus, and by throwing the switch into the lower position the aerial is connected directly to the ground. When the receiving apparatus is not in use, the switch should always be thrown into the lower clip so that there will be a direct metallic path from the aerial to the ground.

Use of the Ground Switch

In order to protect the operator while the switch is in the upper clip and the receiving apparatus is in action, some form of lightning arrester or protective spark gap should be connected across the middle and lower clip of the switch. Various forms of such lightning arresters are available on the market, but a very effective and simple gap or arrester can easily be built at home.

A glass or fiber tube is used, about ¾-inch in diameter and slightly shorter than the distance between the middle and lower clips of the switch. An old 60-ampere fuse cartridge, cut off to the proper length, will serve very well. Into the ends of the tube are inserted fiber or wooden plugs through the center of each of which extends a piece of No. 14 copper wire. The plugs are inserted to such a depth that the ends of the wires are separated about 1/32 of an inch. The ends of the tube are then filled with tar or sealing wax in order to exclude moisture. The outer ends of the wire are then bent at right angles and fastened under the connecting screws of the middle and lower clips. With the arrester attached and the switch thrown into the upper

(Continued on page 12)

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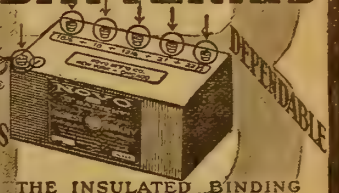
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Combination Tube and Crystal Set

Jacks Used in Set to Make a Quick Change

The accompanying illustration shows a simple hook-up in which jacks are used for switching over from a tube set to a crystal and back again. With the crystal jack the variocoupler is the only instrument in the circuit with the crystal.—Hagen Thompson, Chicago, Ill.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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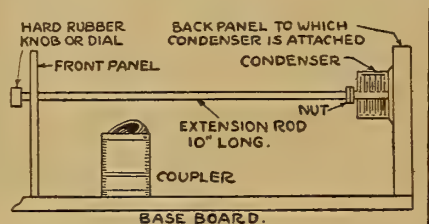
Long Shafts on Condensers

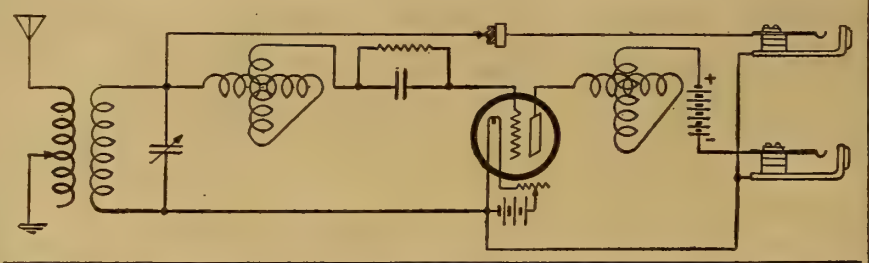
In operating a regenerative receiver any movement of the operator's hands near the variable condensers, will alter the body capacity effect and make reception difficult and sometimes impossible. To overcome this I fitted extension shafts and mounted the variable condensers as shown in the illustration.

The dial or knob is first removed from the condenser, and a long threaded nut with tight fitting thread is screwed halfway on the shaft of the condenser. A piece of brass rod long enough to extend from the condenser shaft to the outside of the panel is fitted into the nut on the condenser shaft. This connection may also be soldered, if desired, to hold it more



securely. The regular dial or knob is then fitted to the front panel end of the extension rod. This method is particularly well adapted for using table type of condensers on the panel sets.—P. Stark, Sterling, Ill.

TWO CIRCUITS USED IN THIS SET



Charging the B Battery

A great many Radiophans own their own rectifiers for charging their A batteries but they do not know how to charge their B batteries with it. As the average storage B battery is of 24 volts the whole battery cannot be charged at a setting. Only three cells can be charged at a time, the remainder being charged three cells at a time in succession until all are charged.—Glen E. Gaufin, Escanaba, Mich.

Use for Phonograph Records

Any amateur attempting to listen in on long distance work finds trouble when tuning with a variable condenser. Fine adjustments cannot always be made.

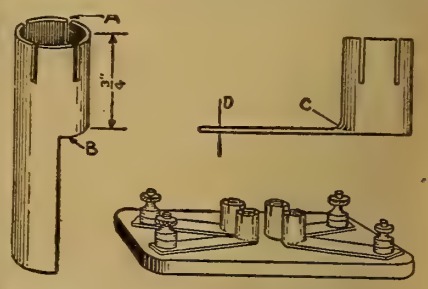
To remedy this I procured a 12-inch record and fastened it with screws on the dial of the condenser. By grasping the outside edge of the record and moving it slowly an extremely fine adjustment can be made. If desired, a graduated scale can be drawn on paper and pasted on the record. With the aid of this device found it possible to tune in stations that could not be heard before their use.—William Bobinson, Edgewood, Pa.

Keep Storage Battery Clean

Dirt and acid, which collect on the tops of storage batteries, can be wiped off with a cloth moistened with a solution of water and ammonia.

Tube Socket Made of Small Copper Tubes

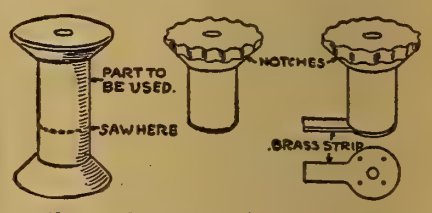
The materials necessary to make the socket illustrated are 1 piece of dielectric material about 2½ inches square, 4 binding posts, or brass bolts, and 4 pieces of copper tube about ⅛ or ¼ inch in diameter. Make two cuts with a hack saw in the top of the tube at A, ⅝ of an inch long. Cut the tube half off ¾ inch from the top as at B. Cut up from the bottom to the last cut and remove half the tube. Bend the tube at C until the bottom half is at right angles to the upper part. Drill a hole at D for a bolt or binding post and as-



semble on the dielectric base. The piece of tubing should be about 2 inches long.—Albert R. Miller, Spring Valley, Minn.

Spools Make Switch Knobs

An ordinary thread spool makes a good knob for experimental work. Cut the spool in two, as shown in the illustration, and



use the notched flange. Some spools have a knurled edge. A piece of sheet copper or brass is cut for a pointer or switch blade and used on the end.—Arthur Gaebe, Cincinnati, O.

With reasonably careful usage the life of the standard vacuum tube should be about 2000 hours or more.

A. B. C. LESSONS

(Continued from page 11)

position, should a high voltage be induced in the antenna due to some atmospheric disturbance, the electric charge would find it much easier to jump the gap of the arrester and escape into the ground than to travel through the windings of the receiving apparatus with the possibility of doing any damage.

The wire which leads from the upper terminal of the lightning switch to be receiving apparatus in the room, should be rubber-covered copper wire at least No. 14 in size, either solid or flexible stranded wire. Where it enters the building, either through the window casing or the wall, it should be protected with a porcelain tube. This insulating tube should slope downward toward the outside of the building so as to prevent rain from entering the room through the tube.

Ground Wire

The ground wire which leads from the lower clip of the lightning switch to the ground should be a No. 4 rubber-covered copper wire and should be supported on porcelain knobs in as straight a line as possible, with no sharp bends. The lower end of the wire should be connected by means of a ground clamp to a water pipe. In connecting the clamp to the pipe be sure to scrape the pipe clean where the clamp is applied, so that good metallic contact will be insured. In case no water pipe is available, a good ground connection can be established by driving an iron pipe into the ground to a depth of about six or eight feet. Such a ground connection will be most effective if the pipe is driven into the ground at some damp place, for dry earth is a fairly good insulator.

Having now considered the outdoor parts of a receiving station, we are ready to take up the apparatus indoors.

The Receiving Set

The receiving set itself comprises the apparatus installed indoors, and serves to render intelligible the signals which are received over the antenna. The receiving set really consists of two individual yet interdependent parts, each part having its own functions to perform. These parts are, respectively, the tuner and the detector. We will now review briefly the nature and operation of each.

An antenna system is in reality a form of open oscillating circuit containing both inductance and capacity. The amount of inductance depends upon the length and arrangement of the wires comprising the antenna, while the capacity depends upon the number of wires used and their height above the ground. An antenna may be looked upon as forming a large condenser, the wires forming one conducting plate and the earth beneath the other plate, while the air in between constitutes the dielectric.

Natural Wave Length

An antenna system, therefore, like oscillating circuit, has its own oscillation frequency or wave length. This is known as the natural wave length of the system, and the receiving antenna will operate most efficiently if this natural wave length is the same as that of the incoming waves, that is, if the two are in resonance.

However, since the desired messages are not always at the same wave length as the natural wave length of the antenna, it is necessary to alter or adjust the receiving antenna in some way so that it will be in resonance with the desired transmitting station. This adjusting, or tuning, as it is called, can be accomplished in one of three ways; the length of the antenna can be altered, inductance can be added into the system, or capacity can be introduced into the system. But since it is not always convenient to alter the dimensions of an antenna that is permanently installed, the last two schemes are the ones commonly used. It is this station tuning process which constitutes the first function to be performed by the receiving set, and the apparatus of the receiving set by means of which this is accomplished is known as the tuner. The apparatus used for tuning purposes, as well as the most efficient and rapid method of tuning a station, will be taken up in the next chapter.

Detector for the Set

After the station is in tune with the waves sent out from the desired station, the next operation is to convert the Radio frequency oscillations to oscillations at an audio frequency but of the same form and quality. This is the second duty to be performed by the receiving set, and is accomplished by means of the detector. The detector really forms the most critical part of the receiving set, for upon its action depends to a very great extent the quality of the signals heard in the phones.

Various forms of detectors have been devised since the Radio art first came into existence, but of all of these only two have proven satisfactory and are being used at the present time. These are the crystal detector and the audio or vacuum tube detector, each of which has its own field of application in that it best fulfills certain requirements. The mineral detector is used extensively for field service, and for small inexpensive home receiving outfits. The vacuum tube, on the other hand, is somewhat costly and hence is used with stationary sets and where greater volume or signal strength is desired. The crystal detector and its operation will be taken up in the next chapter, together with the tuning apparatus; while the vacuum tube detector, on account of the more extensive electrical principles involved in its operation, will be postponed until some later chapter.

A third duty which is often performed by many receiving sets is that known as amplification. By amplification is meant the strengthening or increasing of the intensity. Amplification is employed when the signals are either weak or it is desired to have the signals heard in all parts of a room, and to accomplish this additional equipment known as a loud speaker is required.

Chapter Six

In Chapter Six which will appear in the next week's issue, we will take up a discussion of the construction and operation of the different devices used for tuning a receiving station to the desired wave length. Apparatus such as loading coils, tuning coils, variocouplers and variometers will be taken up in detail. All those desiring a thorough knowledge of these devices cannot afford to miss this important article.

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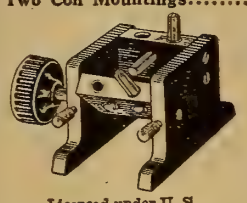

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The "How" of the Simplified Super Circuit

Part I—Setting Up the Flivver Successfully

By E. T. Flewelling

SINCE the publication of the simplified super circuit, the writer has had the opportunity to spend considerable time watching its action and building the theory of its operation. Hundreds of letters have been received telling the trials, tribulations, and successes of those who have tried out the circuit. These things have brought together quite a few items of interest.

Follow Specifications Strictly for Success

An analysis of the letters received shows that those who have successfully built the Simplified Super have in every case followed strictly the specifications called for. No letter has yet been received relating failure that did not also contain its own answer. The experimenter did not use the apparatus especially called for, or else evidently had decided, upon a glance at the hook-up that he could by changing the circuit a little, considerably improve upon its action.

It is surprising how many letters of this type have been received. To try to improve a hook-up or to change it to meet the apparatus that one happens to have on hand without at first trying the original, is to my mind the height of foolishness, because it immediately calls for an assumption that the originator merely hit upon a new circuit, gave it to the public at once without a care that it might be improved upon and then fell asleep.

Now this little story is being written with no other idea than to help out those who wish to work with the Simplified Super, and also to add in the notes to follow a little information that perhaps is not known to everyone in the world.

Hundreds of Circuits Fail

If I said that two hundred different combinations of hook-ups, apparatus, etc., had been tried, that would be a very low estimate. All of these combinations with small exception refused to fire. Those which did go were not equal to the finally developed circuit that has been published, with the possible exception of one. This one referred to seems to accomplish about all that the flivver circuit does, but has failed so far to match quite the results given by a nicely balanced flivver circuit.

I will be pleased to show this alternative circuit with its notes in the next few issues of Radio Digest because it calls for even less apparatus and adjustment than the flivver circuit and illustrates the principle used just as well.

About the Use of Loops

Most folks seem to assume that a loop of average size will work properly, and it will doubtless be of value to them to have the following brought to their mind. First note that a receiving set depends for its audibility and distance qualities upon the effective height of the antenna. Without going into mathematics this works slightly different than at first glance might be assumed.

The answer is this. If an average three-foot loop were computed, it would be found that it possessed the ability of an open antenna approximately one foot high. A loop has the directional quality as one of its most valuable advantages, but unfortunately most of this is lost when using a super set on a loop. It is understood that any antenna system must be tuned to take care of the wave desired, but one is apt to forget entirely that a loop is nothing after all but an antenna. Therefore it too must be tuned. There are at least two ways to do this, one by connecting a variable condenser in parallel with the loop and another by building a loop that is absolutely right so far as capacity, inductance, etc., are concerned. One can see how difficult that would be for the average person.

To sum up, if your set "sings" when tried alone and goes dead when connected to an energy collector, you can be sure that a series condenser is needed.

Points About Flivver's Operation

When the set is complete it is best to adjust the leaks, etc., before being connected to any energy collector. We know that the values for the set itself are correct. Therefore, if we adjust it alone, we will have no outside influence to throw us off.

As has been stated in previous articles, when the set is correctly adjusted one can hear a little shrill whistle, and as the coupling of the coils is changed there is added the sound like the tearing of cloth. Upon approaching the wave of a broadcaster one will hear a series of small weak squawks which increase in loudness and finally spill over to become dead as the wave is tuned in correctly.

To Use Radio Digest as Forum

Inasmuch as I am unable to have a private secretary, it has become impossible for me to answer all of the letters that I receive concerning this circuit. I would indeed be glad to receive comments and results secured, but it has become a physical impossibility for me to answer personally all of the questions asked, much as I would like to do it. For this reason I will write for Radio Digest all available dope on the circuit so that further questions should be unnecessary.

From the above you can easily get, perhaps, the most important point about setting up the Flivver Circuit. It is this—don't use a single thing that is different from the articles called for unless you are prepared to fight it out yourself. Not a single set has failed to work as yet when properly set up and adjusted, so don't let the idea that there is a dark secret somewhere in it bother you, because there isn't any.

Aerial Must Preserve Balance

We will take up the matter of aerials first, because the set will be used on all kinds and varieties. The low frequency oscillation (it really is not an oscillation) that is responsible for the action of the super depends upon the set having the just correctly balanced values of inductance, capacity and resistance in the circuit. If the set itself has these values correct it will function properly, the values and hook-ups published are correct so no trouble will be experienced from this source.

Now if we put an antenna, ground, or loop, either of which may be termed an energy collector, in with the set we must be careful to preserve the correct balance. This point seems to be the one giving the most trouble and a few words concerning it will not be amiss. All grounds, loops, or antennas have different values, yet most of them, especially grounds and open antennas, average up to a value that will be workable with the set as specified.

If a particular energy collector kills your set when you connect it on, you will be able to compensate for it in most cases by the use of, preferably, a variable condenser in series. That is, run your signal through a variable condenser before it reaches the set. This condenser is adjusted to the point where the set comes to life again and is further used as an aid to tuning to the wave length desired.

The set is then quiet excepting that the whistle is still audible. The lower the tone, and the louder the whistle, the greater is the amount of amplification obtained, and the grid leak should be set for the happy medium. After which it may be left in that adjustment.

Tickler Coil Adjustment

This brings us to the tickler adjustment. If, when your set is finished, you get no sound from it, several factors must be considered. These will be taken up as we go along. The first is the polarity of the tickler coil (75 or 90-turn coil). If the magnetic field of this coil works with the first coil (50-turn) you are all right, but if the magnetic field works against the first coil, the set is dead. This condition is corrected easily by reversing the leads to the tickler coil.

If you use improper coils for these two coils (Giblin-Remler 50 and 75 or 90-turn coils are specified), you either will get no action or poor results, depending upon how closely the values of your coils approach those of the specified coils.

It seems that hundreds of Radiophans have tried variocouplers using the stator as the inductance and the rotor as the tickler. As a rule the results have been inferior. They might be improved to an acceptable point by rewinding the rotor to 75 to 125 turns instead of the number generally used.

Use of Variocoupler

If a variocoupler is used, be careful not to have too many unused turns on the stator, because the field set up as a result of these unused turns will have a tendency to upset the balance of the set. Most of the variocouplers for broadcasting now on the market have a suitable number of turns on the stator or tube, but not enough on the rotor or ball for operation on a super set. Of course the exact number of turns in either case cannot be given because of one factor at least, we do not know the diameter of the forms used to wind upon.

Inasmuch as the space available is not sufficient to cover the subject in one article it will be necessary to continue our discussion in the next issue of Radio Digest.

To secure good signals never burn vacuum tube filaments brighter than necessary.

When figuring on the wave length of your aerial, remember the lead-in counts.

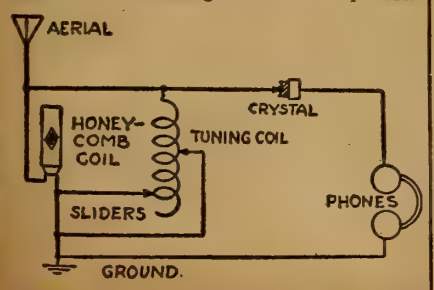
In the Digest Exclusively—

WHEN E. T. Flewelling and his set "that made good in a day" were discovered by Radio Digest, the flivver circuit was practically unknown. Its appearance in the Digest is another scoop.

MR. FLEWELLING has agreed to write exclusively for Radio Digest. The article on this page is the first of a series to appear every week which will help the Radiophan in the perfecting of his own flivver set.

Crystal Receiving Set Uses Honeycomb Coil

For the benefit of other crystal detector fans I am showing this hook-up with



which I have received speech and music over a distance of 500 miles and code 1500 miles. It is the two slide tuner set with a 35 or 50 turn honeycomb coil as a load coil. The stations I have heard with this hook-up are KDKA, WHB, WGM, WSB, WOC, WRM, WLW and 8X1.—Raymond E. Searl, Bloomington, Ill.

Grid Condenser and Leak

To insure accessibility as well as rigidity to the grid condenser a piece of $\frac{1}{8}$-inch fibre or bakelite may be cut and drilled to correspond with the condenser terminal holes and one side of the assembly bolted together with a small bolt. The other terminal can be fastened directly to the grid terminal of the socket. This will lessen wiring complications and will place the grid leak in a position where the pencil marks can be altered if necessary.

The writer has found that the number of pencil marks does not seem to affect the tube operation to a noticeable extent. However, in a closely assembled receiver the grid leak is a rather sensitive adjustment.—H. E. Jameson, Milwaukee, Wis.

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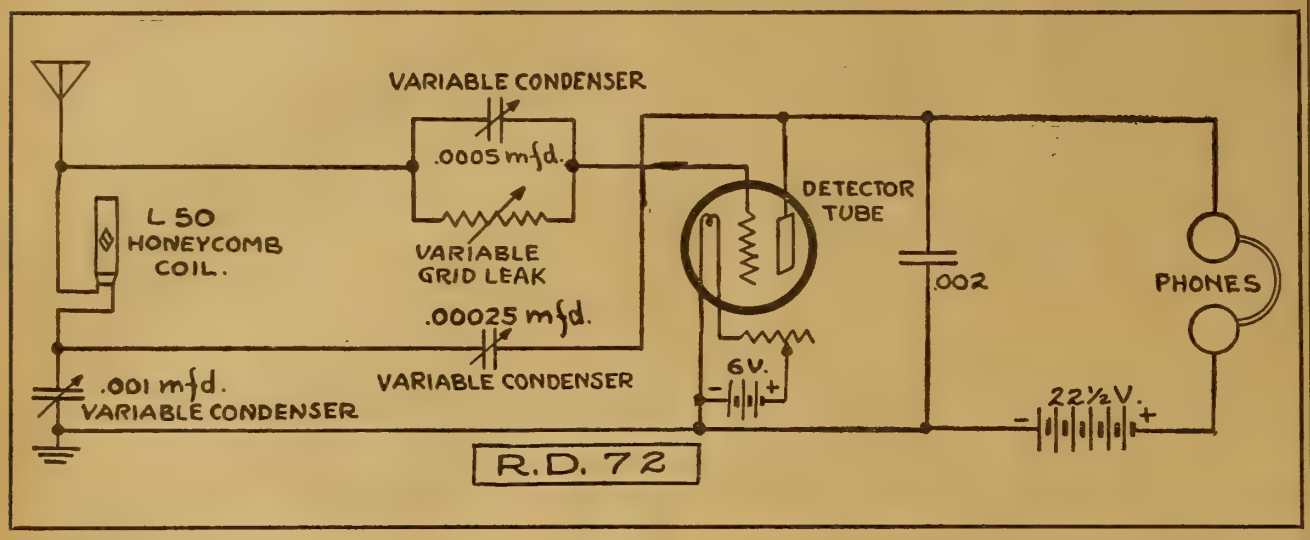


A FAIRLY reasonable priced, simple sort of hook-up always appeals to the average Radiophan. New circuits are his hobby, and he anticipates with relish every new method of hooking up his apparatus.

In the circuit shown, one is impressed with the fact that practically all of the tuning is accomplished by means of variable condensers, three of which are used with capacities of .001, .0005 and .00025 mfds. The primary (.001mfd.) condenser should be connected so the moving plates are on the ground side. In the plate (.00025 mfd.) condenser the rotating plates should be connected to the primary circuit.

The grid condenser (.0005 mfd.) should be connected so the movable plates are on the aerial side. In a circuit of this type a variable grid leak is advisable, especially for the proper variation of grid adjustment for different tubes that may be used. This will insure best efficiency for each tube.

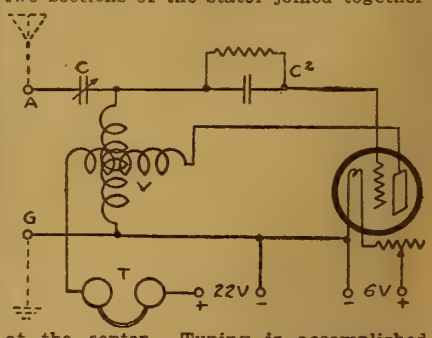
The honeycomb coil should be one with 50 turns although the antenna values may necessitate changes in the number of turns. A .002 mfd. fixed condenser is shunted across the plate battery and the phones.

The negative terminals of both batteries are grounded. In tuning, the proper wave length adjustment is effected by means of the primary condenser. Regeneration is then controlled by the plate circuit condenser. The filament rheostat will also be found very sensitive for tuning in distant stations properly.

Long Distance Stations Picked Up On This Set

The diagram shows a hook-up which has proved very good for long distance work. The apparatus consists of a variometer, variable condenser, grid condenser, rheostat socket and binding posts. Recently this outfit was tested out in a drizzling rain and I heard KFAF, which is 1,000 miles from my set.

In the illustration A represents the aerial, G the ground, C .0005 vernier condenser, C2 .0005 condenser with leak, T the phones and V the variometer. The rotor is separated from the stator and the two sections of the stator joined together



at the center. Tuning is accomplished with a variable condenser and regeneration with the rotor.—J. W. Mayfield, Cincinnati.

The desire of the engineers of various manufacturing companies to simplify the operation of receiving sets makes it quite likely that many of the apartment houses now building in New York city will have both aerial and current source installed, making it merely necessary to press a button or turn a switch to get the concerts.

The Reader's View

Likes the Flewelling

You have a valuable little paper. Can hardly wait from week to week.

You "put one over" when you gave us the Flewelling circuit. It brings in the local broadcasts fine on just a ground wire. Have had a friend try it on his antenna and he says be got Springfield, Mass., Atlanta and Kansas City. This is just the thing for the fellow without an antenna. I use a "peanut" tube.

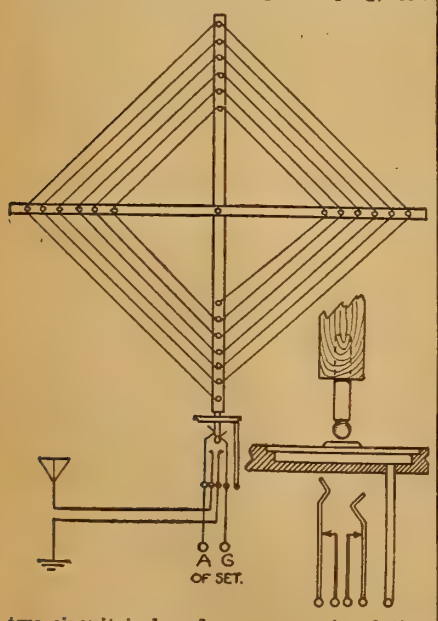
Do your readers know of any improvement in the way of tuning, hook-up, regeneration, etc.? Have them send them in. Have Dr. F. C. Locke, of Oteen, N. C. tell us how he does it.—G. B., Evanston, Ill.

Locating Places for Shafts

In the construction of Radio apparatus marking the places for the shafts on the panel is a difficult problem. The location may be found in the following manner: Procure a piece of thin paper, place a coil over it and mark the circumference. Hold the paper to the light and fold it so that the lines overlap or meet on each half, then fold again at right angles to the first fold. Where the folds meet at the center will be the point for drilling the hole. This paper placed on the panel will locate the place for the hole.—Henry A. Keys, Kinder, La.

Loop With Plug-in Attachment

The material necessary to make the loop as shown in the illustration is, four feet of 1-inch square wood, ½ pound of No. 18 copper wire, one telephone plug, one

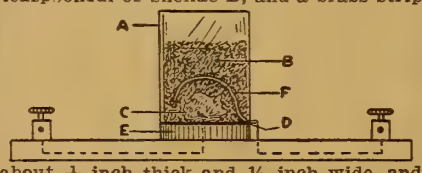


two circuit jack and some scrap insulating material. The loop will require ten turns of the wire.

The plug is attached to the lower part of the loop cross and the jack is mounted [illegible] table top.—Fritz Franke, Chicago, Ill.

Crystal Mounting

The parts needed for this mounting are about two teaspoonfuls of brass filings, a piece of some sort of crystal C, some mercury and lead E, a glass case A, about a teaspoonful of shellac D, and a brass strip



about ½ inch thick and ¼ inch wide, and two binding posts.

Place the crystal C in the lead and mercury E, and then tack it on the wooden base. Place the brass filings B and the brass strip A into the glass case A, allowing one end of the brass strip to extend to the outside. Place the base with the crystal attached over the mouth of the bottle and seal it with wax. Wire the detector in the set in the usual manner. The brass strip takes the place of the catwhisker.—Frank Basler, Altoona, Pa.

A loop antenna works better in a wooden building than in one of steel structure.

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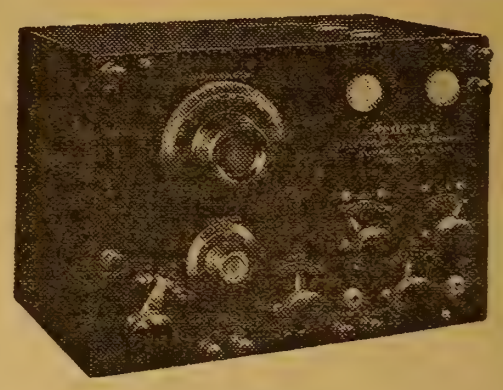

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Questions and Answers

Selected for the Reinartz Circuit Fan

Same Circuit

(1874) OLP, Osceola, Ia.

Will you please send me a wiring diagram of a receiver using a Reinartz spider web coil and the WD-11 dry cell tube?

Would this circuit be as efficient as the one described in the December 23 issue of the Digest?

Please give markings of batteries and value of grid leak resistance.

A. See page thirteen of the November 25 issue of Radio Digest for diagram of circuit asked. We believe that this will prove quite as efficient as the one appearing in December 23rd issue. Much depends upon skillful construction in any case and comparative virtues are difficult to determine to a nicety. Use a two megohm grid leak.

Peanut Tube

(1871) EFH, Jeffersonville, Ind.

In the November 25 issue you have a hook-up using spider web coils (Reinartz circuit).

Could I use the detector panel hook-up with a dry cell WD-11 tube with good results? If so how far should I receive with a 75-foot, two-wire, L-type antenna, 30 feet high, with a 50-foot lead-in?

A. The WD-11 tube may be used satisfactorily in the Reinartz circuit as suggested. The range of this receiver, under all favorable conditions of construction and location, should be approximately five hundred miles.

Patent Infringment

(1891) JPW, Oil City, Pa.

In order to settle an argument I am taking the liberty of writing you to ask if the circuit used in the Reinartz tuner described in the November 25 issue of Radio Digest by H. J. Marx is patented. In other words, if a person should build a receiving set as described to be sold, would he be infringing or violating a patent?

A. All regenerative circuits come under the Armstrong Patents and are controlled by the Westinghouse Electric and Manufacturing Co. Seventeen other companies own licenses to manufacture under these patents. The Reinartz tuner embodies the regenerative principle and so comes under this patent. Therefore to sell same without a license is an infringement and amenable to the law.

Reinartz and Honeycomb Coils

(1974) JLG, Chicago, Ill.

Will you kindly tell me through the Q. & A. columns of Radio Digest if it would be practical to use honeycomb coils as loading inductances to receive wavelengths of over 5,000 meters in connection with the Reinartz circuit explained in a recent issue?

If so how many will be necessary and where should they be placed?

This circuit certainly is a wonder on short waves and I wish to use it as a long wave receiver if possible.

A. It is not advisable to use honeycomb coils as loading inductances with Reinartz circuit. It does not load effectively. It is better to use a long wave set.

Reinartz Amplification

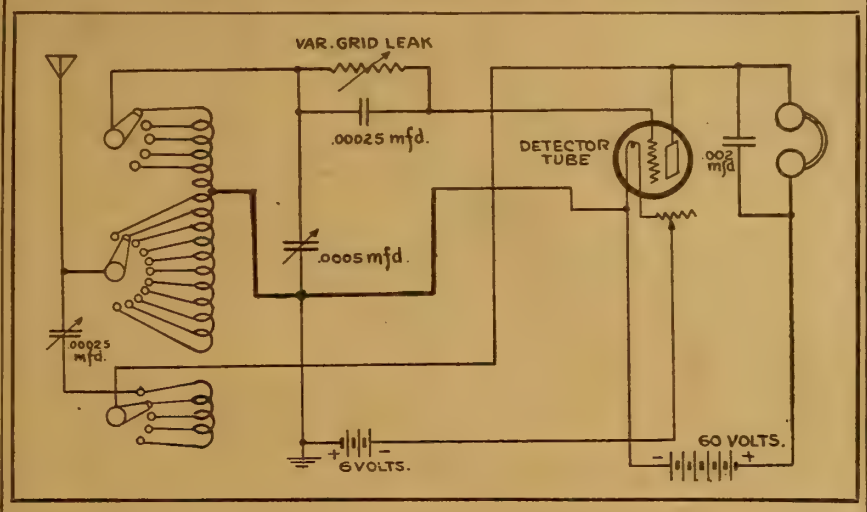
(1957) WMK, Detroit, Mich.

Owing to power lines surrounding my home, the use of any outdoor antenna causes my Reinartz set to hum. My 200-foot attic aerial will only give local reception.

Will hook-up Q. & A.-1552, page 15, January 6 issue, work as an amplifier for the Reinartz as well as for the Flewelling set, when plugged in on the phones?

Can one step of audio be added as on page 7 of the December 23 issue? Where can I get the hook-up?

THE POPULAR REINARTZ HOOK-UP



A. Hook-up Q. & A.-1552, page 15, January 6 Radio Digest will work satisfactorily if plugged in on your Reinartz set phone jack. See page 13, November 25 issue, for complete diagram of Reinartz tuner, detector, and amplifier.

Variable Condensers

(1846) AD, Highland Park, Mich.

Having a Reinartz single tube set, with which I have obtained much better results than with several other hook-ups that I have tried, I would like to ask a few questions about the Hook-up Q. & A.-1434, November 25 issue:

One variable condenser is marked .0005 mfd. What should the other one be?

What voltage should the B battery have?

What resistance should the potential have?

Has this particular set been tried out?

I am figuring on using WD-11 tubes. Would Thordarson transformers be all right for the AF and an Erla for RF?

A. With reference to the Reinartz tuner detailed in the November 25 issue of Radio Digest, the variable condensers should be of .0005 and .001 mfd. capacity. The plate battery voltage should be from forty to sixty. Resistance of potentiometer should be about two hundred ohms. The apparatus you mention will serve effectively. This circuit has been proven and is meeting with much enthusiasm wherever used.

Set Will Not Regenerate

(1275) CR, Jameson, Mo.

I would like to ask a question concerning my homemade receiving set which will not regenerate. I have tried all means of regeneration but with no success. Could there be any other reasons for this? I am using a variocoupler, variable condenser shunted across secondary, detector, and one-stage amplifier.

In super-regeneration, does it make any particular difference about placing a detector or amplifier tube in the first tube socket?

A.—Your set, as now, is not designed regenerative. For regeneration a tickler coil is necessary. This is usually a variometer placed in the plate circuit at any convenient point.

An amplifying tube is necessary in the first tube socket of a super.

For Sale—Westinghouse Aeriola Sr. two-stage amplifier with tubes, $52.00. Amrad shortwave receiver and two-stage amplifier, $92.00. Amrad two-stage Radio frequency amplifier with transformers, $27.00. Burgess B Batteries, $2.50.
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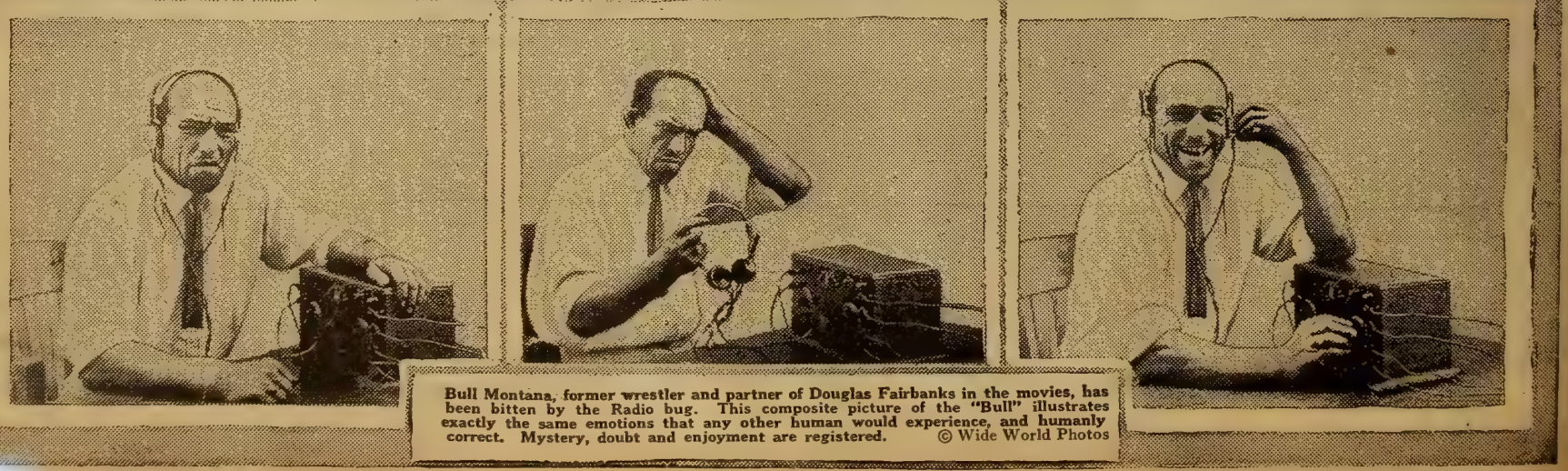
Radio Illustrated

Japanese are not slow in taking up new inventions and are keen to look into any new things that may come from the United States. The picture is that of Mrs. K. O. Gamaguchi, who arrived recently from Japan. She is the wife of a well known hotel owner of Japan. She and her husband are giving considerable of their time while in the United States to looking up Radiophones for their hotel. © Int.

The Boy Scouts are much interested in Radio. At Camp Kanohwahke, in the Interstate Park of New York, 600 boys enjoyed holiday week of real winter sport. They were "snowed in" but the son of the camp director and a fellow scout are using the Radio to get the outside news. © U. & U.



Bull Montana, former wrestler and partner of Douglas Fairbanks in the movies, has been bitten by the Radio bug. This composite picture of the "Bull" illustrates exactly the same emotions that any other human would experience, and humanly correct. Mystery, doubt and enjoyment are registered. © Wide World Photos

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New Reinartz Tuner; Flewelling Tells "How"

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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HOUSE PASSES AIR BILL

LOOP AERIAL PICKS UP WGY IN LONDON

TRANSMISSION SO CLEAR CHILD IS AWAKENED

Englishman, Using Ordinary Instrument, Hears Schenectady and Newark Plants

LONDON, ENGLAND.—American broadcast stations were heard in London on Christmas Eve by Captain Round, of the Marconi Company, at his home at Muswell Hill, using an ordinary standard Marconi instrument, which in no sense might be termed a freak apparatus designed specially for the purpose of receiving messages from America. It was a six-tube receiving set with a two-foot loop aerial below the table on which it was placed. In order to compensate for the small aerial Captain Round fitted an extra tube to the set. In conjunction with the receiving instrument a two-step amplifier was used.

Piano Solo Awakens Child

"The wave length on which the messages were received was half way between the wave lengths of the London and Manchester broadcast stations," said Captain Round. "At times the messages would be perfectly clear. In fact one item, a piano solo, was so loud it woke up one of the children. Then the messages would fade away entirely.

"The great obstacle to getting the American stations strongly are the general post office Radio stations, like Northolt and Leafield, which set up much disturbance and interfere greatly with the messages. But given a place in the north well away from such disturbed areas and the chances are that the signals from America will be heard quite well in favorable circumstances," continued Captain Round. The stations heard were WJZ, at Newark, N. J., and WGY, at Schenectady, N. Y.

One paper worries because people are speculating as to the permanency of Radio. Speculation indicates continued interest in the art, which augurs well for its future.

KOG Returns to Ether After Holiday Layoff

Continues Service Halted for Reconstruction of Studio

LOS ANGELES, CALIF.—After an absence of several weeks during the holiday season, Station KOG, the Evening Herald here, returned to the ether with the advent of the new year by the recommencement of its afternoon broadcasting programs of news matter, market reports and other features. The station is not, however, presenting entertainment programs at this time.

The suspension of the station's broadcasting features was caused by the desire to re-construct its Radio studio, located on the seventh floor of the Chamber of Commerce building, together with other preparations which are being concluded in the form of arrangements to operate KOG as a class B, 400-meter plant.

HARDING TRIES SET; GETS ALL MIXED UP

WASHINGTON.—President Harding stated recently that he tried to work the Radio set which is installed in the library at the White House, the reception yielded noises much like a conference report, it was so jumbled up. The President heard two or three stations at the same time and apparently gave up in disgust trying to be entertained.

Grocer's Set Draws Business

LONDON, O.—A grocery store owner of Alton, fifteen miles east of here, recently installed a sensitive Radio receiving set. He has been able to receive communications from stations in Norway and Sweden, and incidently, the Radio outfit is proving one of the groceryman's best investments, attracting many new customers.

SO. AFRICA PLANS LARGEST STATION

Government O.K.'s Scheme Offered By English Marconi Firm

CAPETOWN, S. A.—South Africa plans to have the largest Radio station in the world. The government has accepted the scheme put forward by the English Marconi company and it only remains for the sanction of the Union Parliament to be given for work to be begun at once. South Africa will then take its place in the great imperial Radio chain that is being linked around the British Empire.

The engineer in charge of the construction of the station arrived in Cape Town in December. He said that he was satisfied from the reports of the experts who had previously examined many prospective sites throughout South Africa that the possibilities for long-range Radio at the Cape were unlimited. The vicinity of Cape Town as a site had been thoroughly examined and reported upon favorably.

In addition to the consideration of the city's geographical advantages, exhaustive experiments were made with the wave lengths of American and European stations, and the results of these indicated that Cape Town was the best site for reception.

ETHER TRUST AIMED AT BY AMENDMENT

Hoover Pleased at Action

Bill to Go to Senate Next—Quick Action Expected There

(By L. M. Lamm, Special Correspondent)

WASHINGTON.—Passing the House of Representatives January 31 without a record vote, the White-Kellogg Radio bill remained unchanged except for one important amendment said to be aimed directly at the Radio Corporation of America because of its alleged grab for the control of the ether and the monopoly of all apparatus for ether communication. This amendment was made by Representative Jones of Texas, and empowers the Secretary of Commerce to revoke the license of any firm or corporation attempting to monopolize broadcasting or the manufacture of apparatus.

The bill now goes to the Senate where it will be sponsored by Senator Kellogg of Minnesota. It will be referred immediately to the Senate committee on interstate commerce but it is very doubtful if any hearings will be held on the bill by this committee in view of the extended hearings given by the House committee and the fact that there is practically no opposition to the bill.

Secretary of Commerce Hoover expressed his pleasure when informed that the much-needed bill had been passed by the House.

Fear of Radio Trust Expressed

When reported to the House for the first time by the committee on merchant marine, the body expressed the poignant fear that a Radio Trust was in the offing.

"Apprehension has been expressed," the report states, "and there is evidence sufficient to raise the question in reasonable

(Continued on page 2)

"It's the Story Lady, pup, from Station WMAQ," says Mary Jule Shipman, seven-year-old listener-in to the story hours on the ether program Photo by Charles White

HOUSE PASSES AIR BILL

(Continued from page 1)

minds that certain companies and interests have been endeavoring to establish a monopoly in Radio communication through control of the manufacture and sale of Radio instruments, through contractual arrangements giving exclusive privileges in the transmission and exchange of messages or through other means."

The committee believed that the subject should be carefully investigated and appropriate action considered at an early date. But the committee was unanimously of the opinion that it was impossible during the life of this Congress to inform itself as to the facts involved. The bill is not, however, an antitrust statute. There are included in it several provisions which it is believed will have a restraining influence upon those who otherwise might disregard public right and interest. It is specifically provided that the Secretary of Commerce may refuse a license to any person or corporation which in his judgment is monopolizing Radio communication. He is authorized with respect to licenses for stations transmitting to foreign countries to impose any terms, conditions, or restrictions which may be imposed with respect to cable landing licenses under the act of May 27, 1921. The Secretary is authorized to revoke the license of any person or company which the Interstate Commerce Commission finds has made any unjust and unreasonable regulation or practice with respect to the transmission of messages.

The bill provides that the construction of a station shall not be begun until a permit for its construction has been granted by the Secretary of Commerce.

Besides these protective measures, of course, the amendment made by Senator Jones will aid in the prevention of a patent or communication monopoly, such as might be attempted, perhaps, by the Radio Corporation of America.

Bill Looks to Future

In order to meet the expansion and development of Radio in the years to come, the framers of the bill sought to give the Department of Commerce broad powers of supervision, regulation and control. The bill is limited in its scope; there are many phases of the subject which invite study and in the near future may require further legislation. Only vital proposals, unanimously agreed to by the committee, were embodied in the legislation.

Briefly, the bill requires licenses for all transmitting stations other than governmental stations, and all except governmental operators. It directs the Secretary of Commerce to classify licensed stations and make rules and regulations for the prevention of interference. The President will assign wave lengths to Government stations. But if the Government stations, other than vessels at sea, are transmitting commercial messages, they are subject to the regulations for commercial stations and traffic.

Other features of the bill give the President enlarged authority over all Radio stations in time of war, forbid aliens from owning Radio stations in this country, restrain the transfer of licenses, limit their duration and provide for revocation of licenses. The issuance of licenses rests with the discretion of the Secretary of Commerce.

More Waves for Amateurs

The bill recognizies the privileged status accorded to amateurs by the Radio act of 1912. It strikes from existing law the words "200 meters," and provides that "the wave lengths for amateurs shall not be less than 150 meters or more than 275 meters." This change was desired by the amateurs and has the approval of the conference and of the committee. The amateur is the only user of Radio to whom a definite assignment of wave lengths is made in the law itself. Other wave lengths are allocated by the Secretary of Commerce.

The schedule of fees provided has been worked out to approximate in return the cost of the service to the Government. No objection has been raised by any interest either to the classification or to the amount of the fees prescribed.

Radio Man Loses Life in Naval Plant Flames

BAR HARBOR, ME.—Clinton W. Ward, of Longville, La., Radioman, first class, U. S. Navy, was burned to death January 19 in a fire that destroyed the recreation hall and garage of the navy Radio station at Otter Cliffs, five miles from here. All land wires were down so the news of the tragedy did not reach here until brought over snow-blocked roads. J. R. Dalton, another member of the Radio station staff, was severely burned but will recover. Facilities for fighting the fire were lacking. The entire building and an adjoining garage were destroyed with a loss of $150,000.

There are two Radio stations at Otter Cliff. One comprises a series of booths for receiving transcontinental messages, but there are no facilities for transmitting messages. Near the receiving station is a Radio compass station, which transmits compass bearings to ships at sea. The power house for the plants is at Seawall, 49 miles away.

WJZ celebrated its first anniversary re-
y.

$100 FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 24 at midnight. Awards will be announced in the March 17 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $40.00; Second, $25.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded each tying contestant.

5. Judges will be the Technical Staff of Radio Digest.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The article should tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants on request.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test Tubes. A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Fan Goes 3,576 Miles an Hour in "Radio Travels"

NEEDHAM, MASS.—Robert H. Anthony of this town recently made a record of over 3,576 miles per hour, using a four-tube set. This speed was maintained over a period of six hours and ten minutes. Among the cities visited by Radio were San Francisco and Long Beach, Calif., Roswell, N. M., Colorado Springs, Dallas and Fort Worth, Texas, and Havana, Cuba, besides such neighborly places as Milwaukee, St. Louis, Atlanta, Birmingham, Ala., and Chicago. There were some 45 broadcasting stations covered in his wanderings, with a grand total mileage of 39,345. This is claimed by Mr. Anthony to be a record for the new game of "Radio Golf."

The latest result of Radiophony is the "Radio impresario." He is the gentleman who arranges for the artists and mechanical details in broadcast concerts.

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Looking Ahead

Flewelling Tells "How"—and makes many fans happy with his Super Flivver circuit. Read Part III of this exclusive series of articles next week.

Contest Papers Submitted in the Flewelling Contest are being studied by the Digest Technical Staff. Have you turned in your paper? The first of these will be published in an early issue.

Reinartz Tuners will be discussed by H. J. Marx again next week. He is going to tell about an improved Reinartz circuit in an early number. It's a "knock-out." Watch for it.

A-B-C Lessons for Radio Beginners, Chapter Seven, to appear next week will be a study of crystal detectors. Read the sixth chapter of Arthur G. Mohaupt's series. Turn to page 11.

Station WMAQ and the Ideals Behind It will be described by Vera Brady Shipman next issue in an interesting illustrated article on the well known Chicago Daily News—Fair Department Store plant.

The Only Sure-Fire Radiophonist's Telephone Book, Part I, will appear again next week.

Looking Still Further Ahead, Benjamin F. Miessner and Thomas W. Benson, to say nothing of Letson Balliet, will soon have some new "dope" for the Digest readers to digest.

Newsstands Don't Always Have One Left

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NAVY CHIEFS LAUD RADIO IN WAR USE

GIVES NATION POWER TO STRIKE HARD

All Prime Stations of Sea Force to Be Retained as Minor Plants Are Quitted

By Carl H. Butman

WASHINGTON.—The value of Radio in the U. S. Navy, both in peace and war, is testified to by four rear admirals and three captains in a report seeking, by the elimination of unimportant shore stations to increase the value of the navy afloat. These naval experts declare an efficient Radio service gives a nation that most important of all war assets—the power to strike hard with its fighting forces.

The abandonment or transfer of 27 minor naval Radio and compass stations was recommended recently by the special naval board on Shore Stations headed by Rear Admiral Hugh Rodman, and was forwarded to Congress by Secretary Denby with his approval. Disposal of these useless Radio shore stations will make for naval sea efficiency.

"Every dollar saved through the elimination of the stations, whether in pay of operators or for maintenance, will be used to improve fleet communication and make for efficiency and mobility of the sea forces of the nation," said a naval Radio officer, explaining the board's recommendations.

New Commercial Stations Anticipated

Communication experts of the navy believe that when these naval Radio stations are closed, commercial interests now served by these stations will immediately establish new public stations equipped with modern apparatus, which will guarantee better service to the public and not interfere with broadcasting. Already the old Miami Station is leased to a commercial company which plans complete new equipment.

Most of the old stations were unnecessary from a marine point of view, and the navy could not afford to continue their operation. Many of the Radio transmitting stations, recommended for the scrap heap, were equipped with old spark sets which interfered with telephonic broadcasting. Some of them had been maintained at a cost ten times the return since the war, because no local public Radio service facilities were available.

Navy to Give Up No Prime Stations

All the high power naval Radio stations such as Arlington, Annapolis, Porto Rico, Canal Zone, Honolulu, Guam, and certain stations in Alaska, as well as the semi-high power stations in the navy yards at the twelve important naval bases, will be retained, together with a number of minor stations now in use. Today there are 65 traffic stations and 33 compass stations in operation, requiring a personnel of 70 officers and 1,257 men. The elimination of 27 would leave 71 active stations. This will be sufficient to meet the navy's needs ashore

The Board recommended that eight Radio stations on the Great Lakes and those at Buffalo and Cleveland, be abandoned or turned over to the army for operation. Nine located at Baltimore, Md., Mobile, Ala., Miami and St. Petersburg, Fla., Grand Isle, La.; Port Arthur, Texas; Seattle, Washington; Navassa Is., West Indies, and Managua, Nicaragua, will probably be discontinued and abandoned.

Radio compass stations at Detour Pass, White Fish Point, and Grand Morais, Michigan, were recommended for transfer to another government department or abandoned. The sites of two old and unused Radio stations at Siasconsett and South Wellfleet, Mass., were also recommended for disposal. It is said some of them might be operated by the navy if commercial and shipping interests would meet the cost of maintenance.

WNAC Rigs Loud Speaker on Street Before Station

BOSTON, MASS.—A special loud speaker has been rigged up on the Tremont street front of the Shepard Stores, connected with the broadcasting room on the eighth floor of Station WNAC, and every night a concert is given to passersby on Tremont street and to interested groups who stop to listen on the famous Common directly opposite. Hundreds of people, hearing the mysterious music issuing from some point high above their heads, crane their necks and locating it finally in surprise, stop to listen.

Open New Manchester Plant

MANCHESTER, N. H.—A new broadcasting station of 100-watts, owned by Barton's Department store here, and operating on 360 meters, was formally opened by Governor Brown of New Hampshire during the week of January 22. The station has a range of 1,800 miles and will be the only one east of Boston giving regular programs. It will broadcast afternoon concerts and high class programs four evenings a week.

RADIO OPERA WINS NEW ENGLAND FANS

MANY LISTENERS IN GET FIRST TASTE

Letters to WNAC Praise Chicago Opera Company's Broadcasts from Boston

BOSTON, MASS.—New England was given a taste of opera by Radio on January 22 when WNAC, the Shepard Stores station, broadcast "Aida," sung by the Chicago Opera Company at the Boston Opera House. The event was a huge success. Many thousands of fans, especially the younger element, received their first impressions of grand opera in this manner.

At a time when orchestra seats at the opera house were all sold out at six dollars each, many thousands of people were able to share its benefits than could be accommodated in the largest auditorium in the East.

Broadcast Aids Opera Popularity

As for the benefit to the opera management? Well, at one Radio opera party of twenty people, a half dozen or more were heard to remark that they must go to some other performance during the week. The excellent renditions of the artists had inspired them to action. There were six new converts to grand opera. How many hundreds more is merely a problem in mathematics.

In another case a youngster listening in at another station said he never knew before that opera was so entertaining, and if the applause could be taken as an indication of appreciation, everyone must have been well pleased. He bought a ticket for another opera.

Fan Thanks Radio Opera Fixers

A most appreciative letter was sent in by A. W. Straus, who has a sensitive set and a powerful loud speaker, so that he was able to give Radio parties on the nights when Station WNAC had especially elaborate programs. Mr. Straus expressed in warm terms his appreciation of the broadcasting of various high-class artists, and particularly the performance by the Chicago Opera Company, saying that the public owes much in heartfelt gratitude to this company and others interested for their public spirit in arranging the Radio performance.

NATION'S COPS HEAR GOTHAM POLICE CHIEF

Crack Law Enforcer Talks by Radio on Police Work

NEWARK, N. J.—Commissioner Richard E. Enright, head of the Greater New York police department and president of the International Police Conference, broadcast a talk, "Police Work," for the special benefit of the police chiefs of the United States, at Station WOR, the L. Bamberger and Company here, on the evening of January 26.

Every important police station in North America is now equipped with a first-class receiving outfit, and as Commissioner Enright is recognized as the world's leading authority on the very latest methods of law enforcement, it is believed that fifty thousand police officers between the Pacific and Atlantic Coasts were among the invisible audience.

Issue 10 Class A Licenses One Class B in Two Weeks

CHICAGO.—One new Class B broadcaster and 10 Class A stations were licensed during the two weeks ending January 27. The Commercial Publishing Co. (Commercial Appeal), Memphis, Tenn., was licensed as a Class B station on 400 meters, with 500 watts power. The following Class A stations were licensed on 360 meters:

KFCP—Ralph W. Flygare, Ogden, Utah; WPAY—Bangor Radio Laboratory, Bangor, Me.; WQAJ—Ann Arbor Times-News, Ann Arbor, Mich.; WQAM—Electrical Equipment Co., Miami, Fla.; WRAC—State Normal School, Mayville, N. D.; WRAD—Taylor Radio Shop, Marion, Kan.; KFGB—Loewenthal Bros., Pueblo, Col.; WQAF—Sandusky Register, Sandusky, O.; WRAM—Lombard College, Galesburg, Ill.; WQAD—Whitall Electric Co., Waterbury, Conn.; WSAB—Southeast Missouri State College, Cape Girardeau, Mo.; WQAH—Brock-Anderson Elect. Eng. Co., Lexington, Ky.

PLANTS SLASH JAZZ AT REQUEST OF FANS

COLUMBUS, O.—Following requests from fans, Stations WCAH, of the Entrekin Electric company, and WPAL of the Superior Radio and Telephone Equipment company, Columbus, have agreed to set aside a number of evenings for the broadcasting of programs entirely void of jazz music. The announcement states that vocal and musical numbers of the better class will be sent on these nights.

"WES" SPINS A BED TIME YARN FOR PALS

BOSTON MASS.—Wesley "Freckles" Barry, the youthful comedian of the screen, who has been appearing in a vaudeville skit at the Shubert Theater, got in touch with young Radiophans the other night, when he broadcast from the Shepard Stores station, WNAC, one of his famous bedtime stories. The subject was original with him and was greatly enjoyed by hundred of fans.

SHE SUGGESTS STOCK COMPANY

Margaret Lawrence, now being starred by Sam H. Harris in "Secrets" at the Fulton Theater, New York City, recently broadcast a talk suggesting the formation of a Radio Stock Company. The idea was so popular with the Radiophans that Miss Lawrence is still receiving letters from them. Miss Lawrence was very effective as a broadcaster, according to the listeners-in

To Open Up Orient

BEIRUT, PALESTINE.—To open up the orient, Radio has been called in and will undoubtedly play an important part in modernization of the near eastern countries. A new Radio station has been erected here which is the connecting link between Syria and Lebanon, and has been recently placed in operation by the French, who are in charge. A series of stations has been contemplated.

GLUCK PICKS WPAL FOR FIRST CONCERT

SINGS INTO MICROPHONE FOR HALF HOUR

Soprano, Known from Coast to Coast, Gives Initial Radio Program at Columbus

COLUMBUS, O.—A Columbus Radio station, WPAL, of the Superior Radio and Telephone Equipment company, was chosen by Alma Gluck, whose soprano voice is known from coast to coast and across the waters, for her first Radio performance. Saturday afternoon, January 27, Miss Gluck sang into the microphone of Station WPAL for slightly over half an hour.

Miss Gluck, who was visiting at the home of Dr. and Mrs. S. D. Edelman, Columbus, is the wife of Efrem Zimbalist, world-famous violinist, who is now on a concert tour. Their children are at home in New York and it was to enable them to hear their mother's voice over a Radio receiving set that Miss Gluck accepted the invitation to sing from the Columbus station. A telegram was sent to the governess of the children to tune in for the concert from the Columbus station. The two children are six and four years of age.

Recognize Singer in Music Stores

The famous singer during her two-day stay in Columbus was taken on a tour of the Columbus music stores by Mrs. Edelman, who is her niece. She was readily recognized in several of the shops, in one instance by a 90-year-old woman admirer.

Miss Gluck has been off the concert stage for some time and frankly admitted that the main purpose in this is to become better acquainted with her two children. She is learning the Russian language in the meantime by writing three letters a week in that tongue to her husband. She returned to New York late Saturday night.

WANTED—INSPECTORS; U. S. EXAM, MARCH 7

Both Men and Women Eligible; $1,800-$2,200 Per Year

WASHINGTON.—The Government is holding an examination on March 7 for Radio inspectors. Salaries run from $1,800 to $2,200 per annum, and the examinations can be taken in practically any large city by applying to the civil service commission. Both men and women are eligible; over 21 years of age and under 50. The appointing officer reserves the right to specify whether he desires a man or woman.

Applicants must have a scientific degree from a school of recognized standing or the equivalent of a high school education and two years of Radio work, and all must be Radio operators.

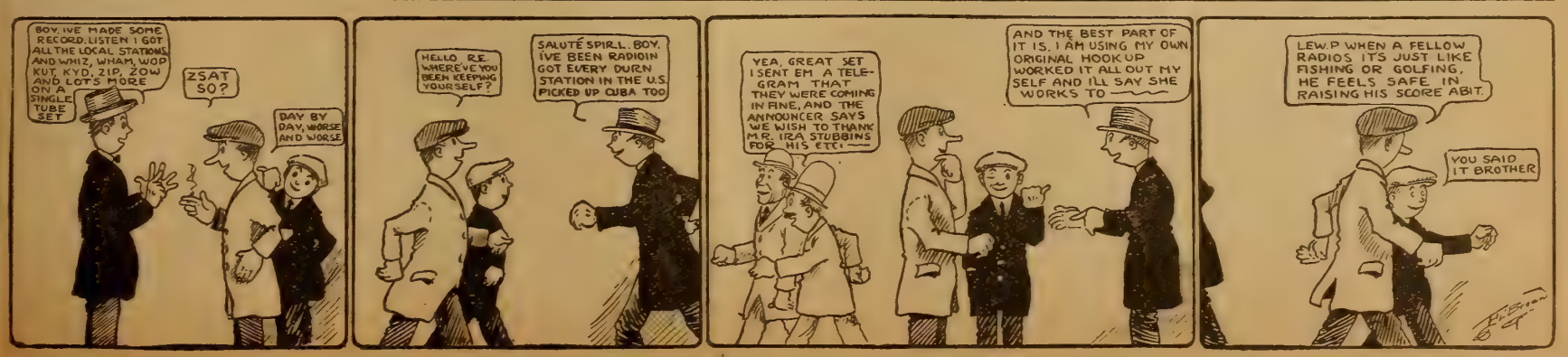
The examination includes theoretical and practical questions in the construction, use and adjustment of Radio apparatus and auxiliaries, counting 50 per cent. Education and experience in the line of duties constitutes the other 50 per cent of the test.

The Department seeks to provide a list of available inspectors to take the places of inspectors who have resigned, but it is believed that the new Radio legislation will require the services of a number of additional inspectors.

Inside Dope on Press Agents

NEWARK, N. J.—Wells Hawks, the far-famed publicity promoter for the Sam H. Harris Enterprises, broadcast from Bamberger Station, WOR, here recently an interesting talk on "Men Who Juggle the Alphabet," (meaning press agents). He gave inside information pertaining to the semi-mystic art of press agentry and told about some of his most thrilling and laughable personal experiences.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Amplification—Not Prevarication



RECEIVING RECORD CONTEST

By the Contest Editor

HOW many of the 202 records published in the January 6 issue do you think were able to hold their own? Well, a count shows 140 still in existence with this revision of the complete list of record holders. Sixty-two records were broken and 63 new records were made. The total list of records now numbers 265.

Going on with the statistics, only 61 records are for distances of 2,000 miles and over; a mere 11 for distances of 2,500 miles and over; and only one for a distance of over 3,000 miles.

The contest editor would be glad to receive complete descriptions of sets used by the holders of records of 2,300 miles and over. Then he can tell other fans the tricks used to make real records. Have you had a record of that class published? Send in the facts about your set if you can qualify.

Station—Miles Away—Who Heard It

CFAC—1650, R. A. Deger, Dayton, O.
CFCA—1850, C. C. Beery, Spokane, Wash.
CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CFCN—1775, John W. Hale, Houston, Tex.
CHBC—2450, S. S. Florence B. Phillips.
CHCA—1625, T. S. Wildman, Nicholas, Iowa.
CHCC—1325, Samuel Woodson, Jr., Liberty, Mo.
CHCQ—1300, W. Easley, Enid, Okla.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
CJCB—1300, V. Dennis, Oskaloosa, Kans.
CJCE—2100, F. C. Woodford, Canton, O.
CJCG—1375, D. J. Morris, Weir, Tex.
CKAC—2700, A. C. Carter, Juneau, Alaska.
CKCK—1625, L. Genack, Springfield, Mass.
CKCR—1225, Samuel Woodson, Jr., Liberty, Mo.
DD5—1225, C. D. Mason, Cleveland, O.
DN4—2100, W. E. Davison, Berwick, N. S., Can.
KDJ—2450, C. Edge, Jr., Melbourne, Fla.
KDKA—2150, Geo. Walker, Fresno, Cal.
KDN—2175, F. C. Woodford, E. J. Poyser, Canton, O.
KDPT—1800, C. Hackney, Fairmont, Ind.
KDYL—2075, T. F. Powers, Somerville, Mass.
KDYM—1100, R. L. Hartman, Hoisington, Kans.
KDYQ—2350, C. M. Rice, Jr., Worcester, Mass.
KDYR—2300, F. H. Peran, Oswego, N. Y.
KDYS—1700, M. C. Ridenour, Kingwood, W. Va.
KDYW—1025, C. B. Martin, Springfield, S. D.
KDYX—4150, W. E. Long, Sterling, Ill.
KDYY—1100, P. Weisgerber, Jackson, Mich.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KDZQ—1325, H. S. Rahiser, Pittsburgh, Pa.
KFAD—1600, D. L. Kalter, Dayton, Ohio.
KFAF—1775, F. W. Foss, Boston, Mass.
KFAM—1775, J. W. Hawes, Boston, Mass.
KFAN—1250, Chas. N. Schwab, Grinnell, Iowa.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFAS—1900, F. Brumon, Urbana, O.
KFAY—1550, C. N. Schwab, Grinnell, Ia.
KFBB—1050, B. Henry, Butler, Mo.
KFBC—2125, J. D. Crosby, Stauffer, Pa.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFBH—1450, R. B. Reed, Eureka, Kans.
KFBK—1950, H. S. Juday, Eldorado, O.
KFBM—2450, T. W. Zeigler, Charleston, S. C.
KFBQ—1025, B. H. Seydel, Tacoma, Wash.
KFC—1525, B. P. Wallace, Cedar Rapids, Ia.
KFCB—1150, F. R. Parsons, Indianola, Ia.
KFCF—1775, R. A. Deger, Dayton, Ohio.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFEB—1125, R. L. Hartman, Hoisington, Kans.
KFI—2150, M. C. Ridenour, Kingwood, W. Va.
KFV—1200, C. C. Sawyer, Liberal, Kan.
KFZ—1750, E. Stonton, Vicksburg, Miss.
KGF—1350, S. M. Woodson, Jr., Liberty, Mo.
KGG—1550, T. S. Wildman, Nichols, Iowa.
KGN—1875, Fay Allarding, Lake Odessa, Mich.
KGU—1650, Eugene Evans, Tippecanoe City, Ohio.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KGY—1500, E. Coston, Edmond, Okla.
KHJ—2900, W. E. Davison, Berwick, N. S., Can.
KHQ—2500, C. M. Rice, Jr., Worcester, Mass.
KJJ—1575, Chas. N. Schwab, Grinnell, Iowa.
KJR—1500, W. M. K. Young, Kansas City, Mo.
KLP—2180, W. G. Mann, London, Ont., Can.
KLX—2225, C. J. Lohman, McDonald, Pa.
KLZ—2100, W. E. Davison, Berwick, N. S., Can.
KMO—1200, A. Taylor, Winnipeg, Man., Can.
KNI—2075, R. A. Deger, Dayton, O.
KNJ—1350, N. M. Holmes, Chippewa Lake, O.
KNT—2425, J. H. Wall, Rensselaer, N. Y.
KOB—1975, C. M. Rice, Jr., Worcester, Mass.
KOG—2125, A. H. Jessup, Erie, Pa.
KON—1900, F. Brinnon, Urbana, O.
KOP—2075, T. W. Smith, Watsonville, Calif.
KPO—2275, G. Murray, Toronto, Can.
KQP—2100, G. A. Walter, McDonald, Pa.
KQW—1900, C. Conrad, Logansport, Ind.
KSD—1725, Wm. Schauer, Daly City, Calif.
KUO—2675, C. M. Rice, Jr., Worcester, Mass.
KUY—2100, Roland Smith, Hilo, Hawaii.
KVQ—1125, G. D. Robarts, Edmonton, Alta., Can.
KWG—2500, Mrs. A. S. Mawhinney, New York, N. Y.
KWH—2250, Hugh Meetze, Manassas, Va.
KWJ—2125, C. J. Lohman, McDonald, Pa.
KYF—1100, R. L. Hartman, Hoisington, Kans.
KYG—2175, J. F. Means, Oil City, Pa.
KYJ—2025, V. V. Tompkins, Cleveland, Ohio.
KYW—1850, J. J. Beales, Jr., San Anselmo, Cal.
KYY—2250, W. Alan, Butler, Pa.
KZDQ—1250, F. C. Woodford, Canton, O.
KZM—2700, Sarkis Kachajian, Worcester, Mass.
KZN—1650, E. K. Kitts, Bluefield, W. Va.
KZY—1950, A. Galloway, Jr., Grand Rapids, Mich.
NOF—1100, C. B. Martin, Springfield, S. D.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAAB—1150, H. K. Cooper, Owego, N. Y.
WAAC—1775, W. F. Macleod, Prince Albert, Sask., Can.
WAAG—1600, C. C. Beery, Spokane, Wash.
WAAJ—1600, R. & P. McDavid, Houston, Tex.
WAAL—1550, Richard R. Martindale, Los Angeles, Calif.
WAAM—1450, C. Sawyer, Liberal, Kans.
WAAN—1400, H. Baird, River de Chute, N. B., Can.
WAAP—2325, W. B. Clark, Bridgeport, Conn.
WAAQ—1325, W. Douglass, Guthrie, Okla.
WAAZ—1700, W. E. Davidson, Berwick, N. S., Can.
WAEF—1125, F. P. Cerniglia, Tallulah, La.
WAH—1275, A. G. Hilton, Bicknell, Calif.
WAOC—1600, O. P. Klein, Leduc, Alta.
WAP—1450, C. C. Beery, Spokane, Wash.
WBAA—1575, C. C. Beery, Spokane, Wash.
WBAD—1125, N. Theobald, Attleboro, Mass.
WBAF—1250, M. Neuman, Guthrie, Okla.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAH—1050, F. T. Wycoff, Springfield, Mass.
WBAM—1125, Dr. W. C. Wolverton, Linton, N. D.
WBAP—2550, C. Blanch, Amherst, N. S., Can.
WBAX—1000, Carl Baumeister, Avoca, Iowa.
WBAY—2175, C. C. Beery, Spokane, Wash.
WBL—1825, W. E. Davidson, Berwick, N. S., Can.
WBT—1100, W. E. Davidson, Berwick, N. S., Can.
WBZ—1400, C. Pearce, Hallis, Kan.
WCAE—1100, Mrs. Nancy L. Wolverton, Linton, N. D.
WCAG—1325, K. McNeil, Ottawa, Ont., Can.
WCAH—1075, D. J. Morris, Weir, Tex.
WCAK—1025, F. J. McKenny, New Prague, Minn.
WCAL—1150, G. D. Robarts, Edmonton, Alta., Can.
WCAR—1750, Sarkis Kachajian, Worcester, Mass.
WCAS—1125, G. D. Robarts, Edmonton, Alta., Can.
WCAX—1325, Doyle Getter, Arkansas City, Kan.
WCAY—1050, D. J. Morris, Weir, Tex.
WCJ—1150, M. L. Johnson, Atchison, Kan.
WCK—1025, D. H. Harris, Marlboro, Mass.
WCM—1650, C. M. Rice, Jr., Worcester, Mass.
WCN—1200, W. M. K. Young, Kansas City, Mo.
WCX—2050, A. G. Hilton, Bicknell, Calif.
WDAE—1225, J. Shamburg, Tekamah, Nebr.
WDAF—1675, W. E. Davison, Berwick, N. S., Can.
WDAH—1300, C. Hackney, Fairmont, Ind.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAK—1200, R. Hastings, Atchison, Kan.
WDAL—1125, M. M. Cardwell, Republic, Kan.
WDAN—1375, W. H. Spencer, Montreal, Que., Can.
WDAO—1500, M. J. Columbe, Plattsburg, N. Y.
WDAP—1875, M. J. Bevilockway, Lomita Park, Calif.
WDAR—1175, C. B. Martin, Springfield, S. D.
WDAS—1200, Carl Baumeister, Avoca, Ia.
WDAU—1250, A. L. Lewis, Stanberry, Mo.
WDAV—1275, J. H. Wall, Rensselaer, N. Y.
WDT—1125, R. Hastings, Atchison, Kan.
WDY—2225, Nestor Barrett, Republic, Wash.
WEAF—2450, N. E. Parr, Albany, Ore.
WEAH—1375, E. A. Howard, Watch Hill, R. I.
WEAK—1100, J. H. Wall, Rensselaer, N. Y.
WEAO—2100, Dobson & Tucke, Oakland, Cal.
WEAP—1250, M. J. Columbe, Pittsburgh, N. Y.
WEAT—1175, R. Luther, Jefferson, Ia.
WEAV—1200, H. S. Rahiser, Pittsburgh, Pa.
WEAY—1950, H. Gow, Seattle, Wash.
WFAA—1925, W. E. Davison, Berwick, N. S., Can.
WFAF—1075, Harold Canon, Storm Lake, Iowa.
WFAG—1375, R. L. Hartman, Hoisington, Kans.
WFAS—1875, B. H. Seydel, Tacoma, Wash.
WFAT—1275, P. Benneyan, Fresno, Calif.
WFAV—1175, E. E. Case, Beverly, N. J.
WFAW—1250, J. H. Wall, Rensselaer, N. Y.
WFI—1250, W. Douglass, Guthrie, Okla.
WFO—1000, D. J. Morris, Weir, Tex.
WGAD—2475, Geo. L. Ritz, Rockwell City, Iowa.
WGAN—1625, H. Lardner, Halifax, N. S., Can.
WGAS—1250, W. E. Davison, Berwick, N. S., Can.
WGAY—1000, D. J. Morris, Weir, Tex.
WGF—1025, E. McDonald, Valleyfield, Que., Can.
WGI—1750, E. L. Dye, Plainview, Tex.
WGL—2375, R. R. Martindale, Philadelphia, Pa.
WGM—2175, Allan Harvey, Snohomish, Wash.
WGR—2175, N. E. Parr, Albany, Ore.
WGY—2575, J. J. Beales, Jr., San Anselmo, Cal.
WHA—1250, W. E. Davison, Berwick, N. S., Can.
WHAB—1550, G. W. Perkins, Thomson, N. Y.
WHAE—1050, H. Rawls, Phoenix, Ariz.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WHAN—1250, K. McNeil, Ottawa, Ont., Can.
WHAS—1425, W. F. Macleod, Prince Albert, Sask., Can.
WHAZ—2200, Percy Severance, Pullman, Wash.
WHB—1675, W. E. Davison, Berwick, N. S., Can.
WHK—1550, L. W. Gushwa, Firth, Ida.
WHX—1025, Mrs. A. S. Mawhinney, New York, N. Y.
WIAC—1200, H. Meetze, Manassas, Va.
WIAO—1050, D. J. Morris, Weir, Tex.
WIAZ—1200, F. T. Wycoff, Springfield, Mass.
WIP—1000, R. V. Hammer, Creston, Ia.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAE—1700, A. Moffet, Ottawa, Can.
WJAI—1000, D. J. Morris, Weir, Tex.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAX—200, Allan Harvey, Snohomish, Wash.
WJAZ—1200, C. B. Martin, Springfield, S. D.
WJX—1400, H. Simons, Ft. Worth, Tex.
WJZ—2575, J. J. Beales, Jr., San Anselmo, Cal.
WKAF—1025, Wilbur Squier, Detroit, Mich.
WKAL—1175, Mrs. Nancy L. Wolverton, Linton, N. D.
WKAN—1100, C. M. North, Maiden, Mass.
WKAQ—2400, R. V. Hammer, Creston, Ia.
WKC—1200, J. E. Latt, Fairfield, Tex.
WKY—1325, T. W. Smith, Watsonville, Calif.
WLAB—1100, C. H. Vale, Providence, R. I.
WLAC—1175, D. J. Morris, Weir, Tex.
WLAD—1275, M. J. Columbe, Plattsburg, N. Y.
WLAG—1525, D. O. Wolfe, San Jose, Calif.
WLAH—1500, D. J. Morris, Weir, Tex.
WLAJ—1450, J. H. Wall, Rensselaer, N.Y.
WLAL—1025, Hugh Meetze, Manassas, Va.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WLAV—2000, G. A. Gallagher, Berkeley, Calif.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—1875, Richard R. Martindale, Los Angeles, Calif.
WMAB—1250, W. F. Macleod, Prince Albert, Sask., Can.
WMAC—1075, C. Edge, Jr., Melbourne, Fla.
WMAD—1150, H. J. Latshaw, Clearfield, Pa.
WMAF—1250, R. Henry, Butler, Mo.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WMC—1000, A. Taylor, Winnipeg, Man., Can.
WNAC—1275, C. M. Bennett, Aurora, S. D.
WNAD—1500, C. T. Mower, Malden, Mass.
WNAF—1375, J. H. Wall, Rensselaer, N. Y.
WNAK—1200, J. H. Wall, Rensselaer, N. Y.
WNAT—1000, R. V. Hammer, Creston, Ia.
WNJ—2375, B. H. Seydel, Tacoma, Wash.
WOAA—1525, G. F. Cory, New Bedford, Mass.
WOAI—1800, O. P. Klein, Leduc, Alta.
WOAS—1125, Samuel Woodson, Jr., Liberty, Mo.
WOAZ—1050, O. E. Frazier, Watts, Calif.
WOC—1675, H. S. Trost, San Jose, Calif.
WOH—1150, W. E. Davison, Berwick, N. S., Can.
WOI—1525, R. H. Strong, Bicknell, Calif.
WOK—1150, H. Rawls, Phoenix, Ariz.
WOO—1325, J. E. Lott, Fairfield, Tex.
WOQ—1150, G. W. Perkins, Thompson, N. Y.
WOR—2100, H. H. McMullen, Prescott, Ariz.
WOS—1200, W. F. Macleod, Prince Albert, Sask., Can.
WOZ—1950, Fred Sheppard, Centralia, Wash.
WPA—1140, C. Edge, Jr., Melbourne, Fla.
WPAB—1250, J. Skinner, Corsicana, Tex.
WPAC—1075, Hugh Meetze, Manassas, Va.
WQAQ—1025, R. A. Deger, Dayton, Ohio.
WRL—1100, W. M. K. Young, Kansas City, Mo.
WRP—1300, A. Taylor, Winnipeg, Can.
WRR—1225, O. E. Frazier, Watts, Calif.
WRW—1225, K. E. Gabbert, Clay Center, Kan.
WSAS—1225, F. T. Wycoff, Springfield, Mass.
WSAY—1125, Billy Withington, Jackson, Mich.
WSB—2275, L. K. Poyntz, Victoria, B. C., Can.
WSL—1175, L. Hull, Eureka, Kan.
WSY—1950, T. W. Smith, Watsonville, Calif.
WTP—1150, C. M. Bennett, Aurora, S. D.
WWJ—2200, F. W. Hill, Cristobal, C. Z.
WWL—1275, G. W. Perkins, Thompson, N. Y.

Buffalo Broadcasts Boom

BUFFALO, N. Y.—Estimates show that there are at the present time 40 broadcasting stations within 500 miles of Buffalo, while a year ago there were but two.

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23 Plate Variable Condenser; value, $3.50; special at 1.35
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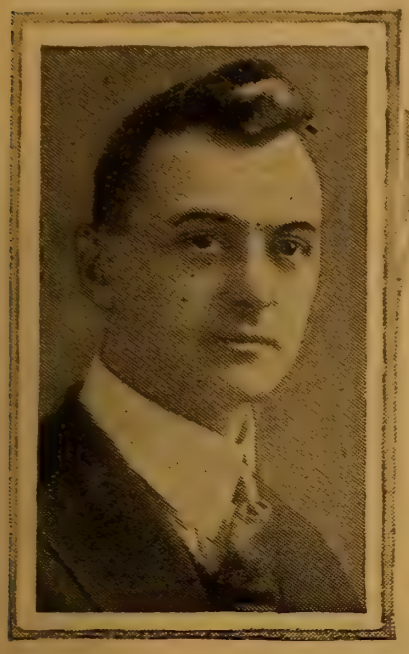
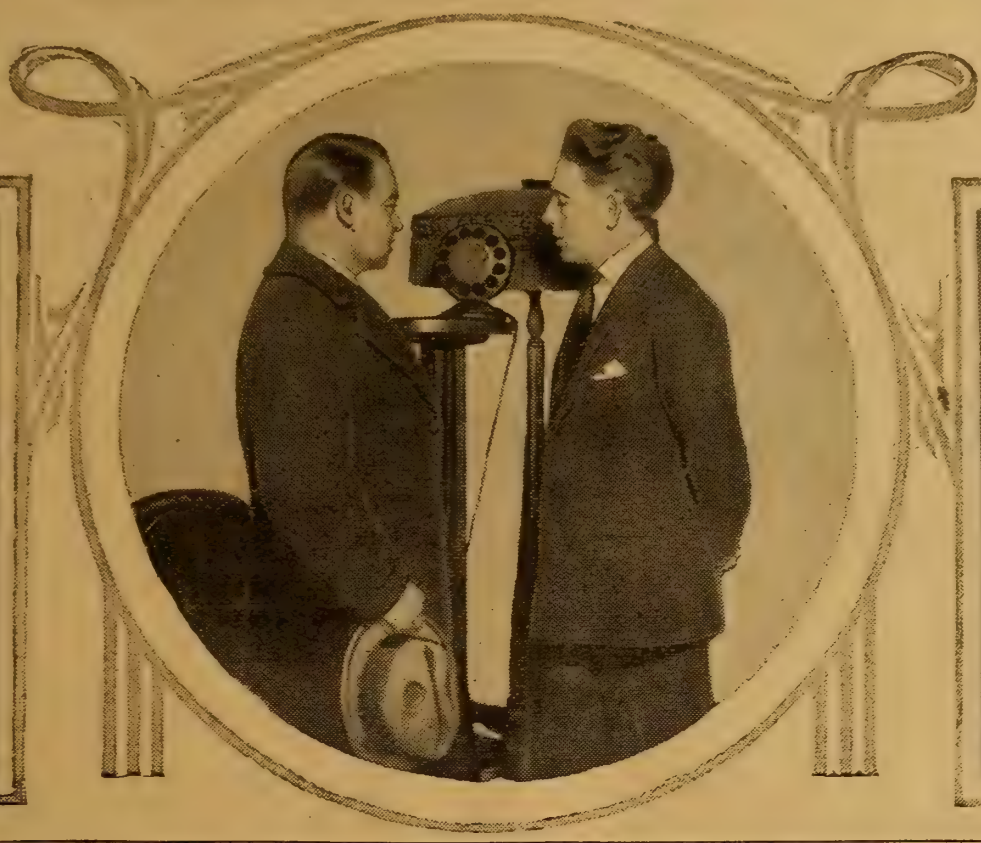
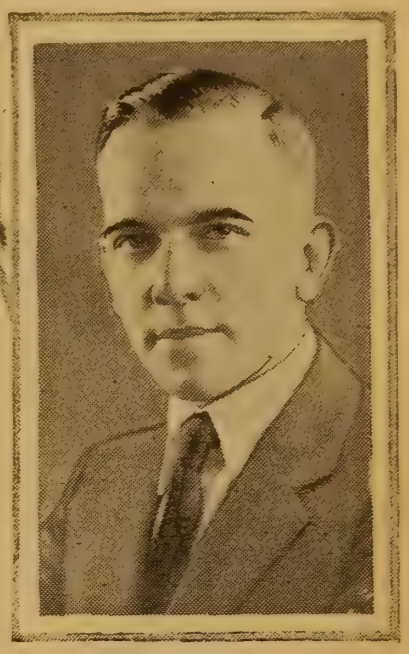
IN THE AIR—HERE AND THERE

Below we have with us E. D. O'Dea, "Radiodea" as he is microphonically known, who manages and announces for WWT, McCarthy Brothers and Ford, Buffalo, N. Y. WWT was the pioneer broadcasting plant in western New York. The two gentlemen in the circle trying to talk both at once into the "mouthpiece" of WOR, L. Bamberger and company, Newark, N. J.,







are (left) Don Allen, writer of "Screenings" for the New York Evening World, and (right) J. E. Williamson, inventor of undersea motion picture photography. And below, well the daily mail of Kolin D. Hager or "K. H." as he is known in the air, contains many letters, ardent and perfumed, from the girl Radiophans. He is chief announcer and studio director of WGY

FOR OR AGAINST PHONE CLUBS?

From the Pen of a Died-in-the-Wool Member

By a Hard-Boiled Radiowl

Are you a "Radiowl"?

If not, someone you know is, for the unique fraternity of the air founded November 22 by WSB, Radiophone broadcasting station of the Atlanta Journal, has swept the nation from coast to coast and in the few weeks of its existence many thousands of Radio "bugs" have filed application for membership and have received their "Radiowl" badges.

Station WSB, known to thousands as "The Voice of the South," was the first broadcasting station in America to conceive the idea of joining its listeners by the bonds of an air fraternity.

Object of Organization

Briefly, the "Radiowls" is a formal affiliation of the "hopeless, benighted and incurable Radio bugs who sacrifice health, home and business" to tune in with the extremely nocturnal concerts originated and inaugurated months ago by WSB, "The Voice of the South."

A message through WSB's microphone at midnight November 22 invited members of the unseen circle to apply for charter membership in the Radiowls, the first thousand applicants to receive blood-red credential cards and to be known forever as founders of the order.

Atlanta Is "Big Roost"

It was explained that Atlanta would be the big Roost, that the head of the order would be called the Big Whoo-Whoo-Whoo, that there would be various degrees of Radiowls, such as Boiled Owls, Hard-Boiled Owls, Cuckoo Owls, Buzzard Owls, Ananias Owls, Hoot Owls, Screech Owls and the like.

The only qualification for entrance into the fraternity is that applicants testify they had listened to at least twenty concerts from Atlanta's coast-to-coast station.

One Owl an Early Bird

A marvelous feature of the organization of the Radiowls is that, while Lambdin Kay, the Journal's announcer, was making the initial statement relative to the organization of the order, a listener in Mississippi called by long distance telephone and was entered as a member before Mr. Kay had left the microphone.

The thousand blood-red charter membership cards and lapel buttons were distributed in a few days after the initial announcement and many thousand have since been sent to many parts of the United States.

WSB Leads Again

WSB has "started something" again. Already other stations are organizing their regular listeners, utilizing the names of various night fowl. First it was the chime call to identify the station, later the inauguration of a slogan, "The Voice of the South," and then the first late concerts.

Of all these, however, it seems that the Radiowls is destined to bring more attention to WSB than any of the other ventures.

FANS, DO YOU LIKE IT? YES OR NO!

Open Secrets of the WSB 10:45 Radiowls

1. The name of the brotherhood of the air shall be WSB 10:45 RADIOWLS.

2. Membership is open to all disciples of Radio who have heard at least twenty concerts from station WSB, "The Voice of the South," radiophone broadcasting station of The Atlanta Journal, Atlanta, Ga.

3. Possession of RADIOWL credentials is prima facie evidence that the owner is a hopeless, benighted and incurable Radio Bug.

4. Every RADIOWL offers the courtesies of his outfit to any visiting RADIOWL.

Every RADIOWL is automatically entitled to maximum privileges when visiting the Big Roost, Atlanta Journal Building, Atlanta, Ga.

Every RADIOWL pledges himself to introduce the wonders of radio to uninitiated blind barbarians on all possible occasions.

Every RADIOWL pledges himself to cooperate with the other RADIOWLS of his Home Roost in bringing radio entertainment to hospitals, charitable institutions, prisons, orphanages and other centers where the aged, the sick, the permanently afflicted, or otherwise unfortunate, may benefit thereby.

5. Every RADIOWL will hold a credentials card from the Big Roost, certifying that the member is a bona fide lost soul of the unseen circle.

6. The first 1,000 RADIOWLS will hold Red cards as token of charter membership. The second thousand will hold White cards, and the third and additional thousands, if any, will hold Blue cards.

7. Local roosts will be known as (town) Red, White or Blue roosts.

8. All local Roosts will be given placards signifying membership and standing.

9. The head of the RADIOWLS will be addressed as the Big Whoo-Whoo-Whoo. This job was preempted when the order was born by Lambkin Kay, Radio Director-Announcer, station WSB, because he thought of it before anybody else.

10. Serving in the posts of vice presidents will be the first RADIOWLS to qualify from each state in the union and in foreign countries. They enjoy the entitlement of state or national Whoo-Whoo (Mississippi Whoo-Whoo or Porto Rico Whoo-Whoo, for instance). Next in rank will be the heads of local Roosts, known as Little Rock Whoo-Whoo, for example.

11. No RADIOWL meeting may assemble before 10:45 p. m., Central Standard time.

12. The RADIOWL call will be the trilogy, "Whoo, Whoo, Whoo," chanted after the fashion of WSB's chimes, which sound the first three notes of America's war song, "Over There."

13. HE-RADIOWLS will be classed generally as Hoot Owls; she-RADIOWLS as Cuckoo Owls; juvenile RADIOWLS as Screech Owls.

14. A Boiled Owl is a RADIOWL who conscientiously testifies that he has lost one hundred (100) hours of needed sleep to listen to WSB concerts. A Hard-Boiled Owl is a RADIOWL who conscientiously testifies that his health, household, morals, or business are imperiled by Radio mania. A Buzzard Owl is a RADIOWL who has visited the Big Roost. An Ananias Owl is a RADIOWL with imagination enough to exaggerate the miracle of radio.

15. All RADIOWLS' ceremonials, initiations, elections and other activities, as well as the transmission of news of the circle, will be conducted during WSB's nightly 10:45 trans-continental concert broadcast.

17. Other officers, titles, degrees, penalties and the like will be introduced and established from time to time, depending upon the happy notions that RADIOWLS may send in to the big roost.

18. WSB 10:45 RADIOWLS modestly admits being the first thing of its kind since Adam.

From the Address of a Strong Anti-Clubman

By Anti-Phone Clubman

I've been asked to say why I am prejudiced against the formation of silly clubs of a tawdry nature by broadcasting stations. My reasons against the clubs, from which several famous long-distance Radiophone plants seem to be having "great gobs" of fun, are very well stated by Ellis Chaney, vice president of the Southern Equipment Company, San Antonio, Texas, operators of Station WOAI. He is strongly opposed to such clubs and has made an ether address on the subject. Here is what he has to say:

"Every owner of a receiving set which has a range of 300 miles and over is entirely familiar with the recent idea of some broadcasting stations organizing so-called clubs. It has been suggested to us by some that Station WOAI should fall in line and organize a club—one gentleman going so far, in an effort to co-operate with us, as to outline briefly by letter the character of matter to be broadcast.

"He also suggests a name for the proposed club, and if we were going to undertake the club idea we would be very much interested to consider the plan and we want to thank this gentleman, whose name is unknown to us, for his interest shown and compliment him on the original and amusing article which he submits as a proposed opening or introductory announcement.

Clubs Bore Fans; Lose Dignity

"In our opinion, the novelty quickly wears off and listeners in become tired and weary, and, in fact, provoked with the reading of names and addresses of those who have written a station in application for membership in a club, or, for that matter, regarding having heard their broadcasting.

"We think stations such as KSD of the St. Louis Post Dispatch are apt to retain the best will of Radio receiving set owners simply because they maintain their dignity by not broadcasting anything except features of general interest, such as high-class music, current news items, market reports and weather forecasts, without sidelights, and we are always pleased when we are able to tune in on such a station and we admire and compliment them for dignity and respect for those people who have Radio sets in their homes.

Abuse of Broadcast License

"We believe it is an abuse of the privileges granted under a Government license to perpetrate various nuisances on the Radio public in the form of ridiculous attempts at wit and humor, which is nothing more or less than plain shoddy advertising, which we hope will soon be more closely supervised by the United States Department of Commerce officials.

Acknowledge Communications by Mail

"We greatly appreciate receiving communications from listeners in who have

(Continued on page 6)

VISITING DAY, CODE PRACTICE AT WGI

GIVES FANS CHANCE TO SEE "HOW IT'S DONE"

15-Minute Period Daily Introduces Listeners In to Dot-Dash Mystery

MEDFORD HILLSIDE, MASS.—A "Radio Visiting Day" has been established at Station WGI, of the American Radio and Research Corporation here, whereby New England Radiophans may visit the station and see how broadcasting is done, and how a Radiophone plant is operated. People who nightly listen to this or that broadcasting station have a certain curiosity to see what the station and the announcers look like, as well as how the "thing" works.

Heretofore, the main reason why the big broadcasters have not invited their audience to visit them has not been because they were not wanted, but because there was not sufficient space to accommodate all those who might care to come.

This main difficulty has been eliminated at the WGI studio by a drawing system which, it is believed, will be adopted, with more or less modification to fit local needs, by other broadcasting stations all over the country.

Draw from Applications; Broadcast Winners

The drawing system works as follows: Those desiring to visit the broadcasting station are invited by Radiophone to make application. These applications are numbered. Then a list of numbers is put in a hat and a drawing is made by a committee. Those numbers selected are the invited guests of WGI at the first convenient date.

The visiting plan was first put in operation at the station recently when at 10:20 P. M. Eastern time, Announcer "HDM" broadcast that all letters received before 6 P. M. the next night would be included in the first drawing. Over 500 letters were received, including special deliveries and telegrams. One resident within a few miles of the station came over in person, his automobile being the first to break through the drifts on the street of the broadcasting studio after a heavy snowfall.

Code Signal Practice Period

Another new WGI feature is its code practice period. A desire on the part of many of the Radio audience for practice in the reception of code signals has encouraged WGI to insert a 15-minute period in its program each evening for this particular purpose. In answer to a query broadcast some weeks ago, asking if the fans desired this instruction, over 300 replies were received and almost as many telephone calls.

The Radio audience seems eager to know what the mysterious dots and dashes are saying. One or two letters read: "If we must listen to that darned buzzing, let us know how to interpret them."

It is believed that practice in the code will lead many Radiophans now interested mainly in the broadcasting to become real "DX" enthusiasts in amateur work. These lessons are planned for Monday, Wednesday and Friday at 6:15 p. m. Each lesson will be repeated the night following at 6:45 p. m.

An article in the New York Times estimates that before the close of the coming winter 3,000,000 Radio sets will be in use and the concerts will have a total audience of at least 50,000,000 persons.

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Book Reviews

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C of Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

Experimental Wireless Stations. By S. E. Edelman. This book assumes that the reader has some knowledge of fundamental electricity and mathematics and is a readily understandable text for beginners in the art of Radio communication who desire to start with the elements. Earlier editions of this book were published during the war. The 1922 edition has been revised and enlarged so as to cover the progress made in the last few years. Price, $3.00.

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Rauland Manufacturing Company
35 South Dearborn Street Chicago

FORMICA
A Laminated Phenolic Condensation Product
SHEETS TUBES RODS
RADIO PANELS
POLISHED BLACK FINISH
CUT PERFECTLY SQUARE TO ANY SIZE

1/32"	THICK	1/2¢ PER SQ. INCH
1/16"	THICK	3/4¢ PER SQ. INCH
3/32"	THICK	1¢ PER SQ. INCH
1/8"	THICK	1 1/2¢ PER SQ. INCH
3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2 1/2¢ PER SQ. INCH
3/8"	THICK	4¢ PER SQ. INCH
1/2"	THICK	5 1/4¢ PER SQ. INCH

SEND FOR COMPLETE PRICE LIST
PROMPT ATTENTION TO MAIL ORDERS
DEALERS PRICES ON APPLICATION
STARRETT MFG. CO.
519 SOUTH GREEN ST. CHICAGO

FOR OR AGAINST?

(Continued from page 5)

heard our programs and we invariably and immediately pass all complimentary letters on to the artists who perform over WOAI, and it pleases these artists, just as applause would from an audience in a hall or theater.

"We not only do this, but a great many of such letters and cards are printed by the San Antonio Evening News and Express, which, in a general way, acknowledges receipt to the sender, but we also acknowledge every letter and card we receive by mail, sending our appreciation and our broadcast schedule.

One's Fun Is Bother for Many

"We have received many thousands of cards and letters from all over the continent and have them filed by states or countries and we are very proud of them and want more and will appreciate, in the future as in the past, the thoughtfulness which prompts anyone to write, but we believe the fan also appreciates the fact we should not spoil many people's entertainment by reading each card, in spite of the fact the individual might be interested to hear his name sent through the air.

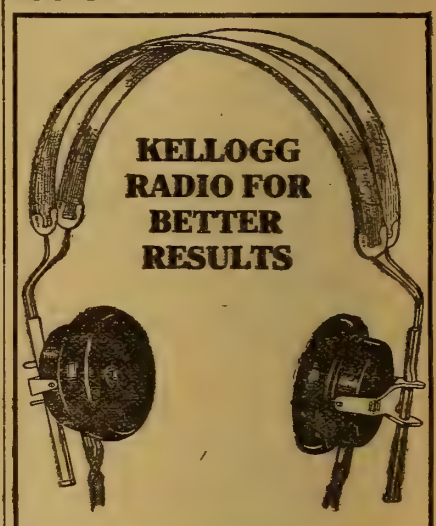
"Next to almost incessant interference of the amateur telegraph 'worker'—frequently entirely unwilling to co-operate and regardless of the laws regulating his license, if he has one, respecting the wave length he may use and that he should always remember it is unsportsmanlike to unnecessarily interfere with rightful pleasure of thousands—the biggest detriment to and nuisance in Radio is the broadcast station which is constantly indulging in 'horse play' of the nature just mentioned. If we were going to pray together we would request you to join us in a prayer that a remedy for both of these impositions is shortly found."

TUNE IN
Join our radio club and save money on sets and parts. Write us your wants and worries.
Radio Supply and Electric Co.
116 West 29th Street, Wilmington, Delaware.

CRL
VAR. GRID LEAK
1/4 to 10 megohms
KLENTZ RADIO CO.
Exclusive Distributors
508 South Dearborn St.
Room 770 Wabash 1380
Chicago

Honor Columbus Council Woman

COLUMBUS, O.—Olga Anna Jones, Columbus' first woman member of the city council, was the speaker at the regular forum program of Station WPAL, the Superior Radio and Telephone Equipment company. The broadcast by Miss Jones was given in connection with a program made up especially for her benefit. Secretary of State Thad H. Brown, also was heard on the Friday forum broadcasting program.



KELLOGG SWITCHBOARD & SUPPLY COMPANY
Chicago

RADIO
Manufacturer Direct to You
SOMETHING NEW EVERY WEEK
LOWEST PRICES—HIGHEST QUALITY
Everything guaranteed as represented. We pay the postage

THIS WEEK'S LEADER
Sale on Honeycomb Coils
Complete set consisting of 16 coils ranging from 25 to 1500 turns regular value $18.45. Sale Price. **$11.45**
Fine workmanship and wire on these coils. Here is a real opportunity

Lattice Wound Variometers	$2.95
Lattice Wound Vario Couplers	$2.95
50 turn Honeycomb Coils	31c
75 turn Honeycomb Coils	35c
Grewol Crystal Detectors	$1.50

BALDWIN TYPE C LOUD SPEAKER UNITS (with long cord) **$4.65**

$4.00 NEW TYPE VARIOMETERS (less capacity effect). (Wooden stators eliminated) **$2.95**

Freshman Variable Grid Leaks	75c	Switch levers	19c
Potentiometers with taper knob	$1.25	Bakelite V. T. Sockets	42c
W. D. 11 adapters	50c	Rubber knob B. posts	45c doz.
3 coil mountings with knobs	$3.25	75c 4 phone connectors	42c
2 coil mountings with knobs	$2.65	Vernier dial controls	42c
Single panel mountings	36c	Two inch dials	19c

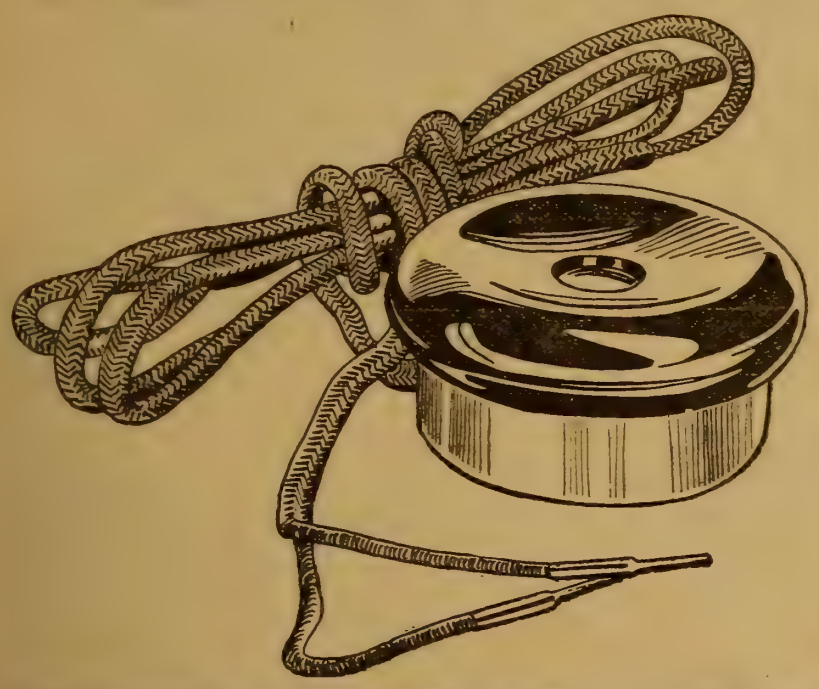
Complete Parts for REGENERATIVE CIRCUIT
1 vario coupler, 2 variometers, 1 rheostat, 1 tube socket, 3, 3-in. dials, 6 binding posts, 1 inductance switch, 20 feet connecting wire, 1 panel. Complete for **$11.95**

All orders filled promptly. We are swamped with orders from satisfied customers. A trial will convince you that we treat you right. Always glad to answer questions or give information.

The House of Service and Quality
Manufacturer's Outlet Company
Moco Products
28 South Wells St., Chicago, Ill.

The Radiophonist's Mart

Single Phone for Loud Speaker



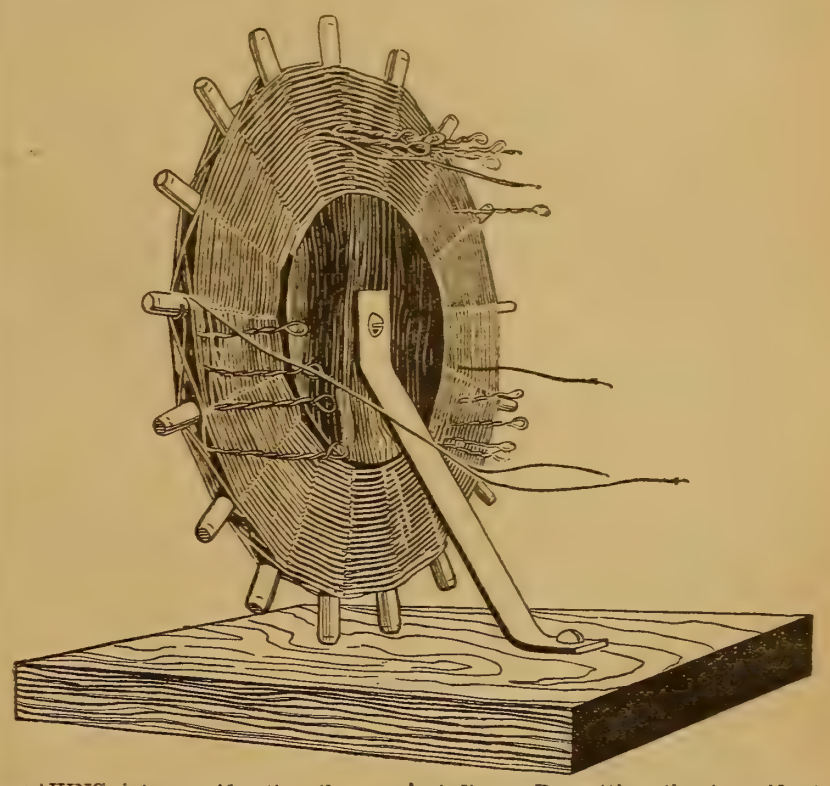
DUE to the rather high cost of loud speakers, many fans have attempted to construct their own loud speaker horns and simply add a good loud speaker phone. One of these telephones, produced by the Radio Industries Corporation of New York, N. Y., is shown in the illustration. This phone has a very clear sound and reproduces the higher notes without the chattering found in some others. Instead of the usual two-pole piece construction, only one spool is used. This brings the pull in the mathematical center of the diaphragm.

Less energy is necessary to pull this down than if the pull was away from the center. The further away the active pole pieces are from the center, the more energy is required to pull down the diaphragm. In addition to this, there is a return magnetic circuit, due to the peculiar construction of the magnet, which extends to both sides of the shell. There is no active pull at the end of these poles, but the magnetic flux returns through the diaphragm, giving a finely balanced magnetic circuit.

The telephone has a heavy aluminum shell with a hard rubber composition cap and a non-rusting, sheradized diaphragm. The windings have a high resistance.

The phone is also furnished with a five-foot cord, the two tips of which are provided with a tag marked "very important," stating that the colored cord terminal should be connected to the positive B battery circuit as this will then permit the lines of magnetic force to follow the magnetized polarity of the receiver, and thus avoid the demagnetizing effects of a reversal of polarity which would ultimately wear down the efficiency of the receiver.

Coil Unit for Reinartz Circuit



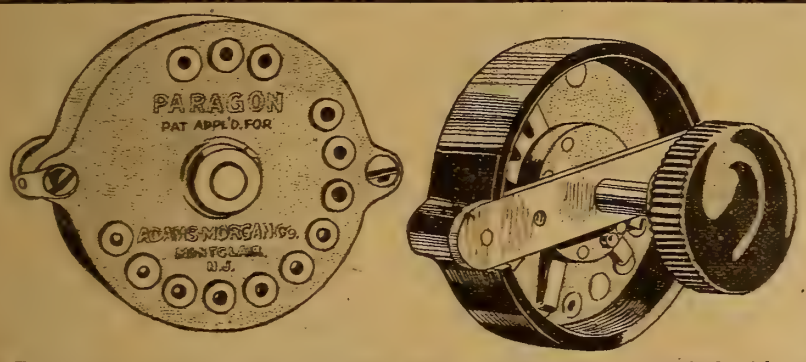
TAKING into consideration the popularity of the Reinartz circuit, all Radiophans will be interested in the spider web coils, made for use in same. The coil shown in the illustration uses a circular wooden core on which seventeen wooden spokes or dowels project radially about 1½ inches from the surface. A green double silk covered wire is used in the winding and is provided with a brass mounting bracket so that it can be fastened to the base with the coil upright as shown in the illustration. Four taps and two end connections are provided for the inner, or plate coil winding. The primary winding has an end connection and nine taps, while the outer or secondary winding, in series with the primary, has three taps and an end connection.

The taps are long enough that soldered connections can be made without the danger of running the solder or flux on the rest of the coil, thus shorting some of the turns. In addition the advantage of the upright mounting eliminates the possibility of the solder dropping into the windings. By setting the tap side towards the panel when mounting it on the base, the lead lengths are reduced to a minimum.

The neatness of appearance and good workmanship are attractive features of the coil. It has been placed on the market by Hudson-Ross, Chicago, Ill.

The positive connection of your B battery always goes to the plate of your audion, although it can go through the telephones and then to the plate.

Compact Stage Control Switch



NOT only has there been a marked development in types of circuits used by amateurs in building their own sets, but of late there has been a decided tendency toward the construction of higher grade and more practical apparatus, compact in form, but which will function over a field that formerly required three or four units. An example of this trend of development is shown in the Paragon stage control switch, manufactured by the Adams-Morgan company of Upper Montclair, N. J.

This unit, as shown in the illustration, not only permits the change over from detector to any of the two stages of amplification, but also combines the filament control features. In this way, it eliminates the necessity of three jacks and the usual phone plug and adds a knob and pointer to the front of the panel instead of the three jack holes. The framework is a molded job with fourteen lug connections. The rotating element consists of a 10-arm, fan-type switch, automatically engaging with the contact points connecting to the terminal lugs, which are so interconnected that the windings of the transformers are thrown in or out of the circuit as required for the stage which the pointer indicates.

A metal bar across the framework acts as a bearing for the rotating shaft and also provides for panel mounting by means of two screws which are fastened to it on each side of the shaft hole. In this way the actual mounting of the instrument simply requires a drilling of three holes. A diagram is furnished with each instrument showing just how to connect the switch in a detector, two-stage amplifier circuit. A recommendation is made that the user see that the outside terminals of the primary and secondary windings of the terminals are connected respectively to the plate and grid of the vacuum tubes. Unless this precaution is observed, howling will result, due to audio frequency oscillations in the circuits. In the case of the primary windings, this connection need not be direct.

Your set will act differently at different times and under varying conditions, but this time of year is good.

IMPROVED REINARTZ CIRCUIT

My highly improved and copyrighted circuit brings in all important stations on both coasts and the Mexican border without any distortion or other noises.
We dance to music from Atlanta received on one loud Baldwin unit.
Build one of these supersensitive sets from my blueprints and specifications. Price 50c or with a perfect and complete double wound spiderweb coil $3.00 by mail.
No other windings used.
Photo of my set on a glass panel with every order.
Everything clearly shown. Cheap and easy to build. Easy to operate.
S. A. TWITCHELL, 1925 Western Av., Minneapolis, Minn.

Carter "TU-WAY" Radio Plug
take two head sets and all types cord tip terminals. Price $1.50. Write for Bulletin on Carter "HOLD-TITE" Jacks and other products.
CARTER RADIO COMPANY, 209 South State Street, CHICAGO

MOUNTING BOARDS for ATWATER-KENT
STANDARD SIZES
DEALERS WRITE FOR DISCOUNT
DUNGAN RADIO COMPANY
68 WEST WASHINGTON STREET

TELMACO
RADIO SUPPLIES STORES
Prompt Service—Quality Goods—Priced Right
Radio Division
TELEPHONE MAINTENANCE CO.
20 S. Wells St. Franklin 3986
5206 W. Madison, Austin 7041. 1122 E. 47th St
Look for the TELMACO Sign

MAGNAVOX Radio
The Reproducer Supreme

IN Radio, there are no substitutes for the Magnavox electro-dynamic principle.
When you purchase Magnavox apparatus you assure yourself the utmost satisfaction.

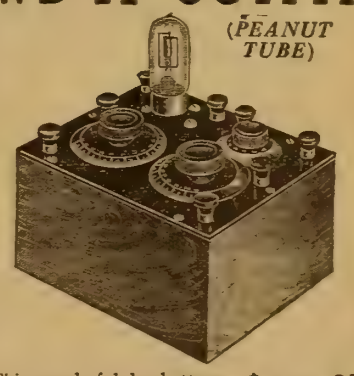
R-2 Magnavox Radio
with 18-inch horn
(as illustrated)
For store demonstration, large audiences, dance halls, etc. . $85.00

R-3 Magnavox Radio
with 14-inch horn
For homes, offices, amateur stations, etc.
$45.00

At good dealers everywhere

THE MAGNAVOX CO.
Oakland, Cal.
New York Office
370 Seventh Ave.

WD-11 OUTFIT
(PEANUT TUBE)



This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire screws and picture diagram for wiring, all at above price.
$13.85
WD-11 Tubes $5.85
Head Phones..... $4.50 and up
Two-stage Amplifier Box complete to match the above..... $14.15
Postage extra on four pounds. No personal checks received. Let us quote on your wants.
RADIO PARTS CO.
8 So. Austin Boulevard, CHICAGO, ILL.

Radiophone Broadcasting Stations

Corrected Every Week—Part III

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WOAY, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KDZA, KFDH

Arkansas:
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Glendale, KFAC
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KDZP, KFCL KFI, KHJ, KJS, KNN, KNV, KOG, KUS, KWH, KXS, KYJ
Modesto, KXD
Oakland, KFBN, KLX, KZM
Pasadena, KLB
Reedley, KFAZ
Richmond, KFCM
Sacramento, KFBK, KVQ
San Diego, KDPT, KDYM, KDYO, KFBC, KFFA, KON
San Francisco, AG1, KDN, KDZG, KDZW, KDZX, KFDB, KLP, KLS, KPO, KSL, KUO, KZY
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KLZ
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WWX

Florida:
Jacksonville, WDAL
Miami, WFAW, WIAZ, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

State, City, Call

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO

Idaho:
Boise, KFAU, KFDD
Moscow, KFAN
Thomasville, WPAX
Wallace, KFCC

Illinois:
Belvidere, WOAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD
Decatur, WBAO, WCAP, WHAP
Galesburg, WRAM
Mattoon, WQAL
Peoria, WJAN
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Evansville, WNAM, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Mishawaka, WBAQ
Muncie, WJAF
Richmond, WOZ
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Cresco, WNAG
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Dubuque, WQAK
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Manhattan, WNAK, WTG
Marion, WRAD
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH

State, City, Call

Louisville, WHAS, WKAG, WLAP
Paducah, WIAR

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WGAQ

Maine:
Auburn, WMB
Bangor, WPAY
Houlton, WLAN
Portland, WJAL

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ, WPE
Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Butte, KFAP
Great Falls, KDYS
Havre, KFBB
Polytechnic, KFED

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, WFAV, WGAT, WJAB, WKAC, WLAF, WMAH, WQAP, WSAS
Norfolk, WJAG

State, City, Call

Omaha, WAAW, WDV, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WAAT, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Roselle Park, WDY
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WWZ
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

Ohio:
Akron, WOE
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WA1, WJAJ
Defiance, WCAQ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA

State, City, Call

Enid, WNAF
Muskogee, WDAV
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WLAL

Oregon:
Astoria, KFBM, KFGG
Corvallis, KFDJ
Eugene, KFAT
Hood River, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Brownsville, WDAQ
Clearfield, WPI
Crafton, WAAX
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WHAF, WJAS
Scranton, WLAO, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WKAZ, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
East Providence, WKAD
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ
Yankton, WAJU, WNAX

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC, WPO

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WOAI
Stanford, WOAZ
Tyler, WOAF

State, City, Call

Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KDZL, KFCP
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Pullman, KFAE
Seattle, KDZE, KDZT, KFC, KHQ, KJR, KTW, KZC
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Arlington, NAA
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE, CKCD
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 2-2:30, 3-3:30, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 2-4 pm, 8:30-10. Central.

WLW, Cincinnati, O. 485 also. 2,000 mi. Crosley Mfg. Co. Daily ex Sun, 10 am-3 pm, music, reports. Tues, Fri, 8-10:30 pm, Thurs, 10-12 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Daily ex Sun, 9:30-10:30 pm, music. Fri, 11:30-12:30 pm. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 also. 600 mi. Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 2:15, weather, markets. Central.

WMAK, Lockport, N. Y. Norton Labs.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. Utility Battery Service.

WMAQ, Chicago, Ill. 1500 mi. The Chicago Daily News (Fair Department Store). Daily, 4:35-5 pm, 9:15-10. Mon, Wed, Fri, Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 485 also. 2,400 mi. Paramount Radio Corp. (Duluth News-Tribune). Daily ex Sun, 11:20 am, 4:20 pm, markets, reports, 6:50-7:30, stocks. Tues, Fri, 8-9:30 pm, classical program. Central.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMC, Memphis, Tenn. 400 and 485 only. 2,000 mi. The Commercial Appeal. Daily, 12 m, 3 pm, weather, markets; 8 pm, entertainment. Central.

WMH, Cincinnati, O. 485 only. 500 mi. Precision Equipment Co. Daily ex Sun, 11 am, 4 pm, reports. Mon, Wed, Sat, 8:15 pm, entertainment. Central.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8:9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAF, Enid, Okla. Enid Radio Dist. Co.

WNAG, Cresco, Ia. Rothert Radio and Electric Shop.

WNAH, Wilkes-Barre, Pa. Wilkes-Barre Radio Repair Shop.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm, Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone .Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. 485 also. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Wed, 7:30-8:30 pm, concert. Sun, 9:30-10:30 am, 7-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. Ervin's Elec. Co.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Grove, Mo. William E. Woods.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. Penna. Nat'l Guard.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 7, concert. Central.

WOE, Akron, Ohio. 100 mi. Buckeye Radio Service Co. Mon, Wed, Fri, 7-8:15 pm, music, agriograms, sports. Sat, 4-4:30 pm, music, sports. Eastern.

WOH, Indianaoplis, Ind. 1,000 mi. Hatfield Elec. Co. (Indianapolis Star.) Daily ex Sun, 10-11 am, music; 10:15, financial, markets; 1-2 pm, music; 1:20, markets; 4-5 pm, music; 4:15, police notes; 4:50, sports. Mon, Wed, Sat, 8:30-10 pm, Concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 and 485 only. 500 mi. John Wanamaker.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7, music, talks. Tues, Fri, 8-10, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WOZ, Richmond, Ind. 485 also. 300 mi. Palladium Printing Co. Daily ex Sun, 12-12:25 pm, 4-5, 6:30-7, music, markets. Central.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, time, 2:30-3 pm, 6-6:30, 9-9:30. Sun, 3-3:30 pm, 9-9:30. Mon, 11-12 mid. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB, State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 1,000 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7, music. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. Wisconsin Dept. of Markets.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. Concordia College.

WPAV, Laurium, Mich. Tinetti & Sons.

WPAW, Wilmington, Del. Radio Installation Co., Inc.

WPAX, Thomasville, Ga. 25 mi. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music. Mon, Wed, Fri, 8:30-9:30 pm, music. Sat, 10-11 am, codes. Sun, 11:30 am-12:30, 8:30 pm-9:30, church service. Eastern.

WPAY, Bangor, Me. Bangor Radio Lab.

WPE, Kansas City, Mo. 300 mi. Central Radio Co. Sun, 6-7 pm, church services. Central.

WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. Elec. Supply Co.

WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

(Continued on page 9)

The "How" of the Simplified Super Circuit

Part II—Details Regarding the Component Parts

By E. T. Flewelling

Exclusive—

WHEN E. T. Flewelling and his set "that made good in a day" were discovered by Radio Digest, the flivver circuit was practically unknown. Its appearance in the Digest is another scoop. Mr. Flewelling has agreed to write exclusively for Radio Digest. The article on this page is one of a series to appear every week which will help the Radiophan in the perfecting of his own flivver set.

WHEN information concerning the Flewelling circuit was first published it was believed to be best to specify only one particular way in which the circuit could be set up, that is only one list of materials needed was given. This was done in order to simplify matters and to avoid the confusion that might arise if various coils, etc., were mentioned, and because it was known that if the specifications were rigidly followed the experimenter was practically assured of success. Our letters have shown us that a great many are endeavoring to make their own loops, coils and other parts used.

There is considerably more interest for some in constructing their own parts and it will doubtless be of value if some details are given about the component parts of the hook-up.

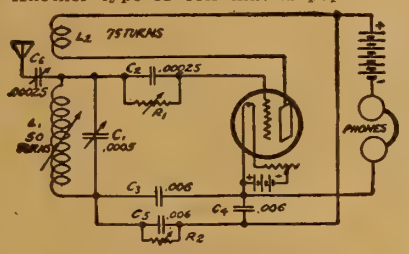
Use of Spider Web Coils

The variocoupler that would be suitable for use in the Simplified Super was covered in the last article. Instead of a variocoupler or Giblin Remler coils one might prefer to use spider web or other coils. Spider web coils are very efficient and flexible so far as coupling is preferred.

To make suitable spider webs for broadcasting reception, that is 325 to 500 meters, procure some discs about 1/16 inch thick of bakelite, cardboard or celluloid. These discs are to be 4 inches in diameter and are slotted to within ¾ inch of the center by 9 slots. The primary inductance L1 should be wound with No. 26 double cotton covered wire to 32 turns and the tickler coil L2 should be wound to 45 turns. It will be hard to get 45 turns of No. 26 wire into the space given so that it will be found preferable to use 30 or 32 wire for the tickler.

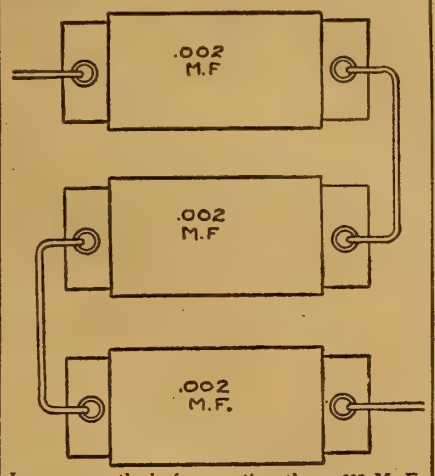
Single Layer Coil

Another type of coil that is popular is



The Flewelling Super Circuit

the single layer coil wound on cardboard or bakelite tubing, and if the experimenter prefers this type, suitable coils may be made by using a 4-inch tube with 30 turns for the inductance L1 and 45 turns for the tickler L2, and as in the case of all other types of coils, mounting them so that the inductive relationship or distance from each other may be varied to meet the requirements called for in tuning in a station.

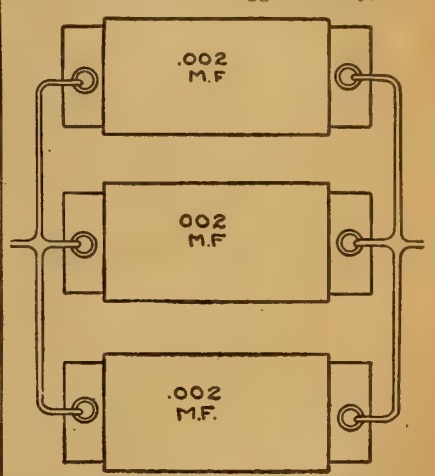


Improper method of connecting three .002 M. F. fixed condensers together to secure a capacity of .006 M. F. This arrangement is known as "series" and the capacity value of the whole is only .00067 M. F. See the correct method and note the difference

This brings us to a point that can hardly be overemphasized. The Super circuit is a very critical tuner and it is known that one of the easiest things to do when searching for a station is to jump right over it without knowing that it is there. When using a standard set equipped with a common three-plate vernier condenser, it has been noted at various times that up to four different broadcasters have been picked up within the range of the vernier alone. It is therefore of the utmost importance, especially for long distance reception, to have all parts move as smoothly as possible so that they may be moved very slowly and evenly, in this way covering every point in their range.

Condensers to Use

For the tuning condenser C1 most any make can be used, and as with anything else, some are preferable to others. Whichever type is used be sure that a vernier is also used. It is best to use a condenser of .0005 MF capacity for broadcasting because if a larger one is used, stations will be jumped over, due to difficulty in moving the condenser without making a comparatively great change in capacity. On the other hand, if a smaller condenser is used, say an eleven-plate, the set will be too much of the hair trigger variety.



Correct method of connecting three .002 M. F. condensers in series in order to secure a capacity of .006 M. F. This arrangement is known as "multiple" or "parallel" and the capacity of the whole is the sum of the capacities in parallel, or, in this case, .006 M. F. The open ends are for connection into the circuit

Body Capacity Effects

The matter of body capacity effects with this set will have to be treated at length later on, but this much can be said while we are on the subject of the phones. Remembering that the phones are not a part of the supposedly low frequency oscillation circuit we find that this effect should not be, comparatively speaking, any greater than with an ordinary receiver. That it is, is due to fact that the Super is so much more sensitive and acts here just

(Continued on page 13)

STATION SCHEDULES

(Continued from page 8)

WPO, Memphis, Tenn. 100 mi. United Equip. Co. Daily, 7:15-8:15 pm, music. Central.
WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. E. B. Gish.
WQAD, Waterbury, Conn. Whitall Elect. Co.
WQAF, Sandusky, O. Sandusky Register.
WQAH, Lexington, Ky. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, Ia. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. Cole County Tel. & Telg. Co.
WQAM, Miami, Fla. Electrical Equipment Co.
WQAP, Lincoln, Nebr. Am. Radio Co.
WQAQ, Abilene, Tex. West Tex. Radio Co.
WRAA, Houston, Tex. Rice Institute.
WRAC, Mayville, N. D. State Normal School.
WRAD, Marion, Kans. Taylor Radio Shop.
WRAM, Galesburg, Ill. Lombard College.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Wed, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. Jacob Carl Thomas.
WRAU, Amarillo, Tex. Daily News.
WRAY, Scranton, Pa. 485 also, 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7:8:30, bedtime stories, music. Sun, 3 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thur, 8:30-8:50 pm, 9-9:30 news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Daily ex Sun, 10:30-12 m. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAJ, Grove City, Pa. Grove City College.
WSAB, Cape Girardeau, Mo. Southeast Mo. State Teachers College.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 9:30 am, 9:45, 10, 10:30, 10:45, 11, 11:30, 11:40, 11:50, 12 m, 1:15 pm, 1:30, 1:45, reports.
WSAV, Houston, Tex. 300 mi. Clifford W. Vick, Radio Const'n Co. Mon, 8-10 pm, concerts. Daily, 7:15-8 pm. Central.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:45 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Mon, Wed, Fri, 3-3:30 pm, 8-8:45, reports, concert. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. Agricultural and Mechanical College of Tex.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 200 mi. Sanger Bros. Daily ex Sun, 10 am, weather, 1:30 pm, music. Mon, Wed, Fri, 8:45 pm, music. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWB, Canton, O. Daily News Printing Co.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400 and 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:40 am, household hints; 9:40-10:25, health talks; 10:25-10:30 am, weather; 11:55-12 m, time; 12:05-12:45 pm, music; 3-3:30 music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports; 7:30-10, entertainment. Sun, November 11, and every other week, 11 am, 4 pm, church services. Sun, fill in weeks, 2 pm, 7:30, church services, special. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.
WWX, Washington, D. C. 1,160 only. 600 mi. Post Office Dept. Daily ex Sun, 10 am, weather; 10:30, markets, 12:30, 2:15, 3:30, markets, 5 pm, 7:30, markets; 9:45, weather. Eastern.
WWZ, New York City. 200 mi. John Wanamaker. Daily ex Sun, 1:15-2:15 pm. Tues, 7:30-9 pm. Fri, 7:30-8:30 pm. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

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116 West 29th Street,
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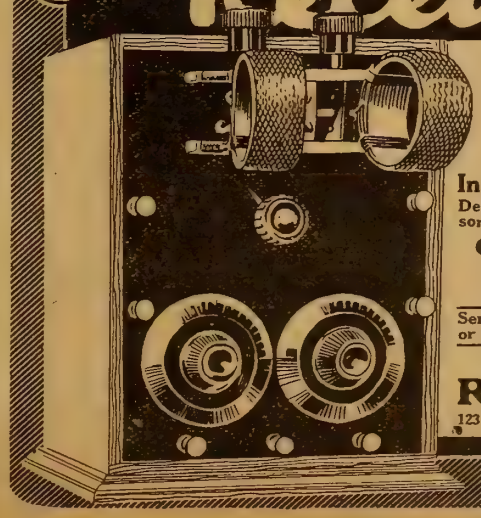

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Chicago, Illinois

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Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, February 10, 1923 No. 5

White Radio Bill

Early Consideration Vital to Development of Radio

AFTER a thorough study of the White Radio bill, the House Committee recommends its early consideration since it carries only proposals vital to Radio development at this time. The approaching end of the session is pointed out with the imperative need for conferring regulatory powers upon the Department of Commerce.

Little opposition is anticipated, and yet, some point out, helpful legislation has been lost heretofore through lack of public interest. If the Radio operators and fans want the White bill passed this session, they must assert themselves, indicating their desires to their representatives in Congress. This is the opinion of many who seek legislation.

If the bill is not passed this session, they say, new measures will have to be introduced in the next session of Congress, which does not organize until next December. Many believe a long delay would be most unfortunate for a national service which is fast developing in its many useful phases.

Those Who Transmit

Where Some Interference Comes from and Why

NATURALLY everyone is acquainted with the fact that no charge is made by the government for the privilege of operating a receiving station. The same, of course, is true of the transmitter. Outside of the small notary fee, there is no charge for an amateur's license or, in fact, any license.

Today, aside from the high power government stations there are thousands of so-called Radio amateurs in the country possessing the authority and knowledge of operating a transmitting station. The transmission is sent out in code and phone, although the former predominates. The licensing, it is agreed, has been somewhat indiscriminate and quite a few operate stations who in reality are not capable. In this lies a source of interference which, it is hoped, will be shortly cleared by better Radio legislation.

Natives of Jungles Broadcast

Before Radio the Natives Had Their Own Way to Send Messages

OUR best Radio sets seem to be back numbers when we learn that in the darkest Africa the bush "Radio" has been in use many years by the natives. Our invention may be wonderful wherein advancing knowledge has made broadcasting possible. Every traveler in savage Africa has had evidence of the almost incredible swiftness with which the native can communicate with distant friends. The bush "Radio" operates even more speedily than our telegraph.

The exact means employed varies with the tribe and circumstances. Drum-beats are the usual signals; smoke is often used, and in some parts of the Gold Coast even whistling is enlisted for the conveyance of news. More mysterious is the so-called veldt or bush "telegraph," a phenomenon which wise Europeans do not attempt to explain.

Bush villages can call up one another very much as if they were on the telephone. Each has its collection of signal drums, used for different purposes, and by them the chiefs can tell each other that there is a man-eating lion on the prowl, that the native commissioner has started his tax gathering tour, or that there will be a big beer-drink at such and such a village on the night of the full moon.

The European who has lived long in the bush and who hears the sound of far-away drums knows well that to him unintelligible beats are far from meaningless for the natives.

At the outbreak of the world war in 1914 a party of explorers was located quite a number of miles from a telegraph station in Africa. When the operator at the telegraph station learned of it he sent a messenger on a bicycle to bring the news. He need not have troubled. Four hours before the telegraph clerk arrived one of the plantation overseers had asked the head of the party mysteriously why the white men in Europe were at war. It was the first intimation that the exploring party had that hostilities were started. The bush "telegraph" had beaten the wire lines and messenger.

Condensed

By DIELECTRIC

A short time ago the news of having talked to England from a broadcasting station in this country would have elicited considerable excitement. The feat accomplished by officials of the American Telephone and Telegraph Company when their speeches were clearly heard in a receiving set in Southgate, England, affects us only slightly, in comparison to the significance of the thing. We are told that it may be months—years, before the arrival of such time as will find Radiophony used internationally on a commercial basis. That may be. It may also prove true that in a much shorter time business will be utilizing this medium. It would be unwise to make a prediction in this age of sudden discoveries. England is preparing to talk back to us and when she does there may be something said by Yankee listeners about the Hinglish accent, by jove! Keep your directional loop aimed toward Senator Marconi or you may miss something. He is working, too, on an important phase of Radio.

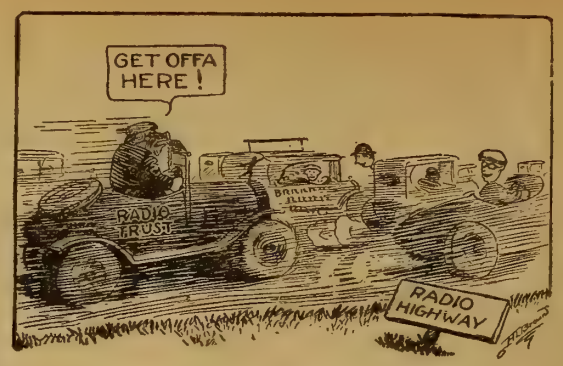
Before swinging away from the British Isles let me call attention to plans, which are now maturing, for the construction of a system over there to allow the sending of messages from England to Australia at a cost of two cents a word. They are awaking to a realization of the necessity of meeting needs in conformity with modern practices. There is no advantage in discussing whether or not Radio is to supplant the more common methods of communication between states and nations, enough that it is to fill an important place in this realm of everyday experience. Pity the country whose lack of vision is responsible for its tardiness in developing this new science and keeping abreast of the times. As in every other field of world progress, it is necessary to adjust oneself to changing conditions and accept whatever tends to advancement. Where outworn usages hinder, remove them, and let every government aid its amateurs to a freer use of whatever ability they possess.

Prizes are being offered by some of the broadcasting stations to the one who hears their programs from the most distant point. An offer of this kind was made by Station WNAC in Boston. DX owls have been indulging in the pastime of picking up remote stations for a long time, and will continue to do so. The number of such patient ones will be rapidly increased, I fancy, if success is to bring some more or less valuable gift. The notion of possessing one of those large boxes of candy offered by WDAP still lingers as a taunting memory. And, just think of winning a WDAP Flivver. That would be rattling good, wouldn't it?

The extent to which code messages may be heard by stations far removed from each other is gradually assuming proportions which Radiotricians prophesied would come eventually. A ship copied code from four Atlantic amateur stations when one hundred and twenty miles off the coast of China. That speaks well for our amateurs. Still more recently a message from Japan was received in its entirety by the receiving operator of The New York Times, a distance of nine thousand miles. If you live long enough, you will look back on these records as commonplace in view of what will then be possible.

Perhaps one of the most enjoyable, and at the same time, profitable, features of a broadcasting program is to be able to listen in to some after dinner speeches by men who are eminent in their particular line. It has been possible to hear railway officials, public officials, university presidents at alumni reunions, leaders in the automotive industry and many others address audiences in banqueting halls through a receiving set in your home. Except for the kindly offices of broadcasting stations this would be impossible for most of us. I happen to know one case of biliousness that was dissipated with Coueism magic, simply by placing the patient where he could hear the hearty laughter which followed witty remarks by Big Bill Edwards at a meeting of college athletic directors. Impressions of prominent men are often found to be erroneous when the microphone transmits side remarks made by them while seated at the speakers' table in the dining hall of a hotel. Mr. Schwab was thus truly revealed to an acquaintance, unmindful perhaps that what those present could not hear was entirely audible in a headset.

No, I have not overlooked the mention of "silent periods". It seems rather a hopeless task to secure the attention of some powerful stations to this subject. If each of you fans will keep a fairly steady flow of letters directed to your local stations asking for this service, we will secure their attention ultimately. Opportunities to hear distant stations without interference from local broadcasters are becoming more general, but there is plenty of room for improvement. Without doubt instances of silent periods obtain about which I know nothing and failure to mention them is not due to intentional neglect. Where specific mention is made it is for the purpose of presenting an example, as much so as for congratulating them on their good judgment. Two instances will be cited of cordial cooperation along this line. WGY signed off for a period lasting over an hour in order that WHAZ might broadcast without interference from them. On another evening WEAF transmitted its entire program over a special wire to WNAC, where it was broadcast to the Radio audience of the latter station. Pacific Coast stations are observing periods of silence to the great joy of Radiophans in that section of the country. Don't fail to express your appreciation where stations follow this regime. They deserve it.



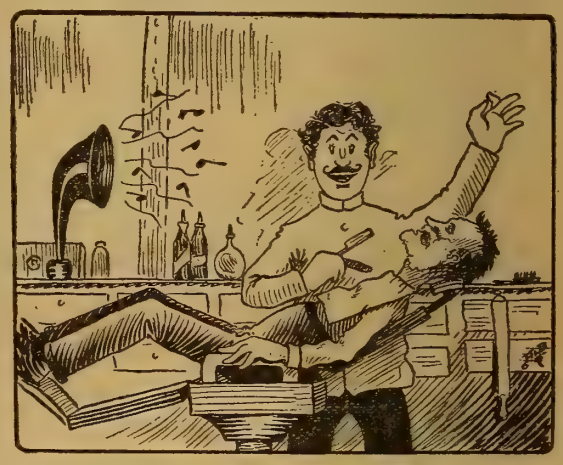
RADIO INDI-GEST

Tony, the Barber, on "Da Rad-I-O-U"

By Edward Callow

Hello Peepla!!!
Deesa time I speaka to you about won greata machine.
It is calla Rad-I-O-U.
Grabba da speecha—da song from da fresh air.
De Rad-I-O-U was firsta invent by greata Italian man—Signor Marconi.
Wan million peepla try to improva da work of Signor Marconi.

I buy Rad-I-O-U for da shop—pay fiva dol' down—feefta centa week.
Gatta da louda speak for da shop—use—a da softa speak for da wife.
Da customer in barber shop talka too much—da barb no can do da work.
Da Rad-I-O-U maka da customer leesen in—no speaka out.
Da barb now can make da clean shave—no cutta da ear—da chin—da lip.



Herba Da Hoove mak' greata mistak—he try to gat congressaman to passa da bill to controlla da wave.
We tal Herba Da Hoove to lay offa Rad-I-O-U wave control.
Coma to barber shop gat nice—a marcella wave on da dome.
Resta da hand an feet—hear Congressaman broadcuss hot air into da fresh air.

Yours vera true, for Rad-I-O-U,
Tony the Barber.

Not Always the Shape

Dear Indi—

Last nite and the nite before, twenty-four stations were at my door. Turned on the juice and let them in. Darned good set for the shape it's in.

—Jay Pee.

Ukeleles out; Radiophones in

A recent heading reads, "Hawaii dances to Seattle's music." A few years ago we were all dancing to Hawaii's music.

Old Gal-Lena Would Detect It

They were trying to improve reception on a crystal set.
"Shall I tickle the old gal-Lena?"
"You might try it, old top, if she'll let you."

Just a Good Variety of Jazz

The broadcast program was being received on a loud speaker. "My, but that static is awful tonight, isn't it?"

"Static nothing! That's a jazz orchestra!"

A. B. C. Lessons for Radio Beginners

By Arthur G. Mohaupt

CHAPTER VI

IN THE previous chapter we were told about the Radio receiving station, how it consists of an antenna for intercepting the Radio waves as they pass through space, a device known as the tuner by means of which the station can be adjusted or tuned to the desired wave length, and a detector by means of which the incoming Radio frequency oscillations are ren-

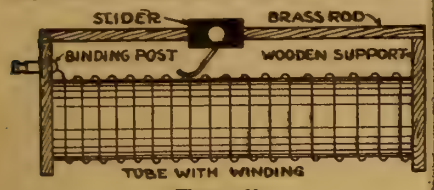


Figure 19

dered capable of affecting the human ear after they have been passed through a pair of telephone receivers. In this chapter we will interest ourselves with the process of tuning, as well as with the construction and operation of their various devices by means of which tuning is effected.

Tuning the Radio Station

Every antenna together with its lead-in and ground wire has its own natural oscillation frequency. In other words, every antenna system will respond more readily to an incoming wave of a certain length than to waves of other lengths. This natural wave length of an antenna depends upon the length of wire used and the height of the antenna above the ground. The longer the antenna or the higher it is elevated above the ground, the longer will be the natural wave length. It is evident, then, that an antenna system could be adjusted to any desired wave length by altering the length of the wire used, or by changing the height above the ground. But since either of these methods is generally not very convenient, it is common practice to add to the receiving apparatus an arrangement of coils and condensers by means of which the same effects can be produced as by altering the dimensions of the antenna.

If the natural wave length of an an-

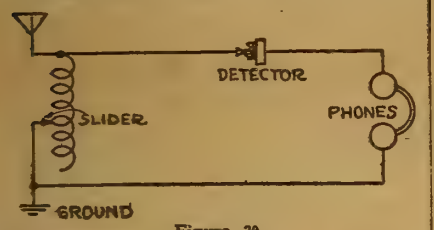


Figure 20

tenna system is less than the length of the desired incoming waves, the receiving station can be adjusted to the desired wave length by introducing additional inductance into the system. This is accomplished by means of some form of inductance coil connected in series with the antenna system. Such a "tuning coil" may be in the form of a one or two-slide tuner, a loose coupler, a variocoupler, or a variometer.

Single-Slide Tuning Coil

A single-slide tuning coil, as is illustrated in Figure 19, consists of a coil of wire wound in a single layer around a cardboard or fiber tube about four inches in diameter. The coil consists of about 150 turns of No. 23 or 24 insulated wire, cotton or enamel insulation being satisfactory. By means of the slider any number of turns can be cut into the circuit, and hence any desired amount of inductance can be obtained from maximum value of the coil to mimimum. A wiring diagram illustrating how a one-slide tuning coil is connected into a receiving station is illustrated in Figure 20. As shown, the antenna is connected to the binding post leading to one end of the coil, while the ground wire, as well as the other wire leading to the phones is connected

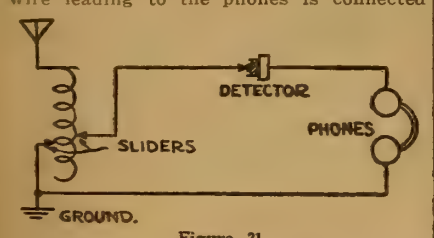


Figure 21

to the slider. By moving the slider back and forth the necessary amount of inductance can thus be introduced into the antenna circuit until the station is tuned to the desired wave length.

Two-Slide Tuning Coil

A two-slide tuning coil is similar in construction to the single-slide coil except, as its name suggests, it is provided with two sliding contacts. A common circuit used for connecting a two-slide tuner into a receiving station is illustrated in Figure 21. As shown, the antenna is connected to one end of the coil, the wire leading to the detector is connected to one slider and the wire leading to the ground is connected to the other slider.

By moving the ground-connection slider back and forth the antenna system is adjusted to the wave length of the incoming signals, while by adjusting the other slider the detector circuit is thrown into resonance with the antenna circuit. The two-slide coil has the advantage in that it makes possible closer and sharper tuning. By closer tuning is meant the ability to tune in one station more accurately and to exclude all others.

Loose Coupler

A loose coupler is illustrated in Figure 22. The term coupler suggests that there are two inductively related or coupled coils. The loose coupler, as shown, consists of two coils, a primary and a secondary. The outer or primary coil, consists of a number of turns of wire wound on an insulating tube. It is also provided with a slider by means of which any number of turns can be cut in or out of the circuit.

Sliding in and out of the primary is the secondary coil which also consists

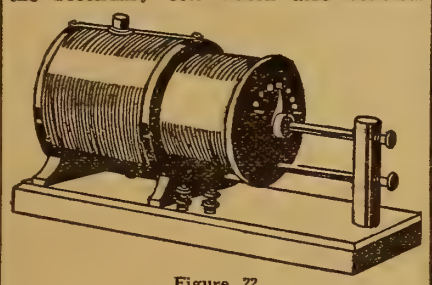


Figure 22

of a number of turns of wire wound on an insulating tube slightly smaller in diameter than the one used for the primary. The antenna is connected to one end of the primary coil, and the ground is connected to the slider. By adjusting the slider, the necessary number of turns can be introduced into the antenna circuit, so that it will have the correct natural wave length to receive the desired signals.

Across the terminals of the secondary coil is connected the detector circuit. The incoming oscillations in flowing through the stationary or primary coil set up around it a pulsating magnetic field which induces a current of corresponding nature and frequency in the secondary coil. The amount of this inductive influence upon the secondary can be altered by adjusting the position of the coil. The signals will be heard loudest in the telephone receivers when the secondary or detector circuit is in resonance with the primary circuit.

Variocoupler

Another form of tuning device used is the variocoupler. This, like the loose coupler, also consists of two coils, a pri-

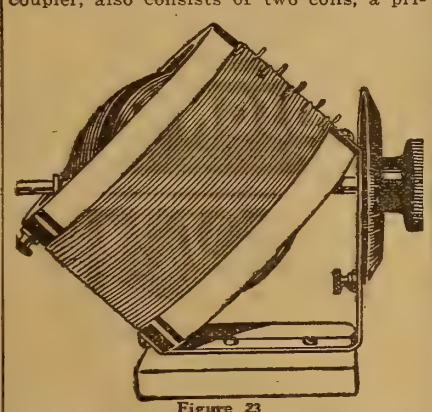


Figure 23

mary and a secondary, but differs in that the secondary rotates within the primary. The variocoupler is somewhat more efficient than the loose coupler and has the additional advantage that it can be conveniently mounted on a panel.

As illustrated in Figure 23, it consists of a primary coil with a number of taps brought out, by means of which the necessary number of turns can be cut in or out of the circuit. These taps are electrically connected to a number of switch points mounted on the panel and over which a rotating switch lever moves. The secondary consists of a number of turns of wire wound on an insulating tube somewhat smaller in diameter than that used for the primary.

The secondary is mounted on a rotating shaft which extends through the front of the panel and by means of which the secondary can be adjusted to any degree of inductive coupling desired. On the end of the shaft, projecting through the front of the panel a graduated dial can be mounted so that the position of the secondary can readily be observed. The antenna is connected to the end or first tap of the primary coil, while the ground connection is made to the shaft of the rotating switch, which moves over the contact points to which the taps of the primary are connected. The detector circuit is connected across the secondary or rotor of the coupler.

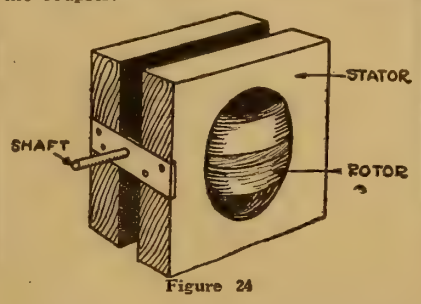


Figure 24

To operate a variocoupler, the antenna is first tuned to the desired wave length by adjusting the rotating switch, and after this has been done the secondary circuit is thrown into resonance with the primary until the signals can be heard loudest in the telephone receivers. In the coupler illustrated in Figure 23, the secondary is mounted at an angle of 45 degrees with the rotating shaft. The advantage of this construction is that it enables the rotor to be adjusted through a greater range of coupling.

Variometer

The variometer is another type of variable inductance. The variometer, like the variocoupler, consists of two coils, a stator or primary coil and a rotor or secondary coil. It differs from the variocoupler, however, in that there are no taps brought out on the primary coil and no variation in the length or amount of wire used is made.

In a variometer the two coils, that is, the primary and secondary, are connected in series and the amount of inductance of the two windings is varied by changing the position of the secondary with respect to the primary. When the rotor and stator are in such a position that their magnetic fields act in the same direction the inductance of the variometer will be a maximum; while if the rotor is turned through an angle of 180 degrees to this position the two magnetic fields will oppose each other and the inductance will then be a minimum. By setting the rotor at any intermediate position any desired amount of inductance can be secured.

The common type of variometer used in Radio receiving apparatus has the stator coil wound in two sections on the inner surface of two wooden blocks which are turned out to form a hollow sphere. The rotor coil is wound on a wooden ball which is mounted on a shaft and which rotates within the stator coil with a minimum amount of clearance between the two. Such a form of variometer is illustrated in Figure 24.

In another type of variometer, the supports for the stator and rotor coils are made of bakelite or some other insulating compound. Such variometers are called moulded variometers and are somewhat neater in appearance, although there is still a question as to whether their operation is better than, or even as good as the operation of the wooden type.

Receiving Circuit

In Figure 25, is illustrated a very efficient receiving circuit employing a vario-

(Continued on page 12)

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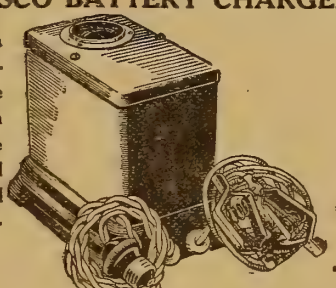

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Mounting for Spider Web Coils

Operating Dial Knobs Placed on Panel Front

Unless spider web coils are neatly constructed they present an unsightly object on the front of a receiving set. Even if they are neatly wound they are so large they will extend out from the front and are in the way of the dial controls. It is always best to mount these coils on the inside of the case, but there is no suitable mounting for this purpose. The illustration shows a homemade device that controls the coils within the case by turning regular dial knobs on the panel front.

The center coil is made stationary by fastening it in an upright position, the other two coils are hinged on like supports to the base surface. The control of the hinged members are obtained by eccentric disks attached to the dial shafts. Coil springs are used to keep the hinged members against the eccentric.—Z. S. Musser, Anderson, Ind.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. RADIO DIGEST is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
RADIO DIGEST,
123 West Madison St., Chicago, Ill.

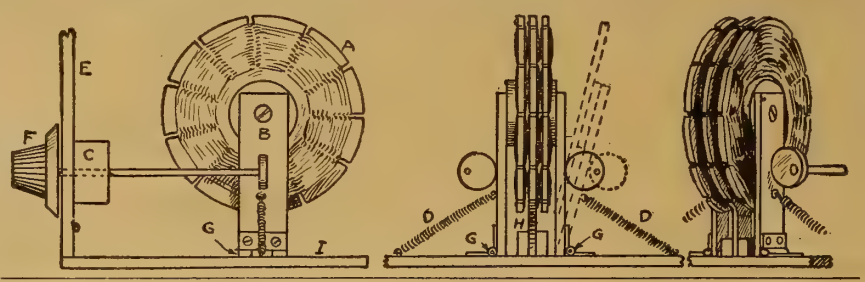
Inside Aerials

There are many possibilities open to the Radio enthusiast who is unable to erect an outside aerial, and the conditions attending each are so varied that he should try every one before deciding upon the best.

Where the set is located on the second floor or higher and a hallway fifty feet long or thereabout is available, four wires strung the full length will usually be the best sort of indoor aerial. The lead-in should then be taken from one end or from the middle, depending upon which is nearer the receiving set. All the wires should be joined at the lead-in.

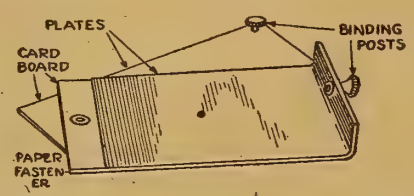
Another possibility in the way of an indoor antenna is the bedspring. Several springs may be joined together with better results, a good contact being obtained by tightening the end of the wire beneath one of the brass nuts on the framework. Often the antenna post may be connected to the gas pipe and the ground post to the radiator or water pipe and excellent results secured.

ECCENTRICS MOVE OUTSIDE COILS



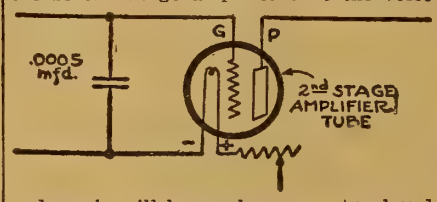
Small Variable Condenser

When an amateur is experimenting, he often finds need of an extra variable condenser but as the experiment is only slight, he does not make the purchase of one for the occasion. The condenser herein described is homemade and it will overcome the difficulty. Procure two sheets of stiff paper or cardboard of any convenient size, about 3 inches wide and 8 inches long. Paste or shellac a sheet of tinfoil on each piece, leaving at the end about ½-inch margin. In the center of this margin place a paper fastener so that the two parts will slide sideways on each other. Turn up the opposite end of the top plate, making ½-inch of it stand at right angles to the base. Place a binding post in the center of the upright part and fasten another binding post on the end of the base piece. By simply sliding the plates on each other, the capacity may be varied. The maximum capacity of the condenser depends on the size of the plates.—John Barry, Cedar Rapids, Iowa.



Amplifier Tube Condenser

By using a fixed condenser of .0005 mfd. capacity across the grid and negative of the second stage amplifier tube the voice and music will be much more natural and noises will be diminished to a great extent. A variable condenser will give slightly better results. This condenser used as described is of value, especially in loud talking instruments.—Arthur R. Klinger, Staunton, Ill.



Eliminating the Howl

One way to prevent the howl in regenerative receivers is to put a shield around the detector tube. Such a shield can be made from a piece of cardboard tube 1¾ inches in diameter and 2½ inches long, with its outside covered with tinfoil, and grounded. Place this over the tube.—Mike Kertz, Cleveland, O.

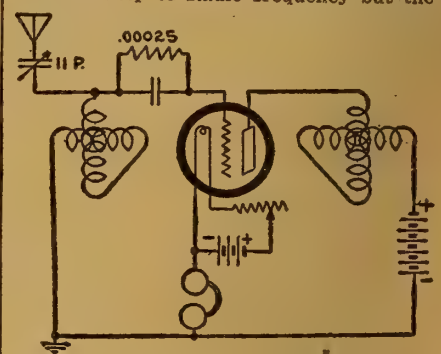
Damp weather tends to shorten the useful life of any form of dry cell, including plate batteries, which should therefore be protected as much as possible.

When your set does not seem to work while tuning in a station, do not blame the set but try another station. Some stations have poor modulation.

Efficient Circuit for Use with Indoor Aerial

I have been experimenting for a long time on reception without an aerial and have at last come upon a circuit that is excellent for the indoor aerial type. This circuit is simple in construction when used with one step audio frequency. I find that stations can be readily copied at distances as great as 1500 miles with great ease and can be understood very plain.

My first experiment was with a single insulated wire in the molding in my room with one step of Radio frequency but the results did not satisfy me and I changed my Radio frequency to audio frequency and dropped an insulated number 18 wire from my set out over the window ledge until it remained about 1 foot from the ground.



I was surprised at the results this produced and was able to copy with ease stations 700 miles distant, but still not being satisfied I next anchored an insulated wire at the top of my bed, passing it four times back and forth from head to foot of the bed and into the set. No change whatever was made in the circuit.

My results were so much better than the previous one that I always have used this type of aerial. When through I always disconnect the lead-in and wind it up on a spool which only takes a few minutes.

The circuit as submitted is used with an ordinary one step audio frequency with 22 and 40 volts respectively on the plates and six volts on the filaments.—D. P. Metzgar.

Signals come in better just at sundown and sunrise.

A. B. C. LESSONS

(Continued from page 11)

coupler and a variable condenser. As shown, the antenna is connected to one end of the primary coil L-1, while the ground connection is made to the center of the rotating switch S which moves over the points to which the taps of the primary are connected. Across the secondary of the coupler L-2 is connected the variable condenser C.

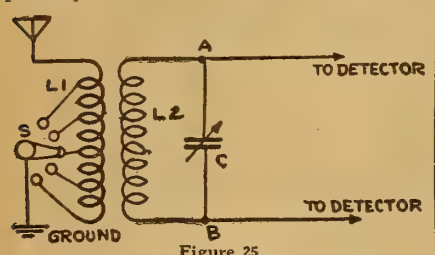


Figure 25

The operation of the circuit is as follows: By means of the switch S, the wave length of the antenna system is adjusted to that of the desired incoming waves. As these incoming oscillations flow through L-1, they establish a pulsating magnetic field which as it expands and collapses cuts the turns of the secondary L-2 and induces in it electrical oscillations of the same nature and frequency as originally flowed in the primary circuit.

In order that these oscillations in the secondary circuit may produce a maximum effect the closed circuit C-L-2 must be in resonance (have the same oscillation frequency) with the primary circuit. This is effected by adjusting the variable condenser C. Next the coupling between L-1 and L-2 is adjusted by rotating the secondary until the sounds are heard in the receivers with maximum intensity. The detector circuit is then connected across the terminals A and B and the electrical oscillations set up across the condenser are then increased upon the detector.

Variometer Used for Tuning

The use of a variometer for tuning purposes is clearly illustrated in Figure 26. Here the left hand part of the circuit is similar to that shown in Figure 25. The circuit is completed, however, by having connected across the points A B the Variometer V in series with the detector and the phones. The circuit is operated by first adjusting the switch S until the antenna system is tuned to the desired wave length. Next, the circuit L-2-C is thrown into resonance by adjusting the variable condenser C and the degree of coupling between L-1 and L-2. After this has been accomplished the variometer-detector circuit is thrown into resonance by adjusting the position of the rotor of the variometer V. It is thus evident that with such completely tuned circuits maximum receiving efficiency is obtained. The variometer V in figure 26 tunes the circuit by altering the amount of inductance in it. If we compare the circuit illustrated in Figure 20 with that illustrated in Figure 26, we will at once see that the closed circuit in the former has no period of its own but must oscillate in unison with the waves coming from the antenna, while in Figure 26 the closed circuits are all perfectly tuned and will thus affect the detector with greater intensity.

This completes our study of the tuning process of the receiving station, and we are now ready to consider the two final operations to be performed, namely, the action of the detector and the telephone receivers.

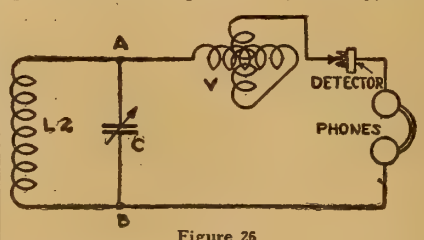


Figure 26

Chapter Seven

In chapter seven, which is to appear in the next week's issue, we will make a detailed study of the crystal detector and how it serves to render the oscillations capable of affecting the telephone receivers so that audible sounds will be produced in accordance with those originally sent in to the transmitting station. Chapter seven will be of special interest because it will sum up in a practical manner the principles set forth in the last three chapters and apply them in the construction of an efficient receiving set.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with lookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
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ALL PARTS NECESSARY
DEALERS: WRITE FOR DISCOUNTS
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CRYSTAL RECTIFIER
MULTIPOINT (Patent Pending)
A Synthetic CRYSTAL DETECTOR sensitive over its entire surface
Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages only. Join the ever increasing Rusonite fans.
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Reinartz Panel Set Designed for Compactness

Cabinet for Popular Tuner Occupies Small Space

By H. J. Marx

THE popularity of the Flewelling Panel Set has created a demand for the same treatment of the Reinartz Circuit, not merely the detector stage, but also a two-stage audio frequency amplifier. It was at first considered rather doubtful whether or not the complete tuning unit and detector tube could be assembled on the popular seven by nine-inch panel. After considerable planning on the layout of the panel, the compact arrangement shown in Figure 1 was decided on.

Naturally it was impossible to account for all the different types of apparatus, so in most cases only the shaft hole is located, and the remainder of the drilled holes necessary for mounting can be filled in by the amateur as required by the apparatus used. Care must be exercised to avoid apparatus where the overall dimensions are too large for the compact assembly.

Controls on Panel

The controls on the panel, as shown in Figure 1, are: The five-contact point lever switch which is the secondary wave length control; the switch facing it, also having five contact points, controls the regeneration in the plate circuit; the eleven-point contact switch is the primary wave length control; the knob in the upper right corner is the rheostat control. The latter can be any of the average type. Vernier adjustment will be of considerable assistance, however, in getting the best results from the tube.

Going on with the discussion of the controls, the dial on the left side is the secondary condenser, having .0005 mfd. capacity and a vernier adjustment; the dial at the right is the plate condenser, capacity .00025 mfd., which should also have a vernier adjustment.

Some of the wound spider web coils on the market have different tap arrangements. If this is the case the number of tap holes for the three switches should conform to the taps on the coil to be used. Such a change in number does not necessarily affect the operation of the set.

The knob and pointer at the center between the two large condenser dials is the variable grid leak. This device will permit operation of the tube at maximum efficiency through the proper control of grid potential. A .00025 mfd. fixed condenser should be connected across the two grid leak terminals.

All the binding posts are marked and so need no further explanation.

Panel Layout

The panel should be 7 by 9 inches and ⅛ inch thick. The holes should be located and carefully centerpunched before drilling is commenced. Carefully centerpunch marks to avoid slipping of the drill, scratched panels and holes off-center.

The three countersunk holes in the base are for wood screws which fasten the panel to the baseboard. In drilling the holes for the switches and contact points, the number of taps must be considered. Also the fan will find that occasionally the contact points have larger or smaller heads. In any event the spacing dimension of the ¼-inch, shown in Figure 2, will have to be altered so that the clearance of the contact points is about ⅛ inch. If this spacing is too great the switch lever is apt to jam between the points, or if too small it will be difficult to make connections in the rear without short circuits to adjacent points.

The three holes for mounting the rheostat are given inasmuch as a number of the standard types were found to be alike. It is advisable to check the location of the two outside holes, however.

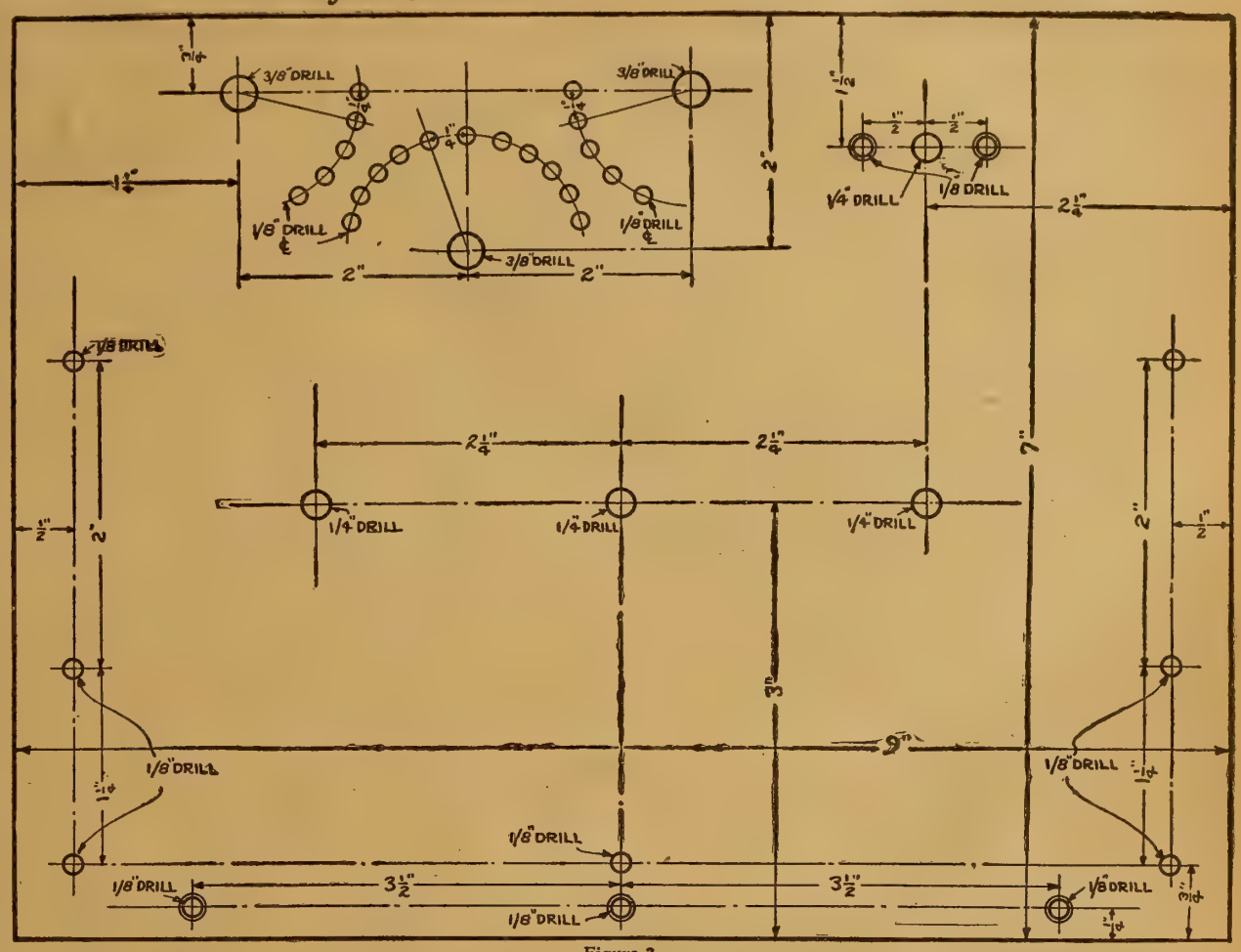

Figure 2

The three ¼-inch holes give the shaft location for the two condensers and the variable grid leak. The holes for the mounting screws should be located as required by the apparatus.

The binding post holes will no doubt be found satisfactory for most of the types available on the market.

Further details of this panel Reinartz set will be given in the next issue.

FLEWELLING ON "HOW"

(Continued from page 9)

ceiver, a capacity change will be noted. If this is more noticeable with a Super it is probably due to the extraordinary sensitiveness of the set. However, a peculiar effect has been noticed, and a number of letters have been received coinciding directly with the writer's own observations to the effect that if a station is tuned exactly on its wave, so to speak, that is by accurate adjustment of vernier controls, audibility is enormously increased (thus agreeing with super regenerative theory) but body capacity seems to be practically eliminated. So much for this point.

It is well to note that testing with known stations under as nearly as possible the same conditions, that the author has never been able to obtain the audibility distance, or lack of body capacity effect, when using the circuit without a vernier that could be secured with the use of them. This point of exact sharp and careful tuning when using the Super circuit, cannot be overemphasized.

The bank of condensers C3, C4 and C5 seem to cause but little trouble except in cases where the common paper dielectric condensers are used. Doubtless even these

(Continued on page 14)

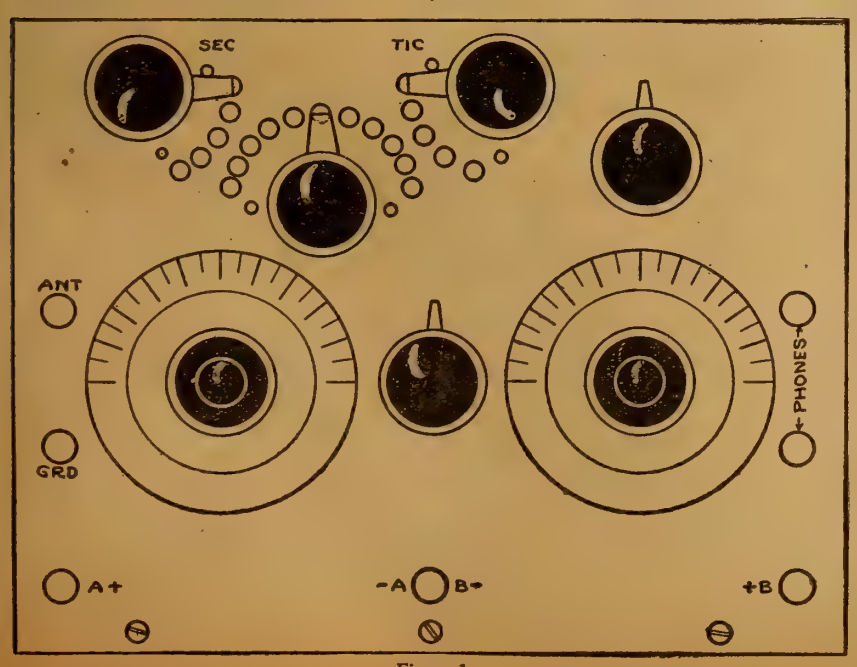

Figure 1

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The Reader's View

More Crystal DX Work

In response to George H. Cook's query as to crystal set records, published in The Reader's View of the Radio Digest for January 6, I wish to submit my record. Below are a few of the stations which I have heard and their airline distance from Pleasant Hill:

WGM, Atlanta, Ga., 700 miles.
WSB, Atlanta, Ga., 700 miles.
WWJ, Detroit, Mich., 650 miles.
WGY, Schenectady, N. Y., 1,150 miles.
WLW, Cincinnati, O., 535 miles.
WFAA, Dallas, Texas, 500 miles.
WPA, Fort Worth, Texas, 500 miles.
WBAP, Fort Worth, Texas, 500 miles.
WLAG, Minneapolis, Minn., 500 miles.
WOAI, San Antonio, Texas, 800 miles.
WKY, Oklahoma City, Okla., 300 miles.
WOC, Davenport, Iowa, 300 miles.

My set is even simpler than Mr. Cook's. It consists of a two-slide tuning coil, a crystal detector, and a fixed phone condenser. My aerial is one strand of solid wire, 115 feet long and 40 feet high.

On almost any clear night (after the local stations have signed off) I can pick up and enjoy programs from one or more of the above stations.—Ernest Pearce, Pleasant Hill, Mo.

Speaking of No. 2 Yellow Corn

I have a suggestion to make to the manufacturers and jobbers of Radio equipment: That they hurry up and build a transmitting station and broadcast Radio entertainment that the majority of buyers of Radio equipment want.

In Chicago, for instance, all but one of the broadcasting stations are controlled and operated by firms and institutions that are not in the Radio business, and they seem more interested in broadcasting market and stock reports, propaganda, etc.

Many times I listen in, and about all I can hear up to about 8 in the evening is No. 2 yellow corn, etc., etc., until I get so disgusted I am ready to smash up the set. Recently a Chicago station changed hands and the air is full of Radio waves that the majority of fans are not particularly interested in. If one wants to get real good Radio entertainment, he is compelled to wait until between 10 p. m. and 1 a. m. to get it.

I think the Radio firms should pause long enough to analyze the situation and ascertain if the people will continue to spend money for uninteresting news; also to find out if the majority of buyers of Radio equipment are people particularly interested in the market reports or what percentage of those market report fiends are really purchasers of Radio equipment. It seems to me if the manufacturers and Radio jobbers want to continue making money, they had better spend a little on broadcasting stations and give the Radio public programs that will keep them interested, and to transmit at a reasonable hour of the day or evening. Many local business men have sets and when at home for noon lunch about all they can hear is No. 2 yellow corn, etc., etc., ad nauseum.

The local stations can not be completely or successfully tuned out. Practically all through the day and during a good portion of the evening the Radio programs are of such a character that the man who looks to his set for entertainment is disappointed.

As to the remedy here it is: The firms that are making money out of Radio goods should get together and install a first-class broadcasting station and broadcast all through the day interesting musical programs on a wave length that can be tuned in without interference from other local stations that are cluttering up the air with market and stock reports, news, propaganda, etc.—Dr. Chas. E. Scharf, Chicago, Ill.

FLEWELLING ON "HOW"

(Continued from page 13)

as it does with an incoming signal it amplifies it greatly.

If the phones are touched (especially in the case of metal backed phones) while a station is being tuned in on any Radio receiver can be used if one is fortunate enough to procure extra good ones. The returns, however, have not been at all consistent and their use is not to be recommended.

At the time that the Super circuit was published it was almost impossible to secure a fixed mica dielectric condenser of larger capacity than .002 M. F. and in order to secure the necessary large capacity of .006 M. F. one was forced to connect three of this smaller capacity in multiple with each other.

A large number of letters have been received showing these smaller condensers in series with each other, and as this is a mistake which means failure of the set to operate, this point should be noted carefully in the accompanying illustrations. There is great stress to be laid on having full value or even greater for the condensers C3 and C4. If you are short of sufficient condensers to make up the full value for all three condensers, satisfactory results may be obtained if C5 is slighted in favor of the other two. The circuit will operate satisfactorily although full value is not used at C5, but will not do so if C3 and C4 are not full value.

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Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete..... **$11.45**

COMPLETE KNOCKDOWN RECEIVING SET

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial.... **$17.95**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now.....$1.75
$3.70 Value, 23 PLATE, now.....$1.45
$3.10 Value, 5 PLATE, now.....$1.25
$2.70 Value, 3 PLATE, now.....$1.15
$3.30 Value, 11 PLATE, now.....$1.35

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Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

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Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... **$12.45**

MAGNAVOX, LOUD SPEAKER, Type R3 ..... $34.95

VARIOMETERS, Genuine Mahogany, $5 Value, Now..... $1.95

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HONEYCOMB COILS

1,500 Turns.....$1.50
1,250 Turns..... 1.50
1,000 Turns..... 1.25
750 Turns.....$1.00
250 Turns.....75c
150 Turns.....60c
100 Turns.....50c
75 Turns.....40c
50 Turns.....40c
35 and 25 Turns.....40c

$8.50 Guaranteed 3,000 Ohm

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SPONGE RUBBER EAR CAPS, Pair 50c

DIALS, 2, 3 and 3½ inch..... 25c

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GREWOL DETECTORS..... $1.65

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Solid Copper Aerial Wire, 100 ft. 35c
Spaghetti Tubing, yard 10c
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Lightning Arresters 95c
2-Slide Tuning Coils, at $1.95
3-Coil Honeycomb Mountings, with Knobs $4.20
Phone Caps, for mostly all phones 25c
Signal Corps Hot Wire Ammeters, at $5.45
Anti-Capacity Switches $1.50
Lightning Switches $2.65
Hydrometers, now at 45c
Freshman Variable Grid Leaks 95c

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Questions and Answers

Coil Position

(1768) MLL, San Diego, Cal.

I built the Flewelling set according to your diagram and specifications. Everything came in fine but; first, for operation, the movable coil had to be always at right angles with the stationary coil. Is this perhaps due to the winding of the particular coils used being opposite to each other? If so, will reversion of the leads in either coil be the remedy?

Second, I could not make the set work without aerial or ground, even with broadcasting stations five blocks distant. I had to use both, ground and aerial, making my ground with a direct connection to the negative of the filament.

Third, in using loop aerial, I had to connect one lead of the loop to the aerial and one to the ground. The set works fine with a Magnavox, and I can bring in Station KHJ, Los Angeles, in this city (San Diego) on the Magnavox.

I used the combinations of 50 turns and tickler of 75 and also 100, but only the 75 works in combination with the 50. I could not use a 90-turn tickler coil, because they are not on the market.

I use, of course, a five-watt tube as detector.

Referring to the amplifier of the Flewelling, are the amplifier tubes supposed also to be five-watt tubes?

A.—We do not believe that the position of coils necessary for operation is due to the direction of winding, but rather to the character of the circuit. The 90-turn coil was made by unwinding ten turns from a 100-turn coil.

Use of a five-watt amplifier will give more volume than any of the other tubes afford.

This circuit requires very sharp tuning and lack of it accounts, undoubtedly, for your inability to hear without employing antenna and ground.

Loop Aerial Construction

(1764) WM, Dallas, Texas.

In connection with the Flewelling circuit published in your magazine, I desire further information as to the following:

1. Amount of B battery required for (a) detector, (b) first step audio, (c) second step audio.
2. Specifications for a loop aerial for this receiver.
3. Will set function properly if connected to both aerial and ground?
4. Can I substitute a single circuit jack for the two phone binding posts? Your criticism is requested as to this change.

A.—1. The voltage of B battery should be from 90 to 150 on all tubes.

2. Radio Digest of September 16th, page fourteen affords constructional data for a loop aerial.

3. This circuit will function properly using both aerial and ground.

4. Your substitution of single-circuit jack for two binding posts is correct and a very good idea.

Body Capacity

(1784) EDW, Berkeley, Calif.

I am constructing a super-flivver receiver using the Flewelling circuit described in your December 2 edition, page 13, and ask that you answer a few questions concerning it.

My set is to be mounted on a glass panel. I do not intend to use the condenser No. 4 in the aerial circuit, as I intend to use a loop aerial.

What size loop is advisable?

Can a peanut tube be used instead of C-301 tube?

Will it be necessary to shield the instruments from body capacity?

What range of wave lengths will it receive?

Can a loud speaker be operated without an amplifying circuit?

When first adjusting the grid leak (8) should the honeycomb coils 1 and 2 be parallel and should the condenser (3) be set at full or minimum capacity?

Will a .5 megohm leak (9) non-adjustable be suitable?

A.—Use a 10 to 12-turn loop, one-half inch space between turns and wound on a 30-inch square.

Peanut or WD-11 tubes are satisfactory. Use 100 volts on their plates in this circuit.

Body capacity will be noticed probably in adjusting variable grid leak, or tickler coil coupling.

Wave length range as described is approximately 250 to 600 meters. For local stations you should be able to work the loud speaker, but you may need one step audio.

Keep honeycomb coils spread until grid leak is once set. After this adjust honeycomb coil coupling, then readjust grid leak if necessary. You will have to approximate correct tuning of coil by condenser 3 before doing anything else.

Yes, the leak (9), .5 megohm fixed, is proper.

Wants Variable Grid Leaks

(1748) IK, Douglas, Ariz.

May I ask a few questions about the Flewelling circuit? I have been a victim of the Radio "disease" and the "doctors" prescribe my "medicine" to be a Flewelling set.

About how far can this circuit receive music? Kindly tell me where I can get the variable grid leaks used in the circuit? Can we use more than a four to one ratio transformer in this circuit without disastrous results?

A.—This circuit properly executed should afford a range of one thousand miles.

Personally we prefer to make grid leaks by ink or pencil lines which can be through experiment graduated to the correct value. Otherwise, must refer you to a dealer, several of whom advertise variable leaks in Radio Digest.

Although it may be possible to use a more than four to one ratio transformer in the circuit, we would not, however, advise the use of a delicate pair of phones in conjunction with it.

Loop Antenna

(1922) JDB, St. Paul, Minn.

Slung the Flewelling hook-up together experimentally yesterday in about an hour, guessed at both grid-leaks and most everything else, and it came to life right off, bringing in KDKA with surprising volume both with indoor aerial and no ground, and with ground and no aerial.

Your diagram calls for shortening the antenna condenser if a loop is used. Should not this condenser be shunted across the loop? I do not see how one could tune the thing without a condenser in the primary circuit somewhere.

A.—Congratulations for your success with the circuit in the experimental test.

Antenna condenser may be shunted across the loop, as suggested, and thus will aid in tuning.

Receivers and Amplification

(1976) FNP, Nelsonville, Ohio

I would like to know if using Brandes receivers in a loud speaker with detector and two-stage of amplification would ruin the diaphragms? I have had several friends say it would ruin the silver diaphragms, and I would like to know.

A.—There could be no detrimental effects on the phones used, in the manner suggested, in a loud speaker.

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Radio Illustrated

Binocular stereoscope cinematography is a new invention through which an audience sees plays on the screen stereoscopically. You look with both eyes and see the roundness of pictures on the screen just the same as if the person were acting in front of you on the stage. The picture shows how the people of Mars appear to a Radio enthusiast who manages to get into communication with that planet. These Martian characters are shown through "Teleview" at the Selwin Theater in a production called "M.A.R.S."

Character reading by Radio. You step up, lay your fingers outstretched on the pads and the automaton seated on a pedestal delivers her message to the subject, which in this case is Viscountess Maitland.
© Keystone

The latest accomplishment in the Radio world is that of pulling an aching tooth. Dr. A. E. Wood of the S. S. America recently directed a successful operation of this nature at sea, the first in the history of Radio
© Wide World Photos

Mr. H. B. Thayer, President of the American Telephone and Telegraph Company, talking in New York over microphone to England.
© Fotograms

©CIB570564

Flewelling Tells of Flivver; Marx of Reinartz

Radio Digest

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BILL FACES YEAR DELAY

PERIL GROWS AS SENATORS FAIL TO ACT

Monopoly Efforts Rapped

Representative Jones of Texas Claims Three Firms Are "in Cahoots"

BULLETIN

By L. M. Lamm

WASHINGTON.—The White Radio Bill is still resting on the desk of the president of the Senate. It has not yet been referred to any committee owing to the illness of Senator Kellogg of Minnesota, who is to engineer the bill in the upper house. There is some feeling as to what committee it shall be referred, and, according to the last minute reports, opposition to the bill is developing in the Senate and it is possible that it will not pass the upper house at the present session of Congress. This, if true, will delay the passage of the much-needed legislation for practically one year.

WASHINGTON.—As announced in last week's issue of Radio Digest, the White Radio control bill has been passed by the House of Representatives and the bill is now in the Senate.

There was considerable discussion on the floor of the House during the debate on the bill, with Representative Jones of Texas the principal opponent to the passage of the bill. As a matter of fact the talk on the floor showed that the Congressmen as a body know very little about Radio.

Jones Anti-Trust Amendment

Jones of Texas offered an amendment to the bill, which was rejected by the House "directing" the Secretary of Commerce not to allow licenses to monoplies instead of "authorizing" the Secretary not to.

(Continued on page 2)

DR. DE FOREST GIVES YALE RADIO LIBRARY

NEW HAVEN, CONN.—A fund for the purchase of a library devoted to the science of Radio has been established at Yale University by Dr. Lee De Forrest, who is a Yale graduate. Dr. De Forrest has also established a fund for a course of 30 lectures by Radio experts for the benefit of advanced students and members of the engineering staff.

Yank Accent Gets Britishers' Nanny

Otherwise, England Reports, Transoceanic Communication was "Bully"

NEW YORK.—During the test recently when heads of the American Telephone and Telegraph company succeeded in talking by Radio direct to a group of prominent persons at New Southgate, England, reports from the old country were that the reception was clear and of good volume. From a mechanical point of view, everything was "bully."

There was, however, one objection. The British audience, which, by the way, included Guglielmo Marconi, grew tired of hearing the "American accent." They prayed that an Englishman be put on the phone, if at all possible.

One whose qualifications included a Park Lane way of saying things, could have commanded a fortune from the American magnates. But there was no such linguist immediately available.

Four splendid artists heard recently on the Class B wave of WCAE, Kaufmann and Baer, Pittsburgh. All are from Keith's Vaudeville. Left to right: Ruth Watson, soprano; Alice and Hazel Furness, sopranos; Irene Geirs-Dorf, of the Geirs-Dorf 10-piece jazz band

Naval Radio Station Demolished

ANCHORAGE, ALASKA.—The S. S. Starr reported here by Radio recently that wind has demolished the naval Radio station on St. Paul Island in the Bering Sea.

Tulane University, Station WAAC, is now broadcasting the U. S. Department of Commerce reports at 7:05 P. M. Central time on Fridays.

Los Angeles Stockyards Plant Begins Service

LOS ANGELES, CALIF.—With the advance of 1923 another Radio broadcasting station was completed and made ready to present its message to the world. The new plant will be known to listeners as KFCL, otherwise, the new Los Angeles Union Stockyards. The station is expected to be a wonder for distance as the masts of the new station are 150 feet high, while the antenna is unobstructed from the four points of the compass.

The Stockyards station will transmit market quotations and crop reports from the government on 485 meters wave length.

STAR'S SONGS BRING BROADWAY TO FANS

NEWARK, N. J.—A program of recitations was given by Florence Flinn from Station WOR here Monday, January 29. The broadcasts comprised "That Old Sweetheart of Mine" and several other popular pieces. Miss Flinn has played in many Broadway productions, such as "Partners Again," "The Exciters," "Daddy Dimples" and is now in the "Masked Woman" at the Eltinge Theatre.

BILL FACES DELAY

(Continued from page 1)

In urging the adoption of his amendment along these lines Mr. Jones said:

"The only place in this bill where any effort is made to curb the tendency to monopoly in this business is in this immediate paragraph, and in this paragraph the Secretary of Commerce is not directed to refuse or revoke a license when he finds companies are trying to monopolize, but he is simply authorized to do so. It seems to me that if the Secretary of Commerce finds that, in his judgment, a company is trying to secure a monopoly in this business he should be directed to say that they proceed no further. And this is not a mere idle chance that there may be a monopoly.

Cites Case of Attempted Monoply

"It is readily recognized that there is a grave danger of monoply in the business, and my information is that the American Telegraph & Telephone Company, the Western Electric Company, the Westinghouse Electric and Manufacturing Company, and the Radio Corporation of America, are today endeavoring to get a monopoly in this business.

"The Western Electric Company monopolizes all broadcasting telephone apparatus that are recognized by the telephone company. In other words, it manufactures the apparatus that is used in the broadcasting stations in that connection.

"The American Telegraph & Telephone Company owns 100 per cent stock in the Western Electric Company. These big four companies have gone into a combination by means of which they seem to have divided the business up. The Western Electric Company is to manufacture all broadcasting apparatus that is used in connection with telephone transmission. The other companies agree not to manufacture that.

Companies "All in Cahoots"

"The Radio Corporation sells receiving sets, but they have agreed to sell only receiving sets that are manufactured by the Westinghouse Electric Company and by the General Electric Company, so they are all in cahoots. Only a short time ago the American Telegraph & Telephone Company owned a million dollars' worth of stock in the Radio Corporation, and so much public pressure was brought to bear on them they transferred their stock, but retained a contract of such a nature that it enabled them to bar the Radio Corporation from entering the field of commercial communication within the United States.

Curbing Monopoly Most Important Thing

"The most important thing in connection with the proposed legislation is to try to curb monopoly in this business. We have considerable regulatory powers under the present law if they are used, but there is a grave danger of a monopoly. It is mentioned . . . . that the American Telegraph & Telephone Company refused to furnish its wires and service for the purpose of broadcasting an entertainment from the Century Theater in New York, which has been giving Radio concerts. There was talk about it all over the country, but they did not purchase the apparatus from these big four, and the American Telegraph & Telephone Company said:

"'We will not let you transmit your entertainment over our wires.' That is the situation with which we are confronted today, and with that situation prevailing does not this House think when the Secretary of Commerce, in view of the immense powers granted under this bill, finds that the companies are undertaking to monopolize the situation he should be directed to refuse or revoke a license."

Accept Second Amendment by Jones

Jones offered another amendment to the bill which was adopted and which reads as follows:

"Or whenever the Secretary of Commerce shall find that in his judgment any person or corporation is monopolizing or seeking to monopolize Radio communication directly or indirectly through the control of the manufacture or sale of Radio apparatus or by other means."

Jones also offered another amendment, which was rejected when the bill finally passed whereby an appeal could be taken in court from the action of the Secretary of Commerce in refusing or revoking a license.

A number of other amendments were also offered to the bill while it was under discussion. None, however, was adopted as the bill passed the House. As the bill finally passed it was substantially the same as reported out by the Merchant Marine and Fisheries Committee.

Up-to-Date Lightship to Carry Radio Fog Signal

NEW BEDFORD, MASS.—A new and up-to-date lightship is almost ready for Nantucket Shoals, and is now being completed at Bath, Me. It will present, among many other new features in lightships, a Radio fog signal, electric signal lights and an oscillator in place of the submarine bell. The services of a Radio operator will be enlisted. Radio communication equipment will be installed. This is the most important lightship station in the world, and there have been many requests that it be equipped with a Radio fog signal. The new ship will be on her station within a few months.

$100 FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 24 at midnight. Awards will be announced in the March 17 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $40.00; Second, $25.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded each tying contestant.

5. Judges will be the Technical Staff of Radio Digest.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The article should tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants on request.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

New England Fans Discuss Silent Period Proposal

BOSTON, MASS.—Considerable discussion is going on in amateur circles over the proposition of a silent period for amateurs, during which the many thousands of other Radiophans, who merely have receiving sets and wish only to listen to broadcasts, may have a chance for a clear ether without so much interference by signals they do not understand.

Radio Inspector C. C. Kolster recommends the hours between eight and eleven in the evening, for the New England district. This will give experimenters and amateur "sparks" two hours after supper in which to experiment without waiting until the late hours of the night.

By making the silent period extend to eleven o'clock, the inspector thinks this will give Radio receivers a chance to hear the broadcasts from the West and South, whose best programs come in at this time after the nearer eastern stations have stopped.

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Looking Ahead

The Flewelling Contest Papers are pouring in. Many unique Super sets have been constructed it seems. The contest closes February 24, so watch for the publication of the series of winners.

Part III of the Reinartz Panel Set Series, by H. J. Marx, next week, will describe the cabinet dimensions and battery connections. See Part II on page 13, this week.

E. T. Flewelling in His Exclusive Digest Series, will tell more about the Flewelling Super in his fourth article, to appear next week. Turn to page 14, this issue, and read what he says about the "flivver" set.

A-B-C Lessons for Radio Beginners, Chapter Eight, will be devoted to instructions for the making of an efficient crystal detector set. Nearly every Radiophan starts with a crystal set, so tell your beginner friends to read Mr. Mohaupt's article in the February 24 issue.

Pictures from Prominent Plants will be featured on pages one and five of next issue. Order it from your newsstand dealer or subscribe today.

Part II of the Radiophonists Telephone Book will be given on page eight of the February 24 issue. You can't get along without it, can you?

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TESTS SHOW NEW USE OF AIR WAVES

RADIO VERSATILITY SEEN IN 'CARRIER' TRYOUT

Seek to Control Remote Apparatus After Successful Transmission of Voice Over Wires

PITTSBURGH, PA.—Before representatives of all the larger light and power companies of the United States, a new use of Radio was demonstrated recently, that of carrying on voice conversations by means of Radio waves over high tension power lines without the use of switches and just as is done in the ordinary wire telephone connection. It was also demonstrated that the system could be used for remote control of all manner of apparatus.

The test was carried out between experimental stations located in the Colfax and Brunots Island power stations of the Duquesne Light company, points located about 30 miles apart, by engineers of the Westinghouse company and the Duquesne power company.

Effort to Control Switches at Distance

For a long period of time the engineers have been working on a method of carrier current control for use in central power stations and electric railways, or other points using high tension electrical lines. The idea behind the whole scheme is to superimpose Radio waves on the power lines and thus make use of Radio transmitting and receiving for both voice communication and control of remote switches.

Preliminary research work on ordinary transmission lines and feeder-line circuits had indicated that the use of wired Radio communication was simple and effective on such lines. But when trying out the Duquesne lines it was found that the system was so complicated and extensive that many additional problems had to be solved before carrier current despatching could be done successfully.

The demonstration test held January 11 was entirely successful and proved conclusively that this method interlacing the telephone with the power lines would soon be a feature in the plants of more progressive companies.

Saves One Line; Cuts High Tension Hum

It was demonstrated in a small room of the power plant in Colfax that the carrier current system of telephony allowing communication over high tension lines, besides saving an additional right of way, does away with the great noises and high induced voltages which operators so much dread in talking along lines that parallel high tension systems.

The new system was demonstrated over a 66,000 volt line and is unique in that the system was duplex and operated as does the ordinary telephone.

When the telephone receiver is unhooked, the transmitting station automatically starts up, allowing talk in both directions without any switching. This feature is entirely new in Radio as all other transmitting and receiving must be done by switching back and forth, because a station transmitting will not receive messages. The transmitting apparatus must first be switched off and the receiving circuit switched in. However, all this is done away with in the new system.

Selectively Picks Number Called

The calling or ringing of numbers is selective and operated by special selector keys which cause the bell to ring only at the station desired. This eliminates the distractive code ringing and allows station operators to keep their minds on their work.

The improved system has been carefully worked out by C. A. Boddie, Radio engineer of the Westinghouse company, and the technical and economic features are now being analyzed by Mr. Boddie, assisted by M. W. Cooke, of the Duquesne Light Company.

Plans to link New York City, Buenos Aires, Paris, London and Berlin with new super-power international Radiotelegraph stations are developing.

COB-WEBS IN MOVIES AIRPHONE ENTERTAINS

LONDON, O.—The moving picture machine in the schools at Cable, north of here, is covered with cob-webs and the former patrons are enjoying the Radio outfit recently installed at the school. For some time the picture shows have been losing money, it is stated, and the Radio outfit is expected to make up the deficit in short order.

MONTH'S EXPORTS TO CANADA HOLD LEAD

WASHINGTON.—Exports of Radio apparatus for November show that 159,950 pounds of Radio apparatus, valued at $223,180, were exported in that month. The largest quantity from the monetary standpoint went to Quebec and Ontario with 23,214 pounds, valued at $39,834, with Mexico, Argentine and Cuba following, in the order named.

PWX LINKS MOTHER TO DAUGHTER

Miss Harriet Williams in Havana, Cuba, wanted her mother in Toledo to hear some of her favorite old tunes. So she broadcast "Mother Machree," "April Morn" and other pieces from Station PWX in Havana, and her mother, using a neighbor's phones, heard them quite as plainly as if her daughter were singing and playing her violin right at home. Incidentally, Miss Wilson's voice carried 3,500 miles and was heard in Alaska—believed to be the record broadcast of a woman's voice

Adds Night Course in Radio

LITTLE ROCK, ARK.—Interest in Radio here has become so intense that the Little Rock High school has added a course in Radio for amateurs at its night school. The class is the first of the kind organized in the state. It opened January 26. The class is in charge of C. N. Clayton.

GIRL'S VOICE HEARD 3,500 MILES AWAY

ALASKAN HEARS SINGER AT PWX, HAVANA

Performer's Mother, in Toledo, Listens to Favorite Songs Sung by Daughter Far Away

By F. N. Hollingsworth

HAVANA, CUBA.—What is believed to be the world's record for broadcasting a woman's voice was established recently by Station PWX of the Cuban Telephone Company here, associated with the International Telephone & Telegraph Corporation of New York. A letter was received at Havana from Robert E. Coughlin, of Douglas, Alaska, 3,500 miles airline from Havana, reporting that on the night of January 6 his wife plainly heard "Mother Machree" being broadcast from Station PWX. The singer was Miss Harriet Williams, a member of the staff of the American consul general in Havana. Miss Williams is a coloratura soprano, as well as a talented violinist.

Hoped Mother in Toledo Might Hear

She was formerly associate editor of a Mexican magazine in New York city. On the night in question, after a violin selection, she sang "Mother Machree" in the hope that her mother, who lives in Toledo, Ohio, might hear. Then she broadcast a few words by expressing the hope that her mother might be successful in hearing her. Since then hundreds of letters have been received from sympathetic fans wishing to know whether Mrs. Williams had picked up PWX. One fan grew so sympathetic that he wrote offering marriage.

Mother Fails First, Succeeds Later

Unfortunately, Mrs. Williams was one of the few who did not hear the program, for the day before the concert the man who owned the tree to which the antenna was attached cut it down.

On January 20, Miss Williams called her mother by long distance telephone and asked her to be listening for the concert that night, when she sang again. A neighbor of the mother, William Steinaker, has a receiving station with which he has been able to enjoy the programs from the powerful Cuban broadcasting station on numerous occasions. Knowing the anxiety of Mrs. Williams to hear her daughter, Mr. Steinaker invited her to his home, and to the delight of everyone was successful in receiving the Havana program clearly.

Sings Mother's Favorites

Miss Williams sang Batten's "April Morn" because she knew it was one of her mother's favorites. Then she played Wieniawski's "Obertass Mazurka" and Handel's "Largo" on her violin.

Station PWX has a 500-watt transmitter, sending regularly on 400 meters, and the International Telephone & Telegraph Company has an exact duplicate of this station at San Juan, Porto Rico, known as WKAQ, which sends on 360 meters.

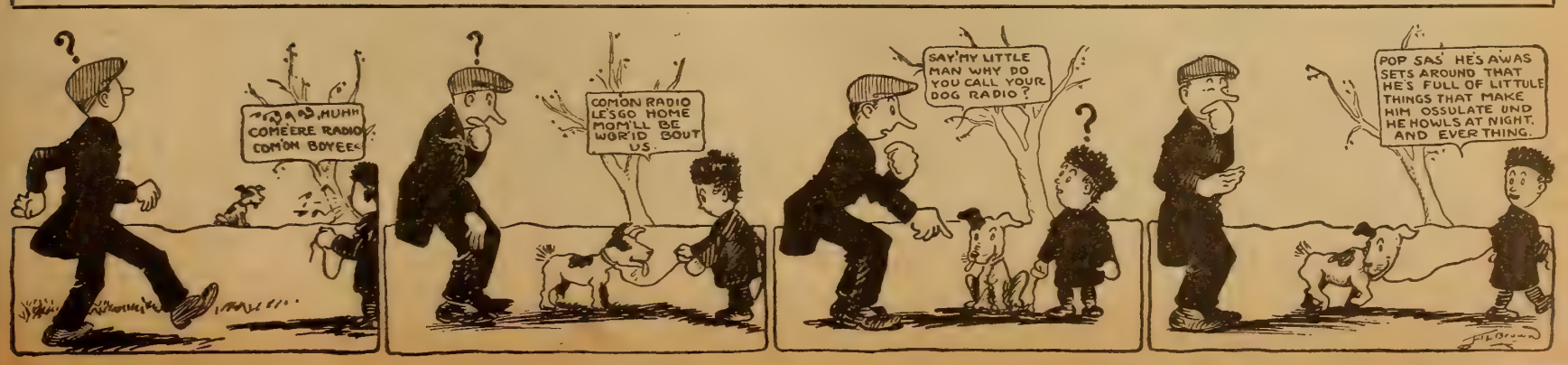
Radio Set to Reward Crippled Boy's Deed

Lad Gave Half His Money So Another Could "Listen"

BOSTON, MASS.—The crippled boy who listened in at the Tremont Temple revival services of Rev. Dr. J. C. Massee and was so impressed with the music and preaching that he gave up one of his two precious dollars to help some other crippled boy have a turn at listening in, is going to have a Radio receiving set of his own. A number of Dr. Massee's loyal friends will provide the set, and when it is to be installed Dr. Massee will call upon the boy personally. Enough money has been contributed direct to Dr. Massee for this special purpose to insure that the boy will receive the set, one of the best.

Australia has two Radio broadcasting stations, each giving a regular program once a week.

THE ANTENNA BROTHERS — Spir L. and Lew P. — All the Symptoms



STANDARDIZE RADIO TEACHING IN ARMY

BIG PART IN TRAINING OF OFFICERS

Board Lays Down Definite Program; 1,309 Hours of Study for Signal Men

By Carl H. Butman

WASHINGTON.—Radio has a very important part in the education of army officers in communication, instruction in which important subject has recently been standardized.

A definite program of instruction in Radio, as part of the schooling of all signal corps officers and other officers assigned for training from the regular army, national guard, reserve crops and civilian military training camps, has been laid down by a board of army officers.

The board, headed by Col. H. B. Fiske, and including Major S. M. Walmsley, signal corps, recntly filed its report on army service schools including the signal school at Camp Vail, N. J. Three communication courses are prescribed; the company officers' course, an advanced tactical and administrative course, and an advanced technical course, all of which include the subjects of Radio and "wired-wireless."

Extent of Courses

The course for company officers includes approximately 1,309 hours of study for signal officers and 1,285 hours for officers of other arms. Courses extend over a period of nine months, commencing in September. Radio telegraphy and telephony covers a period of 180 hours and includes theoretical and practical instruction in fundamental electrical principles, spark sets, thermionic vacuum tubes, continuous wave sets, antenna systems, wave meters and other auxiliary apparatus, with special attention to army Radio sets.

Tactical Radio procedure is studied during 20 hours. This includes the principles governing the organization and operation of tatical Radio nets for all arms, and the procedure essential to successful net operation. Other subjects pursued by the student officers includes codes and ciphers, combat orders, electricity and magnetism, wire communication, code practice, message centers, etc.

Advanced Studies Given

Advanced studies in Radio are prescribed in the tactical and administrative course for signal officers assigned to units larger than divisions. This is also a nine months' course and covers study and instruction periods totaling 1,235 hours. The subject requiring the greatest time is the development of signal equipment which covers 300 hours. Radio systems of divisions and larger units requires 150 hours, and includes instruction on the tatical uses of the various Radio sets furnished to Army combat units, the organization of such sets into nets and their operation. Instruction in the preparation of orders to signal officers of divisions, corps and armies such as the allotment of wave lengths, call letters, and special sets is also given. Fifty hours is designated for the study of codes and ciphers, their design and solution.

Some broadcasting stations have adopted a novel scheme for letting listeners in know that they are still tuned in during the brief intervals of silence between numbers on the programs. As soon as a number is concluded a metronome, a small ticking instrument used by pupils of music, is set in motion until the next announcement is made.

RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

WELL, here we are again with a supplement to the list of 262 records published last week. Seems as though no DX records are unbeatable.

In last issue, we—the contest editor—said that we would be glad to receive complete descriptions of sets used by the holders of records of 2,300 miles and over. Then we can tell other fans the tricks used to make real records. Have you had a record of that class published? Send in the facts about your set if you can qualify.

After the list of records follows the rules of the contests. Every week more new DX listeners are fighting to see their names in print. Here are the latest record holders:

Station—Miles Away—Who Heard It

CFCN—2000, C. M. Bussey, Hudson, N. Y.
CHCQ—2100, G. F. Aiken, Providence, R. I.
CJCG—1425, G. E. Wharton, Houston, Tex.
KDZA—2025, Breisch Motor Co., Ringtown, Pa.
KFAB—2325, Breisch Motor Co., Ringtown, Pa.
KFAE—1650, G. E. Wharton, Houston, Tex.
KFBJ—1775, Richard Reeder, Alliance, O.
KFC—1875, G. E. Wharton, Houston, Tex.
KFCB—1425, O. P. Klein, Leduc, Alta., Can.
KFCX—1075, G. E. Wharton, Houston, Tex.
KMJ—1050, C. C. Sawyer, Liberal, Kans.
KPO—2550, C. M. Bussey, Hudson, N. Y.
KXD—2075, Richard Reeder, Alliance, O.
KYT—2325, Breisch Motor Co., Ringtown, Pa.
KZY—1150, D. D. Coutts, Madison, S. D.
NAA—1075, C. M. Bennett, Aurora, S. D.
WBAP—1425, G. E. Wharton, Houston, Tex.
WBAJ—1075, G. E. Wharton, Houston, Tex.
WBAX—1350, G. E. Wharton, Houston, Tex.
WBT—1250, W. C. Wolverton, M.D., Linton, N. D.
WBZ—1725, W. F. Macleod, Prince Albert, Sask., Can.
WCAE—2150, Perkins Benneyan, Fresno, Calif.
WCAP—1225, W. F. Macleod, Pr. Albert, Sask., Can.
WCAQ—1025, G. E. Wharton, Houston, Tex.
WCK—1225, W. F. Macleod, Prince Albert, Sask., Can
WDAL—2450, J. Beckman, Seattle, Wash.
WDAS—1250, C. M. Bennett, Aurora, S. D.
WDAY—1200, G. E. Wharton, Houston, Tex.
WDT—1400, G. E. Wharton, Houston, Tex.
WEAJ—1300, Richard Siegel, Lawrence, Mass.
WFAC—1200, G. E. Wharton, Houston, Tex.
WFAF—1425, G. E. Wharton, Houston, Tex.
WGAB—1700, W. F. Macleod, Pr. Albert, Sask., Can.
WGAK—1050, D. D. Coutts, Madison, S. D.
WHAM—1125, W. C. Wolverton, M.D., Linton, N. D.
WHAS—1700, O. P. Klein, Leduc, Alta., Can.
WIK—1150, G. E. Wharton, Houston, Tex.
WIP—1150, D. D. Coutts, Madison, S. D.
WJAS—1900, Louis Raymond, Pullman, Wash.
WKAF—1500, C. M. Bennett, Aurora, S. D.
WLAW—1450, C. C. Sawyer, Liberal, Kans.
WMAK—1175, Wm. J. Wolverton, Linton, N. D.
WMAM—1300, Mascn Bradley, Pavilion, N. Y.
WMAQ—1150, W. F. Macleod, Pr. Albert, Sask., Can.
WNAC—1600, G. E. Wharton, Houston, Tex.
WOAB—1250, G. E. Wharton, Houston, Tex.
WOAF—1050, R. H. Schleiter, Freedom, Pa.
WOAQ—1200, G. E. Wharton, Houston, Tex.
WOH—1300, W. F. Macleod, Prince Albert, Sask., Can.
WPA—1475, W. F. Macleod, Prince Albert, Sask., Can.
WPE—1100, W. F. Macleod, Prince Albert, Sask., Can.
WQAQ—1475, W. F. Macleod, Pr. Albert, Sask., Can.

Rules to Remember

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 1,000 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records.

2. Distances must be measured AIR-LINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication, using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of RADIO DIGEST.

Radio broadcasting, it is believed, will make for better speech. Listening regularly to correct English will ultimately have its effect and broadcasters of spoken material to be efficient must of necessity use good English.

Lockport to Be Heard Far

LOCKPORT, N. Y.—The Norton Laboratory of this city has installed a new transmitter with the intention of broadcasting messages as far as the Pacific coast.

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1½" 60c each

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With perfect mechanical and electrical features. Mirror finish Bakelite knob with polished knurl that glows like a diamond. 3 sizes: 1 in., 1¼ in., 1½ in.

Write today for bulletins containing complete lists of parts, prices, etc.

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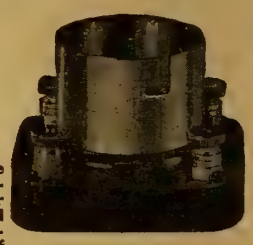

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Black or Mahogany Bakelite $1.00

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WITH EVERY $10.00 AND OVER PURCHASE A $1.50 22½-VOLT VARIABLE B BATTERY
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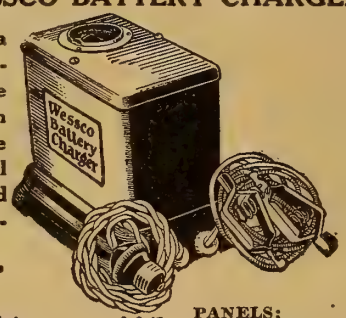
$20.00 WESSCO BATTERY CHARGER DE LUXE

Equipped with a doubly durable vibrator which can be removed in less than a minute without the use of tools. Special rubber treads and various other improvements. Adapted for the recharging of radio A and B batteries and automobile storage batteries at the special introductory price of $12.95



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$3.00 Radio Frequency Transformer..... 1.50
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"HE WHO lightly promises is sure to keep but little faith."
—Said Lao Tzu.

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Doctor Mu.

WMAQ FIGHTS "FADDISTS" IN AIR

A few peeps into the WMAQ studio on the opening night would have shown Ed Wynn, "The Perfect Fool," and Olga Menn, brilliant Chicago clubwoman and soprano of note. Ed persisted in his clownish actions as he lay on the floor, as pictured above, and officially opened the now famous station at 7 P. M., Central time, October 2, 1922

Chicago Newspaper-Store Station Operated for Service, Advertising

"Best None too Good for Fans" Is Principle Upon Which Daily News-Fair Store Programs Are Planned—Managers Aim to Keep Radio from Being "Plaything"

By Vera Brady Shipman

"This is Station WMAQ, the Chicago Daily News broadcasting service, on top of the Fair Store."

Within that announcement lies the advertising secret of a great newspaper and a large department store. For WMAQ is a joint ownership organization, the Fair paying the equipment and operation expenses, while the News controls the broadcasting program service completely.

Why does a newspaper operate a broadcasting service? The answer is this, according to Walter Strong, business manager of the Chicago Daily News:

"The first function of a newspaper is service to its readers. The newspaper should take up a new departure as evidence of its faith in progress. Radio came as a novelty. It has grown into a genuine factor, past the stage of a craze. It is an institution in the home and abroad. What better service can a newspaper afford than that of stimulating both the home and occupational progress of the reading public?"

Best None Too Good for Fans

The Chicago Daily News, appreciating the growing enthusiasm for Radio, began broadcasting programs of merit. The best would be none too good for the News Radiophans.

When Mr. Strong opened the Radio department he took William S. Hedges from the traction news division and placed him in charge of a questions and answers column. This rapidly grew into a regular daily newspaper feature with special Saturday supplement.

The first programs broadcast under the News auspices were sent out from KYW April 25, 1922. The News ran a half-hour program each evening along with others. Miss Judith Waller was placed as the head of the Radio program service. Miss Waller is primarily an educator and her aim has been from the first to elevate the standard of broadcasted programs.

To Keep Radio from Being Plaything

"Now, we could let the fad go on being a fad," said Miss Waller, "and only hear the inferior programs, by amateurs, the jazz bands, the cheap ballads put out by third-rate music publishers, if we preferred to do so; and doubtless that is what thousands of people have already done, Radio being put away as a plaything—laid one side with the closed player piano and phonograph.

"Those of us who know what the possibilities of Radio really are do not want it ever to become a plaything. We want to keep it as an educational opportunity, a means of giving the people higher and better things. We want to reach the people in communities cut off from the big cities with all their advantages.

Helps Small Community Home

"Think, for instance, what it might mean to the home in a small community where the professional artist never goes to actually hear Galli-Gurci sing or Fritz Kreisler play or Prof. Forest Ray Moulton give a lecture on astronomy or to hear the leaders on any subject discuss the big questions they are so vitally interested in. Isn't it a bit more personal than hearing Galli-Curci or Kreisler on a record or reading a lecture or speech in the newspaper or magazine?

"If Radio can bring all these things into the home isn't it likely that the tendency will be a returning to the old home circle and won't it bring an interest to the farm that will, in a way, offset the longing for the 'big city' "?

Staff of Musicians

Miss Waller's assistants are musicians, Miss Elizabeth Burton, assistant director of program service, is organist of the First Methodist church. Donald Weller, operator, Robert Whitney, announcer, are musicians, as are the various assistants.

On October 2, 1922, at 9:15 P. M., Station WMAQ was opened on the Fair Store. A gala night program was given by Daddi, formerly of the Chicago Opera company, Miss Olga Menn, soprano, a Chicago society leader, Wally Heymar, violinist, and Alma Birmingham, accompanist.

The first person to speak over WMAQ was Ed Wynn, whose antics in "The Perfect Fool" were elaborated in his dedicating remarks at the 7 P. M. program that evening when the air was officially intruded upon.

Like Entering Music Conservatory

A visit to Station WMAQ is like entering a music conservatory. Taking the photo gallery elevator in the Fair Store to the eleventh floor, and walking to the front of the building facing above State street, you enter a reception room having chairs for waiting. Then on into the studio, wholly sound-proof, artistically furnished in brown tones, easy chairs and davenports here and there, a large fern, soft brown draperies, a Mason and Hamlin grand piano.

Opera Singers, Celebrities, Visit WMAQ

When the opera is in season, opera singers have broadcast. A visit to Chicago of a celebrity is apt to include a short talk over Station WMAQ. The National Federation of Women's Clubs with Mrs. Mary Oberndorfer as chairman of music, has instituted a series of lectures, recitals and pamphlets called "Hearing America First." And Mrs. Oberndorfer broadcasts a lecture recital weekly from WMAQ on this subject. The children's hour is adequately represented by Georgene Faulkner, the original Story Lady, whose Monday evening stories to children are anticipated by all youthful fans. College lectures, conservatory recitals, Babson financial reports, are sandwiched in between classical and semi-popular musical programs.

Cough Cures Pour in from Everywhere

From the fans who listen in, WMAQ receives an average of more than 250 letters a day. They are from everywhere, asking everything. The farthest distance is 4500 miles, from an U. S. cruiser in the South Seas near Australia. As I watched Miss Waller open the third mail of the morning, a letter from an Iowa fan was followed by a query for a hook-up from downstate Illinois, and a garage owner from Indiana told of his pals listening in with him. In response to a midnight test when the operator inadvertently coughed into the microphone and said he wished he knew a cough cure, at least fifty suggestions for positive cures came in the mail the next day. A child writes in cramped style a request for Miss Faulkner to tell the story of Chicken Little. An isolated woodsman from the north country told of "WMAQ coming in fine" on a crystal detector.

Fair Store Tells Why It Broadcasts

And why does a great store like the Fair give space and financial equipment for a broadcasting station such as this?

E. J. Lehmann, Jr., president of the Fair Store and son of E. J. Lehmann, founder of the corporation, answers:

"The business value of Radio is one of those unseen forces which can never be counted. In dollars and cents, the returns are not evident. But in good will, advertising value and general publicity it brings in its own good returns. Hearing the station 'On the Fair Store' and hearing the name broadcast many times daily, cannot but be a strong advertising force and when the government so regulates its stations that they may be used as definite advertising medium, then the returns will show financial value, for the man who listens in to a program is willing to listen in to a talk on good merchandise, where and how to get it."

Siffer Lemoine, Radio Engineer of the Royal Swedish Telegraph Board, is in the United States studying the American Radio systems and to confer with government Radio officials.

Four New Transformers Ready for Anacostia

Station Near Washington Will Be One of America's Strongest

FORT WAYNE, IND.—Transformers of the latest design have just been completed at the local works of the General Electric company for the government Radio station, NOF, at Anacostia, D. C., near Washington. These transformers, when installed, will make the station one of the most powerful in America.

Designs for the large transformers were made by engineers of the local works.

8 BROADCASTERS LIMIT IN ENGLAND

Transmission Under New Plan Begins; Only Two Stations in Operation

LONDON, ENGLAND. — Broadcasting has finally begun in this country under the carefully devised plan which took practically a year to formulate and which was designed to eliminate as far as possible all of the difficulties which have been experienced in the United States, while retaining all of the advantages. In general the plan limits the number of broadcasting stations for the British Isles to eight in number, but so far only two are actually in daily operation, one in this city and the other in Manchester. A third is being erected in Cardiff, Wales.

It is believed that by limiting the number of active stations to eight the entire country will be adequately covered and unnecessary interference between two or more stations operating at the same time eliminated.

The first station to be put into operation was 2LO, which is installed in Marconi House, on the Strand, in the heart of this city. An experimental station had previously been in existence and the change to a permanent station was an easy matter. The latter has a power output of one and a half kilowatts, or approximately three times that of the average Class B station in the United States.

Since it went into operation 2LO has been heard over the entire country and easily reproduced on a loud speaker by a receiving set in the Shetland Islands, off the north coast of Scotland. There is no doubt that it will be heard over the eastern section of the continent of Europe, and under extremely favorable conditions may be heard on the eastern coast of America with super-sensitive receiving sets.

Hiker to Coast Talks to Family from Station WDAF

KANSAS CITY, MO.—Leo Riley, Columbus, Ohio, youth who recently started on a trip to San Diego, Calif., stopped off one night this week at the Kansas City Star's broadcasting studio and joined the Night Hawks of Station WDAF. While at the station he was permitted to send greetings by Radio to his family listening in in Columbus, all the members of which heard him.

REVAMP CHAMBER TO AID 'AIR EVILS'

LINK BIG INTERESTS AND PUBLIC IN SWEEP

National Radio Body Seeks to Improve Broadcasts and Cut Interference

(Special to RADIO DIGEST)

NEW YORK.—Sweeping reorganization of the National Radio Chamber of Commerce, linking up, as active workers in a nationwide plan to wipe out the evils of broadcasting and to solve other Radio problems, every major interest of the Radio industry and the public, is announced by President William H. Davis following a meeting of the Board of Governors at the Chamber's headquarters, 165 Broadway.

The Board of Governors adopted a new constitution providing for the admission to membership, either directly or through regional chambers of commerce, of individuals, including the audience or the listeners in, manufacturers, jobbers, dealers, broadcasters, amateurs, the press, and organizations and institutions interested in Radio, comprising educational, scientific, religious, civic, political and other bodies.

To Better Broadcasting

"Interference and the broadcasting of the trivial and valueless has injured the business and unless remedied may ruin it," declared a report of a special committee appointed to conduct a survey of the Radio situation and to recommend changes in the organic structure of the chamber, whose membership at the outset consisted of manufacturers.

The committee was composed of Henry T. Hunt, general counsel of the chamber and late member of the railroad labor board; George Lewis, secretary of the chamber; and Ralph S. Watrous, former lieutenant-governor of Rhode Island. Support and improvement of broadcasting in cooperation with the United States government and other agencies was said to be a main object of the chamber.

"The main factors in the situation," continued the report, "are: The Government of the United States is interested in Radio from the standpoint of national defense and public welfare. Furthermore, Radio is a public utility of interstate commerce.

White Bill Does Not Improve Quality

"Congress has before it the White Bill, which gives the Secretary of Commerce power to make regulations controlling broadcasting. This bill may be enacted into law within six months. When the Secretary shall have placed proper regulations in effect, interference will doubtless be reduced. However, neither the bill nor the regulations contemplated provide any support for broadcasting or any measures to improve its quality.

"The broadcasting class comprises manufacturing companies broadcasting to support and extend their sales of apparatus, department stores broadcasting for advertisement, newspapers broadcasting for advertising and news purposes, schools, colleges and universities broadcasting for educational purposes, churches cooperating with broadcasting stations, individuals broadcasting for their own amusement, and the broadcasting activities of the American Telephone and Telegraph Company carried on primarily as research and in preparation for whatever the future may develop.

"There are at present ineffective oganizations of broadcasters, ostensibly national in scope but not including the principal broadcasters, as, for example, the Radio Broadcasting Society of America, which includes some thirteen or more small broadcasters. In this field some sort of cooperation is compulsory in the nature of things. Further cooperation has been brought about by the Department of Commerce."

Under the new constitution, both the membership and the aims of the chamber, now organized to function as a central force in Radio control and regulation, are much broadened.

Book Reviews

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

Elements of Radio Telephony. By William C. Ballard, Jr., M. E. A reliable, authoritative discussion, in simple form, of the essential principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, $1.50.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

The A B C of Vacuum Tubes. By E. H. Lewis. This is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

The rapid development of Radio is proving of assistance to scientists in other fields. A German inventor, Heinrich Scheiferstein, through a study of the manner in which the oscillating currents in Radio transmit energy to each other, has developed by the use of an oscillating motor what he claims to be a noiseless timepiece.

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RADIO PANELS
POLISHED BLACK FINISH
CUT PERFECTLY SQUARE TO ANY SIZE

1/32"	THICK	1/2¢ PER SQ. INCH
1/16"	THICK	3/4¢ PER SQ. INCH
3/32"	THICK	1¢ PER SQ. INCH
1/8"	THICK	1 1/2¢ PER SQ. INCH
3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2 1/2¢ PER SQ. INCH
3/8"	THICK	4¢ PER SQ. INCH
1/2"	THICK	5 1/4¢ PER SQ. INCH

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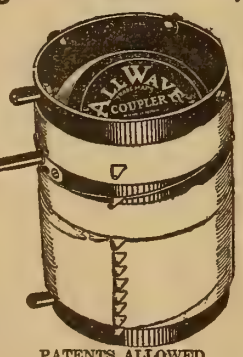

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REINARTZ CIRCUIT
EVERY PART COMPLETE
1 Reinartz wound coil, 1 coil base, 1 tube socket, 1 Vernier rheostat, 1 23-plate .005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 25 switch points and nuts, 8 binding posts, 1 variable grid leak, 1 .002 MFD phone condenser, 25 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions..... $10.00

FLEWELLING CIRCUIT
EVERY PART COMPLETE
2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and diagram and complete instructions..... $11.00

3 Plate Variable Condenser; value, $1.75; special at $1.05
13 Plate Variable Condenser; value, $2.50; special at 1.20
23 Plate Variable Condenser; value, $3.50; special at 1.35
43 Plate Variable Condenser; value, $4.50; special at 1.65
13 Plate VERNIER Condenser; value, $5.50; special at 3.75
23 Plate VERNIER Condenser; value, $6.00; special at 4.00
43 Plate VERNIER Condenser; value, $6.50; special at 4.25

FILAMENT RHEOSTAT—Condensite base; value, $1.10; special at $0.70
FILAMENT RHEOSTAT with 2 1/8" dial; value, $1.50; special at ..... .85
Potentiometer with knob; value, $1.75; special at 1.00
Potentiometer with 2 1/8" dial; value, $2.15; special at 1.15

V. T. SOCKETS—Nickeled brass sleeve, composition base; value, $1.00; special at. $0.50
Ball Bearing Inductance switch; value 75c; special at. ..... .30

BEST QUALITY JACKS, Single circuit; value, 65c; special at. ..... .30
Double circuit; value, 90c; special at. ..... .45

VARIOCOUPLER—Celeron condensite and Litz Wire wound secondary; value, $4.50; special 3.25

THREE INCH DIALS—Unbreakable—heat resisting composition—high finish; special. .30
TWO INCH DIALS—Same design—for rheostats and potentiometer; special. ..... .25

EXTRA SPECIAL—Telephone Headsets; $8.00 list; reduced to. 3.50

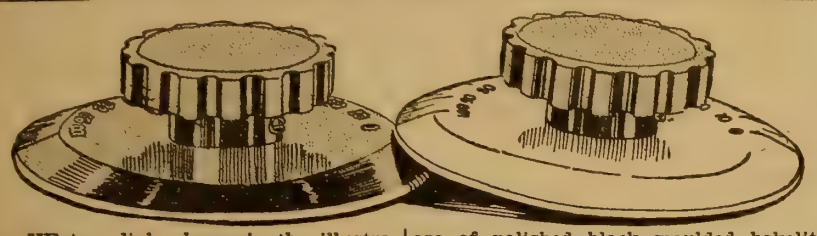
RAYMOND VERNIER RHEOSTATS—Value, $1.50; special ..... .95

ALUMINUM LOUD SPEAKING HORN—Nickel plated—highly polished; $8.00 list.. 3.75

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID. Send check or money order.

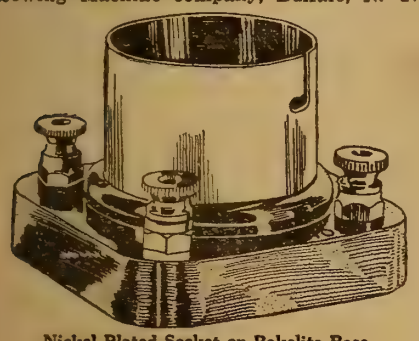
The Radiophonist's Mart

Moulded Knobs with Celluloid Disks



THE two dials shown in the illustration present no new features except simplicity and neatness of appearance. The dial plate is a pressed celluloid disc about ⅛ inch thick. The one is white finish with black graduations and numerals, while the other is black with white markings. The knobs on both are of polished black moulded bakelite. A brass bushing holds the plate and knob together, and also carries the set screw. The dials run true and show no warping tendency. They are placed on the market by the Radio Apparatus Division of the King Sewing Machine company, Buffalo, N. Y.

AN UNUSUAL socket in the sense that it combines substantial construction with extreme neatness of appearance and design, is shown in the illustration. It is manufactured by the Radio Apparatus Division of the King Sewing Machine company, Buffalo, N. Y.



Nickel Plated Socket on Bakelite Base

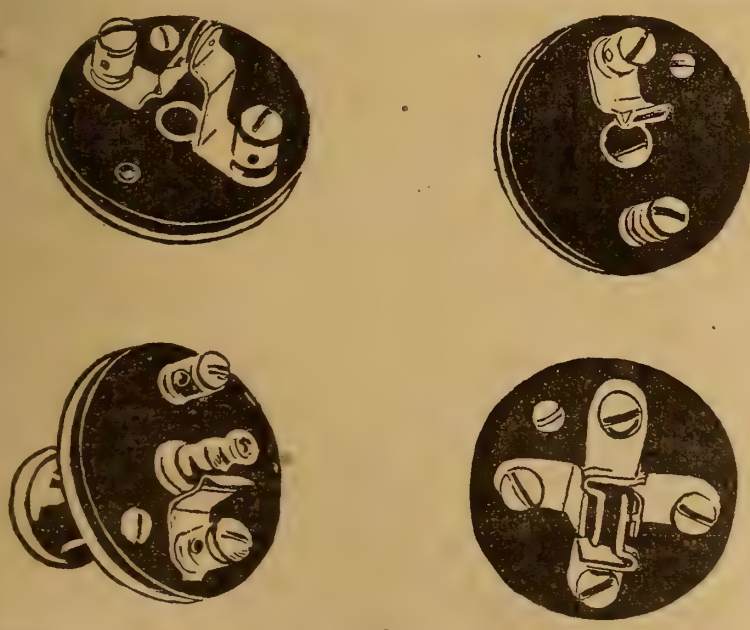
The base is made of moulded bakelite in polished mahogany or black finish. The metal tube of the socket is made of brass with a polished nickel plate finish. The binding posts, likewise nickel plated and polished, hold the spring prongs in position and are equipped with thumb caps. The base has four holes for fastening down the socket to any base. The prongs at the base are set in sufficiently far that no metal parts touch the mounting board outside of the screws holding it down.

Localities Affect Transmission

The range of transmitting and receiving Radio messages depends upon the nature of the territory lying between the transmitting and receiving stations, the greatest range for a given power being obtained over water. Any metal, particularly iron or steel, lying between the stations will cause loss of signal strength. Such metal may either be in the form of artificial structure, such as building framework or tin roofs, or may be in the form of ore deposits. Some regions of the country are noted for their poor location for Radio reception. In many places it is possible to receive effectively from all directions but one, and it is usually found that in this direction a metallic structure or metal deposit is responsible for the lack of reception.

A fully charged storage battery gasses freely when it is time to remove it from the charging circuit and the specific gravity as indicated by a hydrometer reading will also stop rising.

Small Jacks Used for Switches



THERE is no doubt that the skill required in soldering has deterred many a Radiophan from using jacks on his set. It is no easy job for the new beginner in Radio, unacquainted with soldering, to connect his leads properly to the jack terminals without splashing the solder all over, making a poor electrical contact or short circuiting adjacent terminals. For this reason jacks have been omitted and binding posts substituted in spite of the awkwardness in changing from phones to loud speaker or from one stage of amplification to another.

The apparatus shown in the illustration is a new form of jack construction manufactured by the Radio Improvement company, New York, N. Y.

These jacks have miniature binding posts for all terminal connections. In addition, they do not project more than 1⅛" from the back of the panel, thus cutting down the depth necessary for clearance in the usual form of jacks. As observed from the front of the panel when mounted there is no difference in appearance from the usual type of jack. The construction is compact and substantial and is mounted in the same manner as the old type.

TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

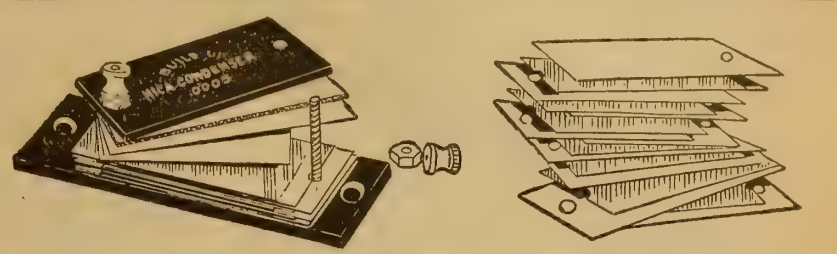
My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 60c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency this is the set to build. Price of blueprint and specifications $1.00, or with complete and perfect windings $5.00. Photo of set with every order.

Either set is cheap and easy to build, easy to operate. Everything clearly shown. Please don't send stamps.

S. A. Twitchell, 1925 Western Ave., Minneapolis, Minn.

Condensers Made of Mica and Copper



RADIO receiving sets using crystal or vacuum tube detectors require condensers in the circuits to insure the best reception from distant stations. The condenser must be of high efficiency and permanent capacity or undesirable noises will be produced in the set. Condensers using mica as the dielectric and copper foil as the conducting plates are more efficient because mica has the lowest leakage and hysteresis losses, and copper foil is the lowest resistance material for the plates. In addition to higher efficiency, mica condensers have a higher breakdown voltage.

The build-up mica condenser shown in the illustration has the mica dielectric and copper foil conducting plates held in intimate contact between the formica insulating pressure plate on top and the base below.

A rubber gasket (with fiber sheet between the rubber and copper plate) insures an equal distribution of the pressure over the entire surface of the plates. This is very important because regenerative vacuum tubes sets are very sensitive to small changes in the capacity of any of the condensers in the circuit. In fact, much of the howling and squealing of receiving sets is directly traceable to faulty grid condenser construction. With the entire condenser under pressure the plates have no opportunity to vibrate and cause changes in capacity.

Condensers of many capacities are required in the various circuits now in general use and this form of condenser fills a definite need at a reasonable price for a condenser that may be easily increased or decreased in capacity.

Each mica plate with the alternate copper foil plates connected to the binding screws has a capacity of approximately .0002 mfd. By adding more plates of mica and copper foil the condenser may be built up to a capacity of .005 mfd. Intermediate values of capacity may be had by adjusting the tension of the nuts on the pressure plate. A slight decrease in the pressure reduces the capacity and an increase in pressure gives a greater capacity.

A grid leak unit consisting of a grid leak resistance deposited on a fiber plate may be placed on the top of the pile of copper and mica plates, with the resistance side down, so as to make contact with copper plates near the screws. A mica plate is placed immediately under the grid leak unit so that the copper foil makes contact only at the ends.

The condenser parts are supplied in an envelope which contains 20 mica plates, and 20 copper foil plates, sufficient to build up a condenser to a capacity of .005 mfd. The condenser is manufactured by Charles Schindler, of Toledo, Ohio.

During a Caesarean operation recently performed in a hospital in Minneapolis, Minn., surgeons entertained the patient with a Radio set after applying a local anesthesia. The patient's mind was soothed and distracted from the operation by music from a specially arranged band concert.

Improved Radio Detector Tubes	**$2.75**
Improved Radio Amplifiers	**3.35**
3 Coil Mounts (Regular $5.00 value)	**3.45**
Reinartz Air Core Coils and Diagrams	**2.00**
$10.00 Automatic Head Phones, long range receivers, pair	**5.50**
2 Slide Tuning Coils, $5.00 value	**1.75**
Complete Radio Receiving Outfit	**55.00**

4 Tube Reflex, Panel Wired and Ready to Use—3 Radio—3 Audio

Sent on receipt of price, prepaid.

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We are distributors for:

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Radio Division
TELEPHONE MAINTENANCE CO.
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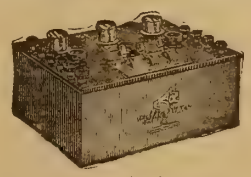
5206 W. Madison, Austin 7041. 1122 E. 47th St
Look for the TELMACO Sign

MAGNAVOX Radio
The Reproducer Supreme

WITH the Magnavox Radio, the volume of sound is limited only by the amount of power input.

Magnavox Power Amplifiers are designed for true power amplification, and give marvelous results.



Model C
Magnavox Power Amplifier

For use with the Magnavox Radio and insures getting the largest possible power input. 2-stage $80.00, 3-stage $110.00.

At good dealers everywhere

The Magnavox Co., Oakland, Cal.
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RADIO
AT CUT PRICES

Just a Partial List of the Many Bargains Offered

$5.50 Murdock Double head sets	$ 3.45
$5.00 Acme transformer, Radio and Audio	3.45
$18.50 "Homcharger" Deluxe	13.95
$5.50 180 Variocoupler on Bakelite silk wound wire	2.45
$15.00 Western Electric Phones	7.45
$6.00 Genuine "Tuska" molded variometer with dial	2.95
Ammeter for Testing "B" Batteries	.49
Hydrometers for Testing Storage Batteries	.39
$2.50 Phonograph Attachment	1.15
$2.50 Socostats	1.25
$5.00 43-Plate Condenser	1.95
$4.00 23-Plate Condenser	1.55
Framingham Rheostats	.45
2-inch Bakelite Dials	.25
3-inch Bakelite Dials	.35
4-inch Electric Dials	.75
W. D. 12 Transformer for W. D. 11 Tube	4.95
$1.00 Freshman Variable Grid Leak and Condenser Combined	.69
100 ft. 7 Strand Aerial Wire	.55
Genuine "All-Wave" Coupler	7.90
50c Single Pole Switch	.20
75c Double Pole Switch	.35
¼ lb. Annunciator Wire	.29
Bus Bar Wire, Per Foot	.02
$10.00 3000 Meter Coupler	4.95

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MODELL'S—The Great Radio Mail Order House.

Radiophone Broadcasting Stations

Corrected Every Week—Part I

AG1, Presidio of San Francisco, Calif. 50 mi. Signal Corps, U. S. A. Sun, Thurs, 8-9 pm, instruction, music. Pacific.

AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.

AV7, St. Paul, Minn. Signal Corps, U. S. A.

BE1, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 9-10 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd. Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45-9:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Van Couver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCN, Calgary, Alta., Can. 275, 440 only. 1500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co.

CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.

CHYC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8-10 pm, music, entertainment. Eastern.

CJBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Pacific.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.

CJCF, Kitchener, Ont. Can. 420 only. 50 mi. The News Record, Ltd. Thurs, 9-11 pm. Eastern.

CJCG, Winnipeg, Man., Can. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, concert. Tues, 7-8 pm, music. Fri, 5:30-6:45 pm, music. Every other Thurs commencing Feb. 15, 11 pm-1:30 am, dance music. Alternate Sun, 8 pm. Central.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm. Fri, 8-10 pm. Alternate Sun, 8:30-10 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 1:30 pm, weather; 1:35-2:30, concert; 4:30-4:35, reports; 5:30-6, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Atlantic.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8.30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDBZ, Bakersfield, Calif. 100 mi. Frank Siefert. Daily ex Sun, 7:30-3:15 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 3, sports; 7-9:55 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. Savoy Theater.

KDYQ, Portland, Ore. Oregon Inst. of Technology.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m weather, time. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYV, Salt Lake City, Utah. Cope & Cornwell Co.

KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Tues, Fri, 3:45-4:30 pm. Sun, 11 am-12:15 pm, 5-6, Church services. 120th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. Frank E. Siefert.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-5 pm, news, reports. Daily ex Tues, Fri, 8-9 pm, reports, music. Tues, Fri, 6:30-7:30 pm. Sun, 8-9 am, church service. Pacific.

KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 50 mi. Nevada Mch. & Elec. Co. (Nevada State Journal.) Daily ex Sun, 4-4:30 pm, news. Wed, 6:30-7:30 pm, music. Fri, 8-9 pm, special. Pacific.

KDZL, Ogden, Utah. Rocky Mountain Radio Corp.

KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.

KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Daily ex Sun, Thurs, 7-8 pm, 8:30-9, music, news, reports. Tues, Wed, Fri, Sat, 7:30-7:45 pm, code practice. Sun, 7-8 pm, music. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Sepp-

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which RADIO DIGEST has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of RADIO DIGEST will give one the most complete and accurate list of broadcasting stations obtainable.

pell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFAD, Phoenix, Ariz. 100 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.

KFAE, Pullman, Wash. 200 mi. State College of Wash. Program irregular.

KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Thurs and Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services.

KFAP, Butte, Mont. Standard Pub. Co.

KFAQ, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Daily ex Sun, 9:30-10 am, 3-3:20 pm, market, news, 8:30 pm, weather. Mon, Wed, Fri, 8:30-9 pm, concert, Mountain.

KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 8-9 pm, concert. Pacific.

KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Wed, 9-10:30 pm. Special programs other days. Pacific.

KFAZ, Reedley, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.

KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buttrey Co. Daily ex Sun, 9:30 am, agriograms, weather. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.

KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.

KFBL, Everett, Wash. Leese Bros.

KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFBV, Colorado Springs, Colo. Clarence O. Ford.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Tues, Thurs, Sat, Sun, 7:30-8:30 pm. Sat, Sun, 9:30-10:30 pm, music. Pacific.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. Los Angeles Union Stock Yards.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCP, Ogden, Utah. Ralph W. Flygare.

KFCQ, Casper, Wyo. Motor Service Stn.

KFCV, Houston, Tex. Fred Mahaffey, Jr.

KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, 6-7 pm. Sat, 8-10 pm. Sun, 4-5 pm, irregular. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. Wyo. Radio Corp.

KFDH, Tucson, Ariz. Univ. of Ariz.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDS, San Francisco, Calif. John D. McKee.

KFEB, Taft, Calif. City of Taft.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music; 6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.

KFED, Polytechnic, Mont. 100 mi. Billings Polytechnic Institute. Mon, 8-9 pm, lectures. Mountain.

KFEJ, Tacoma, Wash. Guy Greason.

KFEP, Denver, Colo. Radio Equipment Co.

KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.

KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.

KFGB, Pueblo, Colo. Lowenthal Bros.

KFGG, Astoria, Ore. Astoria Budget.

KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule.

KFHJ, Santa Barbara, Calif. Fallon Company.

KFI, Los Angeles, Calif. 400 only. 1,500 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Tues, Fri, 1:30-2:30 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-10. Pacific.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger-William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm. Entertainment, lectures, news, weather, tides, police reports. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm. music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 340 only. 50 mi. Altadena Radio Lab. Sat, 8-9:30 pm, concert. Pacific.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat. special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 and 485 only. 1,500 mi. The Morning Oregonian Pub. Co. Daily, 3:30-4 pm, news, features. Mon, Wed, Fri, 8-9 pm, concerts. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 250 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHD, Colorado Springs, Colo. 485 also. 50 mi. Daily ex Sun, 8:15 am, weather. Mon, Wed, Fri, 7-7:30 pm, music, lectures. Mountain.

KHJ, Los Angeles, Calif. 400 and 485 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. 100 mi. C. O. Gould. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am. Pacific.

KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri. 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLS, San Francisco, Calif. 300 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 7:15-7:30 pm, news, entertainment. Tues, 7:30-8:15 pm, Fri, 8:15-9 pm, and Sun, 3-4 pm, concert. Pacific.

KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm, news, markets, bedtime story, concert. Thurs, 8-9 pm, concert. Sun, 8-9 pm, church services. Mountain.

KMJ, Fresno, Calif. 200 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 11-1 pm, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. 485 also. 750 mi. Roswell Public Service Co. Daily, 8 pm, news, reports, concerts. Mountain.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 2-3 pm, 5-6, 7-8, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 pm, code, 8:20-9 pm, music. Pacific.

KON, San Diego, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.

KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 300, 400 and 600 only. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 11-12 m, 3:30-4:30 pm, concert. Wed, 7:30-8:15 pm, concert. Sun, 11-12:15 pm, church service. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, 8:30-9:30 pm, Sun, 9-10 pm, entertainment. Pacific.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm, 2:30-3, music, lectures. Mon, Wed, Fri, 10-11 pm, music, entertainment. Eastern.

KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8:15-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Wed, 9-10 pm. Sun, 5:30-7:30 pm, concert. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Thurs, 11:30 pm, concerts. Central.

KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Fran. Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 3-3:30 pm, lecture, news; 5:30-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather report. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, concert; 5-6 pm, concert, news. Pacific.

KUS, Los Angeles, Calif. City Dye Works & Laundry Co.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KXS, Los Angeles, Calif. Braun Corp.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:25 am, 10, 1:20 pm, 2:15, 2:30, markets; 3 (3:30 ex Mon, Wed, Fri), 4, 4:15, 4:30, 5, news, sports (6:30 Mon only, news, reports, sports), 6:50, bedtime stories; 8-9, music; 9, news, sports; 9:05, special. Sun, 11 am, 3:30 pm, 7, church services. Central.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. Wenatchee Battery & Motor Co.

NAA, Arlington, W. Va. 710 only. 2,000 mi. Official government broadcasting station. U. S. Navy Dept. Mon, Tues, Thurs, 7:15-7:30 pm, lecture. Mon, Thurs, 6:45-7 pm, lecture. Tues, Thurs, 7:45-8 pm, health lecture. Wed, Fri, 8:30-9:45 pm, band concert. Eastern.

PWX, Havana, Cuba. Cuban Telephone Co.

WAI, Dayton, O. McCook Field, U. S. Army.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri, 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.

WAAF, Chicago, Ill. 485 only. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:30 am, 10:30, 10:45, 12:45 pm, 3, 4:30, live stock and weather reports. Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Mon, Wed, Fri, 9-10 pm. Tues, 10-11 pm. Thurs, 8:30-9:30 pm, Sat, 7-8 pm, music. Eastern.

WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun. 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 7:30-8 pm, code instruction; 8-9, special program. Eastern.

WAAN, Columbia, Mo. Univ. of Mo.

WAAP, Wichita, Kan. 485 also. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAT, Jersey City, N. J. 70 mi. Jersey Review. Wed, 7-8 pm, concert, lecture. Sun, 7-8, church service, concert. Eastern.

WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45, 10:45, 11:45, 12:45, 1:20, 8 pm, market reports. 8:15-9 pm, music. Central.

WAAX, Crafton, Pa. Radio Service Corp.

WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

(NOTE—The second part of the station schedule list will appear next week.

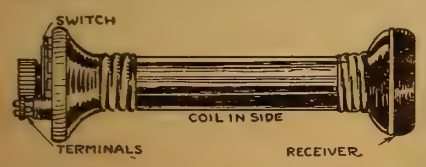
Old Flashlight Case Makes Receiving Set

The illustrations show a very unique Radio receiving set. The receiver and phone units are all enclosed in one case, making a very small and compact set.

It consists of an old flashlight case with the flared part of another case, a piece

of one-inch radiator hose on which is wound a tapped inductance, a crystal detector, a three-inch dial with knob cut off in order to mount the rotary switch and switch points, and two binding posts for the ground and aerial connections.

Eleven switch points are mounted on the dial and taps are taken off on the first ten turns of wire on the inductance coil and also one tap is taken off on the fortieth and one on the fiftieth turn. The



rotary switch has two arms, one arm is set on the fiftieth turn and the other arm rotates over single taps until the station comes in the clearest.—Mrs. H. Mayer, San Antonio, Tex.

Because of the loneliness of lighthouse keepers, who are isolated for weeks, even months, Radiophone receivers are being installed aboard lightships at sea and in lighthouses around New York.

SILVER S RADIO Batteries SAVE YOU 50%

WRITTEN 2YR. GUAR.

SOLID RUBBER CASE

Factory-to-user selling methods and low operating costs make possible the remarkably low prices that we quote below, and the proved worth of the World Battery warrants the iron-clad guarantee that we give to every purchaser.

Designed Especially for Radio

The World **Noiseless** Radio Battery was designed with the special requirements of radio operation in mind. It is not an experiment! It is made by an old established company that for years has been making the very highest type of batteries. Remember that the success or failure of your set depends upon the quality of battery that you buy. The correct construction of the World Battery makes it non-leak, non-conductive, non-deteriorating; and prevents hissing and frying noises. We back these statements with a two-year written guarantee.

Special Solid Rubber Battery Case

Because of the extensive demand for a battery case that will insure home radio users against acid leakage we have designed our special Solid Rubber Battery Case. It is absolutely indestructible and acid proof.

Users Are Delighted

T. B. Grove, 718 East Park Av., Fairmont, W. Va., writes: "Battery arrived in excellent condition and to say that I am pleased is putting it very mildly. Your promptness in shipping was appreciated and will do all that I can to advertise your product in this vicinity. Again thanking you."

Frank C. Wozniak, Rt. 4, Box 101, Michigan City, Ind., says: "I am more than thankful to you for the kind and prompt shipment of the Batteries. They are just what I wanted."

Save 50% on Your Next Battery

No other manufacturer offers such a high quality radio battery in a solid rubber case at such a low price. Save 50% on your next battery and get better and longer service. Buy a World Radio Battery. Write today—at once.

WORLD BATTERY COMPANY
Dept. 12
1219 S. Wabash Ave., Chicago, Ill.

WORLD RADIO BATTERIES
6 Volt. 80 Amp., $13.50
6 Volt. 100 Amp., $16.00

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RADIO

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Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete..... **$11.45**

COMPLETE KNOCKDOWN RECEIVING SET

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial.... **$17.95**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now.....$1.75
$3.70 Value, 23 PLATE, now.....$1.45
$3.10 Value, 5 PLATE, now.....$1.25
$2.70 Value, 3 PLATE, now.....$1.15
$3.30 Value, 11 PLATE, now.....$1.35

U.S.A. SIGNAL CORPS Aviation Type 194-W WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

COMPLETE PARTS FOR FLEWELLING CIRCUIT

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... **$12.45**

MAGNAVOX, LOUD SPEAKER, Type R3 ..... **$34.95**

VARIOMETERS, Genuine Mahogany, $5 Value, Now..... **$1.95**

VARIOCOUPLERS, $4.50 Value, Now **$1.75**

HONEYCOMB COILS

1,500 Turns.....$1.50
1,250 Turns..... 1.50
1,000 Turns..... 1.25
750 Turns.....$1.00
250 Turns.....75c
150 Turns.....60c
100 Turns.....50c
75 Turns.....40c
50 Turns.....40c
35 and 25 Turns.....40c

$8.50 Guaranteed 3,000 Ohm **HEAD PHONES** **$3.65**

RHEOSTATS **45c**

SPONGE RUBBER EAR CAPS, Pair **50c**

DIALS, 2, 3 and 3½ inch..... **25c**

Thordarson Amplifying **TRANSFORMERS,** $4.50 Value, Now... **$2.95**

GREWOL DETECTORS..... **$1.65**

Signal Corps Super Sensitive Microphone Transmitters **$2.45**

Solid Copper Aerial Wire, 100 ft.	35c	Lightning Arresters	95c	Phone Caps, for mostly all phones	25c	Lightning Switches	$2.65
Spaghetti Tubing, yard	10c	2-Slide Tuning Coils, at	$1.95	Signal Corps Hot Wire Ammeters, at	$5.45	Hydrometers, now at	45c
Cord Tip Plugs	60c	3-Coil Honeycomb Mountings, with Knobs	$4.20	Anti-Capacity Switches	$1.50	Freshman Variable Grid Leaks	95c

FORMICA PANEL, ⅛" thick, Black or Brown, Square Inch..... 1½c

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Letters of comment on the merit of the merchandise sold and the service rendered through our mail order department have brought duplicate orders which have put us in a swamped condition. We ask to bear consideration, if your order is a day or two behind in delivery.

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, February 17, 1923 No. 6

Legislation for Us All

Amendment to Bill Is Worthy of Notice

JUST recently the White bill passed the House almost unanimously. It now goes to the Senate. We have Representative Jones of Texas to thank for his amendment. This clause strikes a blow to the interests which have been so active in trying to close in on patents for the purpose of controlling the entire Radio trade and the ether. The amendment empowers the Secretary of Commerce to revoke the license of any firm or corporation attempting to monopolize broadcasting or the manufacture of apparatus.

The Senate will next take up the bill and present indications are that there will be little opposition to it as it now stands. Senator Kellogg will have charge of the bill in this division of the legislature. This bill with its amendment will greatly aid amateurs and the one who wants entertainment.

Response from Listeners

Public Wants Learned by Letter or Telegraph

THE improved quality of the concerts sent out from broadcasting stations is one of the reasons why broadcasting is holding its own. Before this day of filling the air with entertainment, the few owners of receiving sets were more interested in the why and how of the set instead of entertainment. The Radio audience has now grown to such an extent that the largest portion of those who listen in are doing so only for the entertainment, not for the technical side of the operation.

Ready-made sets which any one can operate have come on the market; the amateur who sets up his own set, once he has found his pet layout, gives himself little further trouble about its technical arrangement. Both he and the ready-made set operator are content to use their outfits as they are and concentrate on what they can get. For them the Radio receiving set has become less a piece of apparatus to be tinkered with in making constant experimental changes and adjustments.

One of the difficulties always has been that the person listening in was not in responsive touch with the broadcasting station. The broadcasting stations, on the other hand, faced a corresponding predicament. There was no spontaneous reaction from their audience. They tried to meet this situation by suggesting to their hearers that they let them know by postcard or letter.

It is not known who started it, but some ingenius person found the remedy for this one defect which stood in the way of complete action and reaction between audience and broadcasting station, and once it had found it, it proved extremely simple. He turned to his telephone, called a telegraph station and sent a telegram to the broadcasting station. Within a few minutes the broadcasting station had received the telegram and in turn was reading it out to the listeners. Here was a live contact with the audience and the station.

Picking Up the Carrier Wave

Re-Transmission a New Way to Relay Sound Waves

SOME amateurs have had recent successes in borrowing the carrier wave from a nearby broadcasting station for their own purposes. A crystal set owner received a concert at an exceptionally long distance just because his aerial paralleled one that had power transmission on it. A tube set will receive louder when a nearby transmission dynamo is running and not broadcasting. Does this tend to lend power to the incoming waves?

Various broadcasting stations are trying out this same method or something along about the same lines in relaying messages from a distant city to another. A Canadian station has used their instrument for retransmission of concerts broadcast from New York. The waves are picked up by a powerful sensitive receiver and highly amplified. The output of the receiver is then fed into the broadcasting equipment and the very entertainment sent out from New York or Chicago can be enjoyed by others in distant sections of the country through their own broadcasting station who own simple sets.

Condensed

By DIELECTRIC

It is doubtful if most of us realize to what extent the Radio compass has been successful in averting disaster at sea. In severe storms near the coast vessels have been swept clear out of their course and driven dangerously near to shoals, and when the ship's captain has regained control of the movement of his ship, he has not known his exact location. By means of the Radio compass full information may readily be had and the proper course to steer is carried to him immediately upon receipt of his inquiry. During the course of six hours, eighty vessels were advised of their true location while approaching New York Harbor (I believe my figures are correct), some of which were then heading for shallow water. Just how many catastrophes have been averted solely through the efficacy of the Radio compass it is impossible to state, but the invention of such a scheme is of tremendous value to shipping.

Acoustics is a subject that has occupied the attention of experts, presenting them with a formidable problem. It is still a matter for exhaustive study and, as concerns Radio audiences, a very vital one. There are many features of broadcasting relating to the transmission of operas and concerts which need correction. These in large part are acoustical imperfections. As inspiring and generally enjoyable as are the concerts being broadcast, it remains for a later day to devise the means whereby the various choirs in an orchestra may be heard in their true value. I have no doubt that we listeners-in will find future concert halls to be designed with particular attention to what may be called Radio acoustics. There is no intention on my part to criticize without qualification the efforts of those broadcasting stations which are doing so much to spread a knowledge of classical music. They deserve the utmost praise and loyal support of all true lovers of music. No single feature of Radio is perfect. However, no effort is being spared to accomplish that end.

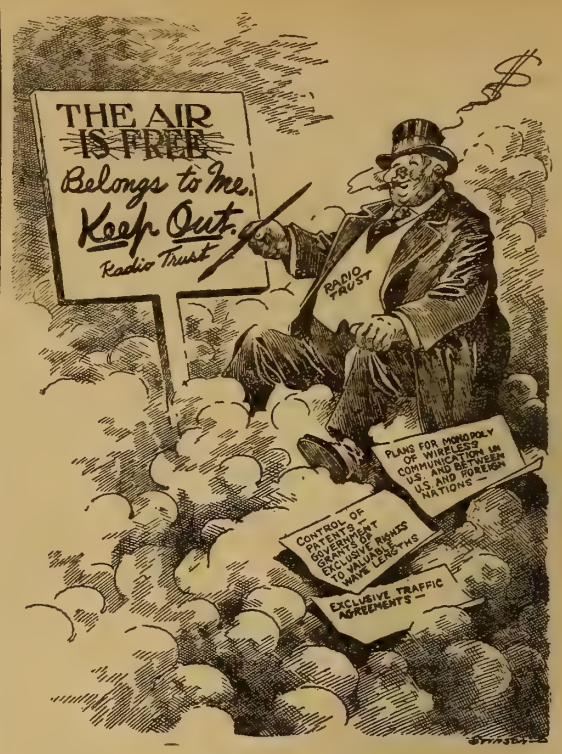
On New Year's eve the listening public were provided an opportunity of hearing the chimes in Old Trinity, New York city, and to many who were far distant from that city the melodies from these historic bells were heard for the first time. The famed carillon of Malines Cathedral in Belgium are now heard by Radiophans in that country, since the installation of a transmitting set in the belfry. What would it mean to us if we might tune in to some powerful station in the city of Philadelphia broadcasting the sound of our Liberty Bell from Independence Hall? It could be made to carry all over this land and even to Europe. No oratorical attempt could equal in effect the hearing of this historic bell on the fourth day of July, 1923!

The two hundred and seventeenth anniversary of the birth of Benjamin Franklin was celebrated in Boston, New York and Philadelphia. Radio made possible a far larger audience at the ceremonies than could have been the case otherwise. It is not the season of the year when standing in a public square is entirely enjoyable, as was required of those attending the exercises in New York. Nor is it always convenient to travel from place to place to attend several interesting meetings. With a Radio receiving set one could hear the speeches in the warmth of his home and be altogether comfortable. It would have been impossible for most of us to gain access to the ballroom of the Bellevue Stratford Hotel in Philadelphia, yet thousands probably heard the entertainment given for the benefit of the members of the Poor Richard Club assembled there. This broadcasting from notable assemblages is one of the treats in store for the owner of a receiving set. I heard most that transpired at the inaugurations of three Governors—and was present at none of them. To hear the announcements at the Capitol of one state one minute and from another state the next is covering ground pretty fast.

Augustus Thomas expressed some skepticism as to being heard by folks in Oregon and Washington while he was speaking from station WOR in Newark, N. J. He didn't do as Mayor Rolph of San Francisco is reported to have done, invite all those listening in to wire him collect if they were able to hear his voice. If he had, the bill for telegrams would have shattered his disbelief in national broadcasting.

Before the fervor of this "high brow" reflection fades out, I want to recall to your attention what is being done in some of the colleges and universities along the line of broadcasting lectures by college professors. When this thing gets to going as I expect to see it by another year, then thousands of young men and women will find a counterpart to correspondence courses in the subjects selected for broadcasting from these higher schools of learning. The University of Washington has fallen into step with the times in broadcasting classroom lectures on history. Dr. Elliott, president of Purdue University, was one of the first to lecture in this fashion. There doesn't seem to be any sleeping sickness among the officials of Station WSB, for Atlanta, Georgia, is the home of the "School of the Air" from which prominent educators will speak on a variety of subjects appearing in the usual college curriculum each evening for a fifteen minute period. Station WHN will broadcast from its studio on Long Island what will amount to a university extension course. The University of Pennsylvania adds a course, "Principles underlying Radio communication," to be known as "Physics 5." Thus do they come in stronger and—Dielectric fades out.

What Ex-Governor Cox' Paper Thinks of It



COURTESY DAYTON (OHIO) DAILY NEWS

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts, who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Pancakes for Indi-Gest

An unusually attractive hook-up for morning reception consists of honeycomb coils tuned in with pancack inductances. The combination is regenerative to a degree. Aunt Jemima please note.

My Dear, Try to Shut Us Out

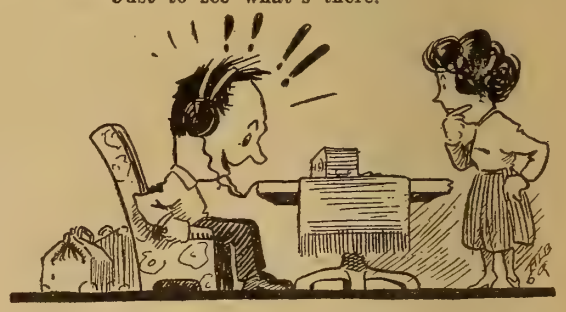
A California paper refers to Radio concerts that are "open to the public." We'll tell the world! There are more knot holes in a Radio broadcast than in a sand lot ball park fence.

All Broadcasting—No Attempts at Receiving

"Pa, what does broadcasting mean?" asked Clarence.
"Telling a secret to a woman, son," replied Pa.
—CINCINNATI ENQUIRER.

The Radio Fanatic Husband

He is a traveling salesman,
  Home from Saturday 'til Sunday night.
"Now hurry with the dinner, dear,
  I must set the Radio just right."
And from seven until twelve, P. M.
  He never leaves his chair,
And then sits in till two, A. M.
  Just to see what's there.



In the morning I will find upon
  The stand, a nice long list,
Of all the far off stations that my
  Husband couldn't miss.
And as the next day's Sunday,
  He will sleep till one, P. M.,
And then he's up and doing the
  Same thing over again.
MRS. PAUL W. SHUE.

Call in Abe to Split the Rails

Some Congressmen seem to think that Radio can be laid out like pastures or grazing lands, with neat wire fences which would keep the broadcasts and messages within the confines of a State. Two of them actually believe that State rights are involved in the bill before the House, and want local Radio control left with the State governments.

Jazzing Up the Ether

Despite the general use of Radio and the millions of fans informed as to the reception of broadcasts, some remain ignorant of its possibilities. The other day in the National Press Club, one member suggested that the set be "speeded up," saying the music coming in was "too slow."

A. B. C. Lessons for Radio Beginners

Chapter VII—The Crystal Detector

By Arthur G. Mohaupt

THE detector forms that part of a receiving station which renders the incoming oscillations, after they have been passed through the telephone receivers, capable of affecting the human ear.

In the previous chapters we learned that all Radio transmission is effected by means of electromagnetic waves which travel through space at very high frequencies and with a velocity of 300,000,000 meters per second. For example, a broadcasting station operating at a wave length of 400 meters, sends out 750,000 waves per second. These waves, on being intercepted by a receiving antenna, induce in it electrical oscillations of the

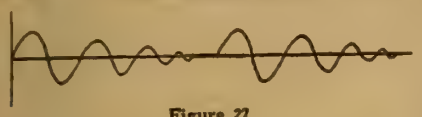


Figure 27

same nature and frequency. But these oscillations are all at a Radio frequency and far too rapid to be capable of affecting the human ear. It therefore becomes necessary to provide some means or device for reducing these high frequencies to an audio (audible) frequency, so that the human ear can recognize them and interpret their meaning. This is the part that is played by the detector in conjunction with the telephone receivers.

Damped and Undamped (C. W.) Waves

In an earlier chapter we were told that the high frequency electrical oscillations needed for Radio transmission are generated by means of special types of circuits having some form of inductance coil connected in series with a condenser. Two types of waves or oscillations are employed in Radio communication, one being known as damped wave transmission and the other as undamped wave (C. W.) transmission. These two types of waves differ both in their general form and their mode of propagation.

Damped waves, such as are generated by a spark transmitting station, consist of a series or train of waves each one of which is of less intensity than the preceding one. Such a train of waves is illustrated in Figure 27. The number of these wave trains that are radiated from the antenna per second, depends upon the spark frequency of the station. It is common practice to use a spark frequency of 1,000 discharges per second, and hence 1,000 trains of damped waves would be radiated from the antenna per second.

In damped wave Radio communication there are thus two frequencies to be considered; first the individual waves which occur at a Radio frequency, and second the trains of waves which occur at an audio frequency. The Radio frequency of the individual waves depends upon the amount of inductance and capacity in the transmitting circuit, while the audio frequency of the wave trains depends upon the spark frequency.

In undamped or C. W. transmission, all of the waves are of the same intensity,

Figure 28

and the antenna is charged with a continuous stream of uniform electrical oscillations. In the case of a Radio-telephone, these uniform or C. W. waves are moulded, or modulated as we say, into groups according to the nature of the voice or music that is being sent out. Here again we have two frequencies to consider, namely, the Radio frequency of the individual waves, and the audio frequencies of the groups into which the waves are moulded or modulated by the sounds that enter the transmitter. The individual waves that are moulded according to the nature of the transmitted sounds are known as the carrier waves.

The detector, therefore, operates upon the audio frequency groups or wave trains, and moulds them so that when they are sent through the telephone receivers they produce audible sounds corresponding in every respect to those that entered the transmitter originally.

The Crystal Detector

The detector, it is evident from the preceding paragraphs, forms the most important part or unit of the receiving station, for upon its proper functioning depends the quality of the sounds that are received. Numerous types of detectors have been devised and tried out since the Radio art first came into existence, but of all of these only two have survived and are now in common use. These two are the crystal detector and the vacuum tube detector. Each of these has its own field of application in that it best fulfills certain requirements.

The crystal detector is low in cost and easy to manipulate, but possesses the disadvantages that it requires delicate adjustments. The quality of the tones received, however, is very good.

The vacuum tube detector, on the other hand, is quite expensive not only in first cost but also in upkeep, for it requires the services of several batteries to supply electrical energy to the various circuits. The tube detector, however, is somewhat more positive in action and lends itself somewhat more readily to careful adjustments and amplification, in case it is desired to strengthen the received signals.

Various mineral crystals have been tried out, but today the one most commonly used is the galena (lead sulphide) crystal. The carborundum crystal is also used to some extent, especially in sets that are used for field service and are subject to rough usage.

The action of a crystal detector is based upon a peculiar property of certain crystals due to which they will permit an electric current to pass much more readily in one direction than in the opposite direction. The crystal thus acts as a rectifier, that is, it is capable of converting an alternating current into a unidirectional pulsating current. The term uni-directional means flowing in only one direction. The crystal is thus often said to rectify the incoming electrical oscillations.

Sensitive Spots on a Crystal

A mineral crystal does not have this rectifying ability distributed over its entire surface, but there are certain regions or spots that are more sentitive than others. These places at which the rectifying qualities are most pronounced are called the sensitive spots of the crystal. The crystal will thus operate more efficiently at these sensitive spots than at the other places on the surface.

In order that they can be conveniently handled, crystals to be used as detectors in Radio receiving sets are generally supported or mounted in a metal cup, as is illustrated in Figure 28. The crystal is held in place by means of three set screws passing through the walls of the cup, or

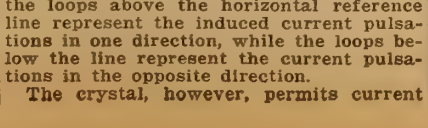


Figure 29

else is held secure with a few drops of low melting solder. A crystal must never be subjected to high temperatures, for these cause it to crack or scale off, and also greatly cut down the sensitiveness.

The metal supporting cup forms one of the electrical contacts to the crystal, while the other connection is made by means of a finely pointed piece of spring brass or copper wire. This fine point, sometimes called the cat whisker, is fastened to a movable arm so that it can be moved around over the surface of the crystal when it is desired to locate the sensitive spots. The point should rest upon the crystal firmly, but not with excess pressure.

A convenient form of crystal detector now available on the market has the crystal securely fastened to a neat support, and also has the contact point permanently fixed and set at a sensitive spot on the surface of the crystal. The crystal with its contact point is covered with a glass cover, while the rear is provided with two contact screws for connecting the detector into the circuit. The entire detector is thus very neat in appearance and very suitable for mounting on a panel. The permanent setting of the contact point also eliminates the task of locating the sensitive spot every time the detector is to be used.

How a Crystal Detects

We were just told that a crystal detector operates upon or moulds the audio frequency groups, so that when they are passed through a pair of telephone receivers they will produce sounds similar to those that initially entered the transmitting station. This operation is brought about in the following manner:

When a train of damped waves, such

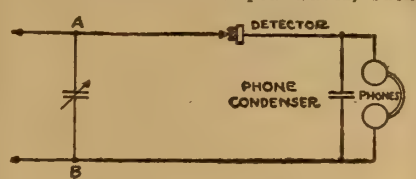


Figure 30

as are illustrated in Figure 27, are intercepted by the antenna of a receiving station, an alternating potential of the same nature is impressed across the terminals of the crystal. In the illustration the loops above the horizontal reference line represent the induced current pulsations in one direction, while the loops below the line represent the current pulsations in the opposite direction.

The crystal, however, permits current to flow through it in only one direction, and hence only one-half of the current pulsations can get through while the other half cannot pass. The resulting current pulsations after they have been subject to this rectifying action by the crystal, appear as illustrated in Figure 29. Only one-half of each current wave was able to pass and hence the loops on one side of the horizontal line have been wiped out while the other half remains. The current flowing in the circuit beyond the crystal is thus a unidirectional pulsating current. These individual current pulsations still occur at a Radio frequency, but the groups of pulsations come in at an audio frequency. The Radio frequency oscillations are not capable of producing audible sounds, but the audio frequency groups can be caused to produce audible

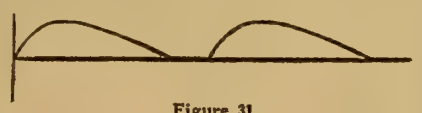


Figure 31

sounds by means of a pair of telephone receivers shunted by a small fixed condenser. The term shunted means connected in parallel or by-passed. The phone receivers are thus by-passed by the fixed condenser, as is illustrated in Figure 30.

The Action of the Phone Condenser

The current flowing in the detector and phone circuit shown in Figure 30 is a pulsating direct current we just found out. But a direct current cannot flow through a condenser, for the insulating dielectric forms a gap in the circuit. The result is that as these Radio frequency current pulsations flow through the circuit, they accumulate on the plates of the condenser and cause it to become charged. But this building up of a charge lasts only as long as one wave train continues, and furthermore, the charge at once tends to leak off through the telephone receivers. This discharge current in flowing through the receivers, however, has all the individual current pulsations ironed out, with the result that it forms a smooth current wave, one for each wave train. It forms a so-called envelope of the wave trains, as is illustrated in Figure 31.

As each of these discharge current waves flow through the telephone receivers, they attract the diaphragm. But since they occur at an audio frequency (corresponding to the frequency of the wave trains), they affect the receivers so that a sound is produced. And since these discharge current waves form an exact envelope of the individual current pulsations, the sounds produced by them will be in every respect identical with those that originally entered the transmitting station.

Operation of the Telephone Receivers

The telephone receivers, we all know, serve the purpose of converting the electric current pulsations into corresponding sounds, so that the electric oscillations received by the antenna can be rendered intelligible to our physical senses. The general principles of construction of the telephone receivers used for Radio work are the same as those used on our

(Continued on page 12)

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Cartridge Fuses Make Inductances

Substitute Windings for Honeycomb Coils

A blown No. 6 cartridge fuse may be used in Radio work for winding inductances and then using them in the same way as honeycomb coils. Wind these coils with any handy cotton covered or enameled wire; soldering one end of the wire to one end of the fuse and the other end of the wire to the other end. Bank the windings for best results. For a socket for these fuses use erector angles or regular fuse blocks. Wind these coils to suit the wave length desired.—Ben Bartzoff, Buffalo, N. Y.

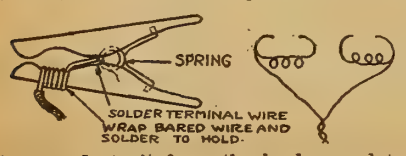
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

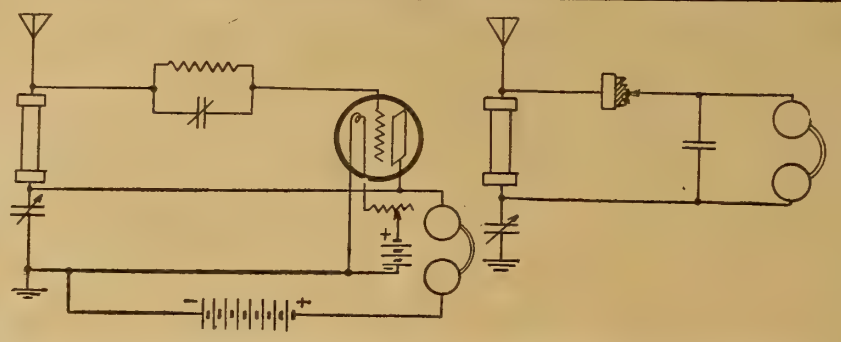
RADIO KINKS DEPARTMENT,
Radio Digest Illustrated,
123 West Madison St., Chicago, Ill.

Clip for Battery Connections

An ordinary wooden clothespin can be made into a good battery clip. A little wire twisted about one jaw and connections made to it from the lead, completes the clip. The clip can be attached and detached quickly and it keeps the terminals scraped clean.—G. A. Bessette, Valley Field, Canada.



NEW COIL SHOWN IN TWO CIRCUITS

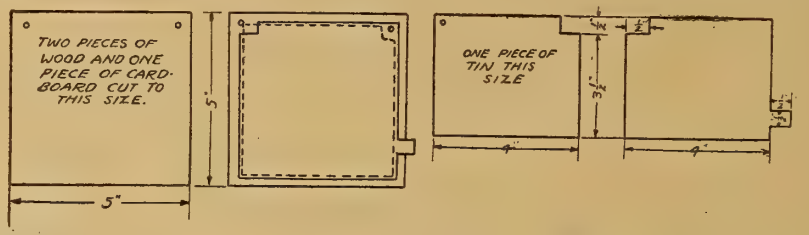


Homemade Variable Condenser

The type of variable condenser shown in the illustration can be made easily and used temporarily until one can be purchased. Cut two pieces of tin 4 inches square. On one leave a small tabe ½ inch square. On one leave a small tab ½ inch variation. Bore a hole for the binding post in the corner and on the same edge opposite. On the other plate drill a hole in the corner for the post.

The corner adjoining the hole and directly above the tab cut a ½-inch square out, as shown. Cut two pieces of cigar box wood 5 inches square, also cut a piece of cardboard to go between the plates to the same size. Bore holes in adjoining corners of all three for binding posts.

One of the boards is placed on the table after the bolts for the binding posts are run through the holes provided for them. Place a piece of tin over it, putting the bolts through the hole in the tin and allowing the notch fit around the other post. Put the piece of cardboard over the tin, the bolts passing through the holes provided for them. Lay the other plate on this, allowing the other bolt to pass through the hole in the tin. Lay the other board on in the same manner as the first and turn the top of the binding posts down fairly tight. Variation is accomplished by pulling the out or pushing it in the wooden frame.—Keron C. Morrical, Farmer City, Ill.



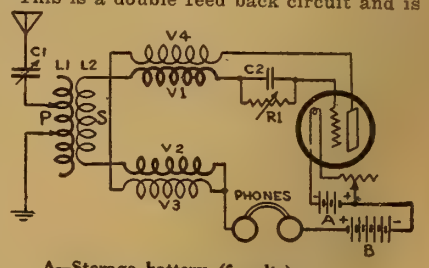
Filling Chips in Panels

Sawing and drilling panels sometimes result in chipping on the best side. If this chipping cannot be avoided either of the following mixtures may be used to fill the chipped part, after which they may be colored to match the panel with ink. Dissolve celluloid in banana oil and ether. This gives a good mixture. Dissolve as much celluloid as possible in some high grade concentrated acetic acid.—Glen E. Gaugin, Escanaba, Mich.

Long Distance Circuit with Double Feed Back

The set shown in the illustration may be of interest to many readers who would like to receive from long distance broadcasting stations without using many tubes and transformers. I can tune out all local interference and tune in distant stations loud enough to be heard several feet from the phones on only one tube. The most distant station I have heard with this hook-up was Denver Station, KFAF, which came in very clear.

This is a double feed back circuit and is very sensitive. Oscillations in the plate circuit cannot blur out music as the phones are not in line with the main oscillations.



A—Storage battery (6 volts)
B—"B" battery (22½ volts)
C1—Variable condenser (.0025 M. F.)
C2—Fixed Condenser (.0005 M. F.)
L1—Stator of variocoupler
L2—Rotor of variocoupler
V1—Stator of variometer
V2—Stator of variometer
V3—Rotor of variometer
V4—Rotor of variometer
R1—Variable grid leak

The amplification of this circuit is enormous. To obtain this double feed back the use of the two variometers is required, the rotors of both being separated and connected as shown in the illustration. The rotors are in the plate circuit and the stators in the antenna or secondary circuit.—Alton Theodore, Charleston, S. C.

Amplifier Tubes

Changing the vacuum tubes in an amplifier around often gives good combinations which improve the results materially. The tube of the first step can be changed with that of the second and the second with the third. The best combination will be found by experiment.

One long wire will give better results than several short ones for your aerial.

A. B. C. LESSONS

(Continued from page 11)

ordinary wire telephones; but since the currents used in Radio practice are so very small, compared to those used in wire telephone communication, the Radio phone receivers must be made much more sensitive so that they will respond readily to the faint currents flowing through them.

The receivers commonly used for Radio work are of the watch case type and consist of a hard rubber shell or case in which is mounted a small electromagnet. The electromagnet is of the horse-shoe form, and has its two poles close together near the center of the receiver. The core is made of hard steel, and hence there is a slight but constant magnetic pull on the soft iron diaphragm which is adjusted so that it does not quite touch the poles. The electromagnet is wound with a large number of turns of fine wire, the ends of the windings being brought out to a pair of terminal screws by means of which the receiver is connected into the circuit.

As the electric current pulsations of the detector circuit flow through the windings of the electromagnet they alternately strengthen and weaken it, and thus cause variations in the magnetic pull on the diaphragm. The diaphragm is thus caused to vibrate in exact unison with the electric current pulsations, the result being that sounds are produced which are identical with those which were initially sent into the transmitting station. An important point to remember is that it is not the sound waves that travel through the air and are then heard in the telephone receivers; but the sound waves at the transmitting station cause high frequency currents to be generated and sent out broadcast. At the receiving station these electrical waves are again converted into sound waves. There are thus two transformations of energy taking place.

Rating Telephone Receivers

Telephone receivers as used for Radio service are generally connected in pairs, forming a headset. They are usually rated according to their resistance, as 2000 ohm or 3200 ohm sets. The higher the resistance the greater number of turns are used in winding the magnet, and a greater number of turns makes the receivers more sensitive.

But it will not do to compare the receivers made by two different manufacturers solely on their resistance as a basis, for one make of receiver may have a higher resistance, on account of finer wire being used, than another, and yet it will not be as sensitive as the second. Hence, the statement that a 3000 ohm set is more sensitive than a 2000 ohm set does not mean anything, unless both sets are of the same make and are wound with the same kind of wire.

Operation of the Entire Receiving Station

We will now review briefly the complete operation of a crystal detector Radio receiving station, and in this manner sum up the contents of the last four chapters.

A Radio receiving station consists essentially of four parts, each of which performs its own individual operations. In the first place, there must be some form of antenna to intercept the electromagnetic waves as they pass through space. Electrical oscillations of the same nature and frequency as were originally sent out from the transmitting station are induced in the receiving antenna. In order that the antenna will respond most readily to these induced oscillations, the receiving station must next contain some form of tuning device by means of which the wave length of the receiving station is adjusted or tuned to that of the incoming waves. For this purpose devices such as tuning coils, loose couplers, variocouplers, or variometers can be used.

The third essential part of the receiving station is the detector which accepts the groups of Radio frequency oscillations and rectifies them into unidirectional pulsations. These direct current pulsations then strike the condenser shunted across the telephone receivers. Here a charge accumulates, which finally leaks through the telephone receivers. These discharge pulsations thus occur at an audio frequency and form a socalled envelope curve of the respective groups of Radio frequency oscillations. As they flow through the telephone receivers, they cause variations in the strength of the electromagnets, and in this manner set the diaphragm into vibration. Audible sounds are thus produced which in every respect resemble those which originally entered the receiving station.

Although the entire processes as just explained seem perfectly simple and natural, we must not forget that they represent the results of many years of study and effort carried on by some of the keenest scientists and investigators of the entire world. Little do many of us appreciate or realize the large amount of time and labor that was spent in solving many a little process which now appears of almost minor importance.

Chapter Eight

Having now completed our study of the principles of operation of a Radio receiving station, we are ready to put our knowledge into practical use by constructing a crystal detector set and then observing its operation in accordance with the instructions just given. Accordingly, Chapter Eight will be devoted to the details of construction of an efficient crystal detector receiving set. The chapter will thus comprise a practical conclusion to the work taken up this far.

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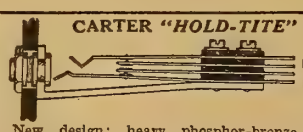
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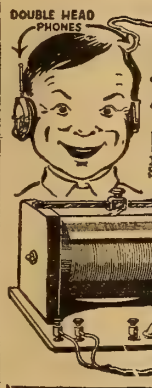

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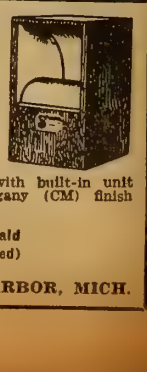
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Questions and Answers

Stranded Antenna Wire

(1920) DJS, Blackfoot, Idaho

I am installing a receiving set, consisting of detector, one stage of tuned radio frequency amplification, and a two-step amplifier. This set is put out by the Crosley Mfg. Co. of Cincinnati.

What phones would you suggest? I want phones good enough that I will not become disgusted with them and throw them away, and get a better set.

What makes of tubes and "B" batteries would you suggest with this outfit? Is the 16-strand braided antenna wire better than the plain? What do you think of the corrugated surface wire, put out by the Yardell Corp., Utica, N. Y.? They claim this wire has a collective surface of 10 points.

I noticed your article of "Antennae and Lead-ins" in the December 30th issue of Radio Digest and would like to say I had figured on putting in an aerial, like the one mentioned in your article.

It will be a single strand, 40 feet high, 75 feet long, N. W. by S. E., the other wire will be S. W. by N. E., same length and height. Three poles will be used. The center pole holding the end of both wires, insulated good. A lead-in from each wire, with a double switch, allowing me to use either aerial by simply throwing the switch inside the room.

My idea for this kind of an aerial is this: I have noticed on several of the sets in my town a certain broadcasting station will come in very clearly on an aerial facing a certain direction, while another fellow with aerial facing opposite direction will hardly be able to pick them up. What do you think of the idea? I do not understand a .001 mfd. condenser in series in use with an aerial. Would you please explain?

I do not know whether you charge 25 cents for answered questions, like some information bureaus, but will inclose it to be sure.

Will you please answer by personal letter?

Do you know of a good book for Radio receiving that is easy to understand and yet one that will go right down to the inside of a set and tell you what each part is, what it is for, and how it works?

I have been told that the direction your leadin is taken off, the broadcasting stations in that direction will come in clearer than those facing the opposite end of aerial. Is this so? Would there be any advantage in having a leadin from each end of aerial? Can "B" batteries be recharged? What do you think of the homecharger? What is meant by Potential and Potentialmeter?

A.—It is not our policy to recommend any particular make of apparatus. Secure phones of well advertised make and rugged construction of three thousand ohms. The same advice applying to all apparatus.

The sixteen strand braided antenna wire is highly desirable. The corrugated surface wire cited is also very good and effective. Your idea for construction of antenna is good. It is admitted that a more or less directional value exists from lead-in end. No special advantage in having lead-in from each end. A .001 variable condenser in the antenna circuit is for tuning.

Application to the Book Department of Radio Digest with specific designation of special phase of Radio information desired will lead you to securing an authorized work on the subject.

B batteries can be recharged when of the storage type.

The Homecharger is all right. Tube rectifiers are highly efficient.

Potential means possible voltage. A potentiometer is a meter for controlling amount of potential.

Radio Frequency and Regeneration

(1936) JGR, Los Angeles, Cal.

Being a constant reader of your valuable paper and seeing a hook-up of the Flewelling single tube super-regenerative set, I have decided on building a set accordingly. However, I see by the hook-up and picture of the circuit, that one step of audio frequency is used. I would much prefer using one-step Radio frequency if it can be accomplished. Radiophans here seem to think that Radio frequency cannot be used on a regenerative set successfully, but I note an article in your issue of December 30, page 11, Mr. Horle, of the Federal Telephone and Telegraph Company states that R. F. is much better than A. F., but he does not state whether or not R. F. can be used in a regenerative set with success. Will you please advise me as to whether or not it can be used, especially with the type transformer I have mentioned?

A.—Radio frequency amplification may be used with a regular regenerative circuit, but not with the Flewelling successfully.

Radio frequency amplification has its virtues and its limitations, and if not well understood in principle and use is apt to be difficult.

Reflex Circuit

(1946) ELH, Akron, Ohio

I would like to ask you a question or two concerning the reflex circuit. I have two Federal audio No. 226-W and two Acme A-2 Radio transformers. Can these be used in the reflex circuit?

Would a variocoupler with units and tens on 80 turns of No. 20 D. C. wire be all right?

I have built several sets and never had any trouble with them, but when I built the Reinartz hook-up that you published some time ago it would not work. I tried everything, even left it at the Radio store a couple of days, and they found everything just right, commending the workmanship, but could not find out why it failed to work. I removed the variable condensers and some of the wiring and it worked better.

Five different coils were tried out and there was no difference. I now have the Copp tuner and detector hooked up to the amplifiers and it works fine.

A.—All apparatus you mention for use in the reflex circuit is correct. The trouble you have with the Reinartz circuit seems to be with the coils. The common fault in construction of these coils is to have a short circuit in the two inside coils, even though special care may have been taken to prevent this trouble. Would advise rewiring coil. The Reinartz gives exceptional results when perfected and is well worth the endeavor.

Day Reception

(1982) AJN, Walnut Ridge, Ark.

As a subscriber to the Radio Digest, I wish to ask you to tell me why I cannot get stations in the day time? At night we hear everything from California to Cuba and New York. I also hear the Drake Hotel, but have never heard KYW, which we are very anxious to hear, especially the grand operas.

I have a Westinghouse R. C. set and loud speaker and should hear everything.

A.—The electromagnetic waves are set up near the earth's surface and are partly transmitted as guided wave trains along the earth's surface, modified by refractions and absorptions at its irregularities. In the daytime the upper conducting boundary will be less definitely marked than at night on account of partial ionization of the air by the sun's rays. Hence there will be less reflection of the wave known as space wave in the daytime, and consequently the guided wave will not be assisted materially by a reflected or refracted part of the space wave. At night, when the upper boundary is more sharply defined, there is more reflection of the space wave, which in general gives stronger signals at night.

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Easier tuning, clearer signals; green silk on Bakelite, $1.75 ea.
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Fits any condenser. Requi[illegible] extra space. 95c.
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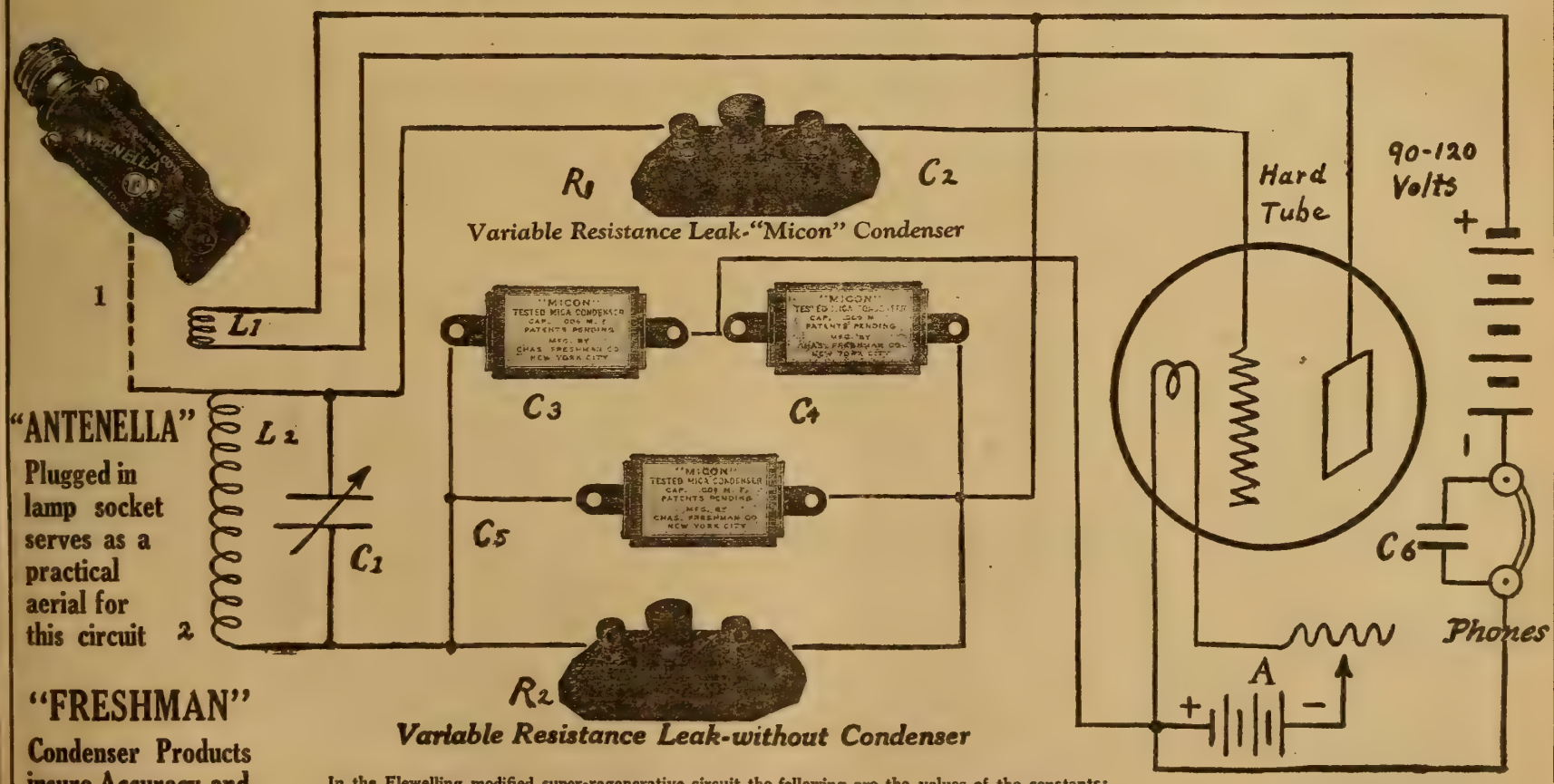
FLEWELLING "SUPER" CIRCUIT



"ANTENELLA" Plugged in lamp socket serves as a practical aerial for this circuit

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In the Flewelling modified super-regenerative circuit the following are the values of the constants: C_3, C_4 and C_5, approximately .006 mfd. MICON, not critical; R_1 and C_2—FRESHMAN COMBINATION VARIABLE RESISTANCE LEAK and MICON—.00025 mfd. Condenser, critical. R_2, FRESHMAN Variable Resistance Leak without condenser, very low. C_6 'phone condenser, Micon .001 mfd. "B"-battery, 18 to 250 volts using UV-201 tube (110 volts found very good); L_2 is 50-turn coil or equivalent; L_1 is 75-turn coil or equivalent; C_1 is .0005 mfd. The two dotted leads, 1 and 2, are used in various ways. Using both ground and aerial, connect these to 1 and 2. Using either aerial or ground alone, or one side of Antenella or loop, connect to 1, leaving 2 free. Using both sides of loop or Antenella, connect to 1 and 2.

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Parts Pictured Here at Your Dealer. Otherwise Send Purchase Price and You Will Be Supplied, Postpaid

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Micon .001	.40
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Radio Illustrated

Recently there was filmed a play entitled "Via Radio" in which many scenes were prepared and many stage settings, one of which is shown in the picture. However, this picture is one which may be readily duplicated in the average American home. The father and son are much interested in what they are hearing over the Radiophone at home

Miss Dorothy Knapp was selected as America's most beautiful girl at the present time, but she is not the only beauty shown in the picture, for there is the Radiophone, and you must admit, if you are a real fan, that it is some beauty, too, and must be a great entertainer for the distinguished party with the head phones
© K. & H.

There is no question but what the Radiophone has been a boon to the disabled soldier. Entertainment which the boys receive helps in more ways than one for it is educational and takes up the idle time. Walter Kofield and Erney Grenbush listening in at the veterans' hospital
© World Wide Pictures

Since the advent of the Radiophone many babies have been entertained by the music as well as the bedtime stories. Baby John Ferree is a very young Radiophan, but nevertheless he is interested in what is coming through the headphones. It is just as interesting to the little folks as the older people for there is something mysterious about having a voice come out of the air or a box. Many times the mother is relieved of baby's care by the use of a simple receiving set
© World Wide Pictures

FEB 26 1923

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Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, FEBRUARY 24, 1923 | No. 7

INSURES BETTER MUSIC

ASKS FEDERAL QUIZ TO UNEARTH TRUSTS

WHITE WANTS ACTION BY TRADE BOARD

Would Have Contracts, Patent Ownerships Brought Under Spot Light of Commission

By L. M. Lamm

WASHINGTON.—Representative White of Maine has introduced a resolution in the House calling for an investigation by the Federal Trade Commission of Radio activities. Mr. White states that he believes that there will be no opposition to the resolution in the committee and he is of the opinion that it can be passed at the present session of Congress. The resolution, which has been referred to the House committee on Merchant Marine and Fisheries, is as follows:

"Resolved: That the Federal Trade Commission be, and it is hereby, requested to investigate and to report to the House of Representatives at the convening of the Sixty-Eighth Congress or as soon thereafter as practicable, the facts relating to:

"'(A) The ownership of patents covering Radio apparatus used in interstate and foreign commerce and to all assignments or other contracts concerning such patents;

"'(B) Contracts, leases or agreements in whatsoever form the same may be, the purpose, tendency, or effect of which is to control or restrict the manufacture, sale, resale, or use within the United States of such Radio apparatus, or to control or fix the price thereof;

"'(C) Contracts, leases or agreements in whatsoever form the same may be, the pur-

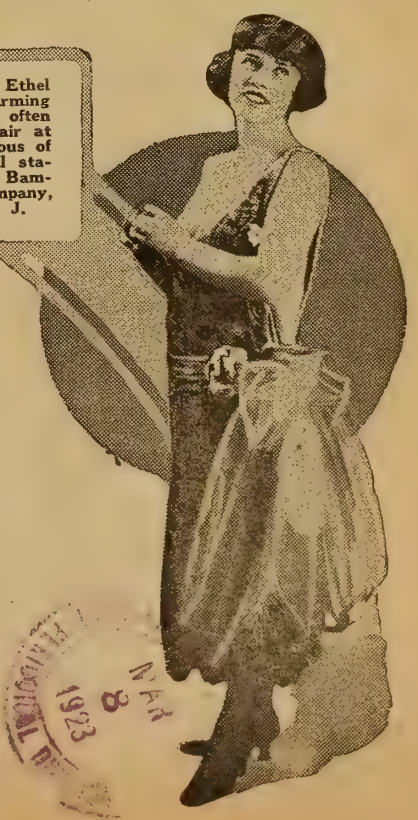
(Continued on page 2)

FAIR SEX BROADCASTS ENTERTAINMENT FOR FANS OF NORTH, SOUTH AND EAST

Below is Mme. Jacquet, distinguished Parisian harpist. She is often heard on CKAC, La Presse, there. The famous Erard harp she plays was given her as a prize when she was sixteen years old

Mary Brumby, head of the Mandolin club, Agnes Scott College, Decatur, Ga., led her fair troubadors at WSB, the Atlanta Journal, recently

At our right is Ethel Payne, charming young soloist often heard on the air at that most famous of all international stations, WOR, L. Bamberger and Company, Newark, N. J.



LATEST DEVICE SPELLS 'FINIS' ON DISTORTION

"Glow-Discharge" Microphone Declared One of Most Important Radio Feats

Reproduces Near Perfect

Westinghouse Plans Installation of Thomas Invention in All Four Plants

E. PITTSBURGH, PA.—A diaphragmless "glow-discharge" microphone, said to be almost perfect in its reproduction of musical and voice sounds, has just been announced as perfected by Dr. Phillips Thomas, research engineer with the Westinghouse Electric company of this city. The perfecting of the microphone, which has been used in trials for the past several months at Station KDKA here, is claimed to be one of the most important developments in Radio since broadcasting the voice became popular, inasmuch as it will eliminate virtually all distortion in broadcast-

(Continued on page 2)

BETTER CONCERTS, CUT PLANTS—FANS

"We Pay for Programs," Listeners-in Decide—Irritated at Station Interferences

NEW YORK.—Better programs and fewer broadcasting stations were the demands voiced by thousands of Radiophans in all parts of the country in answer to a questionnaire recently sent out by the National Radio Chamber of Commerce, it has been announced by that organization. The questionnaire was designed to learn what improvements are necessary to further extend the industry.

It was stated that listeners in are becoming more and more impatient with the interference between stations. The novelty having gone from Radio, patrons now are demanding first-class service in every respect, especially since it is becoming recognized that they themselves are paying for programs in one way or another.

Hawaii Hears WHAZ, Distance 5,500 Miles

Rensselaer Polytechnic Institute's Station Claims World's Record

TROY, N. Y.—According to letters received by the Rensselaer Polytechnic Institute's Radio broadcasting station, WHAZ, a new world's record has been established for Radiophone reception of concert programs. Three different communities in Hawaii, with Radio receiving stations, have been reported by letters stating that a clear reception of both music and speech had been established at an approximate distance of 5,500 miles. This station is the largest broadcasting station of any educational institution in the country, and in the amateur transatlantic tests in December, Troy was heard both in England and France. The mail reports have just come in from Hilo, Wailuku and Haiku in the Hawaiian Islands, the writer in each enumerating program numbers and messages which were heard.

MAR 8 1923

PERFECT MICROPHONE

(Continued from page 1)

ing formerly caused by mechanical resonance of every diaphragm microphone transmitter. It fills a need which has long been felt at every broadcasting station, and because of its obvious advantages over every other microphone now in use, including the condenser microphone, the Westinghouse company has announced plans for installing the new device at all of its plants, which are KDKA, WJZ, WBZ, and KYW. Other stations are also considering the use of the device.

Research Work a Classic

The development of the new microphone required much research and many unsuccessful attempts with other styles of transmitters. This work by Dr. Thomas is classic in the realm of scientific research and will go down in the annals of electrical history.

Briefly, the carbon granule microphone, such as in use on practically every wire telephone, was discarded because of the packing of the granules and the distortion created from this. Secondly, a moving coil or "electrodynamic" transmitter was constructed. However, it was found that the resonance frequency, that is, the "tune," of the moving coil and connecting wires entered into the reproduction of the voice and music, so that this style of microphone was considered unsatisfactory also.

Condenser Type a Failure

Next the condenser microphone, designed primarily for the measurement of sound intensities, was tried out and met such success that it is still in practical use at hundreds of the leading Radiophone broadcasting stations. The condenser style, although undoubtedly the best yet of any microphone employing a diaphragm, still had two serious disadvantages. Its diaphragm sagged very much with use and varying atmospheric conditions, and a very high degree of amplification was required for its satisfactory operation.

Eliminate Diaphragm

It was then decided to attempt to reproduce the sound waves electrically by one of the several ways not necessitating the use of a diaphragm. At this stage in the development, Dr. Thomas was possessed with the idea of using the phenomenon of the great change in potential across a so-called "glowing discharge" at reduced pressures of air when a change in the length of the discharge path occurred. He believed somewhat of the same effect might be present in air at atmospheric pressure and went to work on this idea as a means of making a diaphragmless "glow-discharge" microphone. In telling of his work Dr. Thomas says:

Inventor Tells of Work

"A calculation showed that this effect would afford ample sensitivity at reasonable impedance, were it to be even one-hundredth as great in open air. Tentative tests were made along this line, which seemed to show that the sensitivity in open air would not be sufficient for the purpose; also it was necessary to use a diaphragm. The writer, however, was able to show that the discharge impedance could be varied directly, without the intermediary diaphragm, by pressure variation from sound waves reaching the discharge path.

Origin of Name "Glow-Discharge"

"The direct current glow discharge, at low pressure, is a fairly well-known form of ionization conduction. Little has been published, however, on its characteristics in open air. Since the new microphone makes use of such a discharge as its variable impedance, a brief description of the phenomenon is thought to be desirable.

"The application of moderately high direct potential between two electrodes separated a short distance in air, with enough series resistance to prevent formation of the usual type of heavy current arc, will cause the establishment of a peculiar low current, high voltage discharge, having a characteristic glowing appearance, from which is derived the name 'glow-discharge.'

Nature of Discharge

"The order of current is from one to 20 milliamperes or more, at voltages ranging from 200 to 1,000 volts. Such a discharge, when produced between electrodes of certain metals, of which copper is one of the best, is remarkably quiet and steady to the unaided ear and eye. The discharge path is very similar to that produced at low air pressure.

"The development was completed by the working out of a low current, high voltage rectifier, with resistance-capacity filters, which permits the discharge to be struck or started by flashover, and maintains its current practically independent of discharge impedance. Units substantially of this construction have been used in the regular broadcasting programs of Station KDKA for several months."

Winnipeg New "Scalp" for WCAH Station, Columbus

COLUMBUS, O.—Winnipeg, capital of the province of Manitoba, Canada, is one of the new distances made by Station WCAH of the Entrekin Electric Company, Columbus, it has been announced by C. A. Entrekin, proprietor. WCAH now has the record of being heard in 27 states in the Union and two provinces of Canada.

$100 FLEWELLING PRIZE CONTEST RULES

1. Contest is open to all Radiophans, whether or not they are subscribers to Radio Digest, Illustrated. The contest is open now and will close February 24 at midnight. Awards will be announced in the March 17 issue of this publication.

2. The object is to locate and award prizes on a competitive basis for the best Flewelling circuit receiving set entered.

3. Prizes are: First, $40.00; Second, $25.00; Third, $10.00; Fourth to Eighth (five prizes) inclusive, $5.00 each.

4. In event of a tie, equal prizes will be awarded each tying contestant.

5. Judges will be the Technical Staff of Radio Digest.

6. To enter the contest send working drawings and diagrams together with an article of from 1,500 to 2,500 words in length describing the making and operation of an actual Flewelling circuit receiving set. The article should tell: (a) how to make the set, (b) how to operate it, (c) helpful suggestions for getting maximum results, (d) actual airline broadcasting station receiving range using only one tube, first employing only an indoor aerial but no ground, second, using a ground but no aerial, and third, if available, using only a loop aerial. Other combinations and notations on the antenna system used will be considered in the award of prizes.

7. In sending material for consideration in the contest, exclusive publication rights are automatically given to Radio Digest, Illustrated. All articles published, but not awarded prizes, will be paid for at regular space rates. Unused manuscripts will be returned to contestants on request.

8. In deciding the winners of the contest the judges reserve the right to call for any set entered to be sent in for examination and test. Tubes, A and B batteries and phones will not be required in sets sent in for testing.

9. Manuscripts will be judged from the standpoints of neatness, clarity of expression, completeness, and actual tried success of the set described.

10. Originality in the use of various parts of apparatus other than shown by Radio Digest in the Flewelling circuit heretofore, is encouraged and even recommended. See Rule 6, however, for method to be used in determining the range.

Army Net on Paying Basis

WASHINGTON.—After a year's operation, the army Radio service has now reached the point where it is operating on a paying basis, giving good service on all official communications in and out of Washington. While perhaps not comparable to commercial Radio traffic systems, the signal corps Radio traffic curve, the plotting of which began in January, 1921, has risen by about $1,000 a month. In December it reached the value of $6,200 for the month. This is solely on official war and other departmental Radio traffic between stations of the army Radio net; the army handles no commercial or naval messages.

During December the returns for traffic handled, when figured at commercial rates, exceeded the costs for personnel and maintenance of the whole net, including sixty stations.

Radio waves vary up to thousands of meters in length. They travel in all directions and through all mediums.

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Looking Ahead

Sets Submitted in the Flewelling $100.00 Prize Contest will be shown soon. Judging from the unique designs submitted, the descriptions of these sets will be interesting reading for all fans who have been experimenting with the Radio Flivver. Watch for the series.

Another Fine Article by E. T. Flewelling will appear in the March 3 issue of Radio Digest. Read his opinion on the theory of the circuit's operation, page 7, this issue.

Arthur G. Mohaupt Will Tell Radio Beginners next issue how the vacuum tube works. Chapter Eight of his splendid series for beginners appears on page 11. Read it and keep on with the series.

An Interview with Jackie Coogan should interest the young readers of Radio Digest. Watch for this feature in an early issue.

More Pictures of Popular Artists at All the Well-Known Stations are assured for readers of Radio Digest. Every issue features some of the singers, musicians, readers and other artists. You hear them nightly but like to see them, don't you?

Part III of the Only Sure-Fire Radiophone Station Directory will occupy pages 8 and 9 next week. Three consecutive issues gives the whole directory. Buy the Digest and know who you hear.

Newsstands Don't Always Have One Left

WHEN YOU WANT

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END DATE NEAR IN PRIZE SET CONTEST

FLEWELLING FANS FLOOD MAIL WITH ENTRIES

Letters Show How Improvements Have Been Made in Circuit—Last Call for Contestants

By the Contest Editor

As this edition of Radio Digest goes to press, manuscripts, photographs and drawings to be entered in the $100.00 Flewelling Set Prize Contest continue to arrive with every mail. The few remaining days before the closing date of the contest, midnight of February 24, it is believed will yield many more contributions from aspiring Flewelling fans.

Marked ingenuity and clever assemblies are shown by many of the amateurs who have already submitted papers. And the results they claim! It seems that Radio Digest can be congratulated without a doubt for having made the discovery of E. T. Flewelling and his truly "flivver" super circuit.

Fans Improve Circuit

It is also interesting to note the changes and modifications in the circuit which are shown by some of the contestants. Greater results than with the average Flewelling receiver are claimed by some of the fans who have made distinct changes in the original circuit.

Well, now a word to the eleventh-hour contestants. The date of the issue for which this is being written marks the close of the contest. Papers received after midnight, Saturday, February 24, cannot be considered in the contest. So mail in your papers today, after carefully reading the rules of the contest which are given in full on this page.

Preliminary Injunction Granted in Tube Suits

Judge A. N. Hand Gives Decisions in Patent War

NEW YORK.—Judge Augustus N. Hand, in the United States District Court for the Southern District of New York, has handed down decisions, granting preliminary injunctions in three suits brought by the Radio Corporation of America for alleged infringement of the De Forest audion patents by the manufacture and sale of vacuum tubes for Radio purposes.

The first of the suits was that against the La France Import and Sales Company, Inc., and others who are manufacturing and selling a vacuum tube known as the "La France" detector and amplifier.

The second suit was against Harry Rosenthal and others who are manufacturing and selling a vacuum tube detector and amplifier known as the "Perfection" tube.

The third suit was against the Radio Guild, Inc., a dealer in the "Perfection" tubes.

One of the principal defenses urged upon the court for a denial of the preliminary injunction motions was that the Radio Corporation of America had no right to maintain the suit because the De Forest Radio Telephone and Telegraph Company was the owner of the De Forest audion patents. This defense was overruled by Judge Hand for the present, in granting the preliminary injunctions.

ASKS FEDERAL QUIZ

(Continued from page 1)

pose, tendency or effect of which is to give exclusive rights or special privileges in the reception and transmission in interstate or foreign commerce of messages by Radio, and

"'(D) Such other facts as, in the opinion of the commission, may aid the House of Representatives in determining whether in the foregoing respects or otherwise the antitrust statutes of the United States have been or now are being violated by any person, company or corporation subject to the jurisdiction of the United States.'"

New Tropical Station Opens Direct Route to Honduras

WASHINGTON.—The opening of the new Tegucigalpa station of the Tropical Radio Telegraph on December 1 provided the first direct communication from the United States to Honduras. Previous to date the only available route was via All-America Cables to La Libertad in El Salvador and thence over the land lines of that government and those of Honduras.

The new station is equipped with the latest type of tube transmitters, with a power of 20 kilowatts and a normal operating range of 1,500 to 2,000 miles.

The Navy Department has begun the publication of the Communication Bulletin, issued in the interests of increasing the efficiency of Naval Communications, especially through greater rapidity and accuracy in handling messages by Radio.

ETHER UNITES TWO 'LOST' TEN YEARS

CFCA'S MESSAGES BRING COUSINS TOGETHER

One Relative in Canada, Other in U. S., Search Vainly for Each Other—Radio Aids

TORONTO, ONT. — Two cousins-in-law who were lost to each other for ten long years, have been brought together by The Toronto Star's Radio station, CFCA.

In 1913 both left their native country of Northants, England. One went to Canada, the other to the United States. They lost almost complete trace of each other. He who cast his lot with the land of the Stars and Stripes, heard the other had located in Toronto. He in Toronto understood his cousin was somewhere in the United States.

And with nothing more definite than this to work on, the latest scientific agency of communication—Radio—was harnessed to try to put the two cousins in touch with each other. It was the first time on record that such an attempt was made, and the Star's station, CFCA, has the unique distinction of being the one through which the experiment was successfully carried out.

Asked Aid of Radio

A request to endeavor to locate his relative came from Walter L. Hales, of Orange, Massachusetts. He had heard R. J. Fleming and Controller Singer speak from the Star's station on New Year's night, and was impressed with the wonderful medium offered by Radio for "putting across" a message. He said he wanted to ask a favor—that CFCA tell the world about his desire to find his wife's cousin, Leonard Stanway, who came from Wellingboro, Northants, England.

"Perhaps I am asking too much of you," he wrote, "but I thought this would be a new way of finding our long lost friends, if you would be so kind."

A brief announcement was made on two evenings, after the end of the regular program. Yesterday Mr. Stanway got in touch with the Star. A friend of his, who has a Radio set, had heard the announcement, and had passed on the message to him. Eagerly he inquired for his cousin's address, and got it.

Cousins Reunited.

Mr. Stanway has been living in Toronto ever since he left England. He had been very anxious to learn of the whereabouts of his relatives in the States, but to no avail. Every track proved to be false. And here was an alleged message from his cousin right out of the clouds. He seemed to think it incredible.

"You bet I'll lose no time in communicating with my cousin now," said Mr. Stanway. He read the address over two or three times, while the Star's representative checked it with that appearing on the letterhead of the relative in Orange, Mass.

A wire was sent forthwith to Walter L. Hales, Orange, Mass., informing him of the finding of his cousin, Leonard Stanway, in Toronto, as a result of the message broadcast by the Star.

Hundreds Miss Speech, so Babson Repeats by Radio

BOSTON, MASS.—Roger W. Babson, the "Wizard of Statistics," whose services and that of his organization are employed by big financiers all over the world, takes to Radio like a duck takes to water. Finding that some 3,000 people braved a recent heavy snowstorm to hear his lecture "The Business Outlook for 1923," only to be turned away because there were no more seats, he repeated the lecture by Radio from WNAC, the Shepard Stores station, in the hope that a majority of these, as well as other interested Radiophans might hear it. He is the man who is building a community church and auditorium in Wellesley, Massachusetts, near his offices, which will have services for different denominations conducted entirely by Radio.

PROBLEMS OF WORLD DISCUSSED BY JUDGE

COLUMBUS, O.—"Our World Problems" was the subject of an address broadcast recently by Chief Justice C. T. Marshall, of the Ohio Supreme Court, from Station WBAV, the Erner & Hopkins company. Judge Marshall's talk covered many vital questions rising from the present-day situation in Europe, touching upon the important phases of world unrest as they affect America.

WCX FOSTERS WORLD'S LARGEST BIBLE CLASS

DETROIT.—WCX, the Detroit Free Press station, has one of the largest Sunday School classes in the world. Every Thursday afternoon Dr. Gaius Glen Atkins of the First Congregational church explains the International Sunday School lessons. That thousands are listening in is shown by the responses received expressing appreciation, from all over the United States and Canada.

HEARS CHICAGO IN MID-OCEAN

Transmission across 2,465 miles of the Atlantic ocean, from Chicago to a Europe-bound ship without any prearrangements, is the enviable record of the Drake Hotel station, WDAP, Chicago. Miss Florence McDonald, sister of the president of the Chicago Radio laboratories, made the receptions aboard the liner. On the last day Miss McDonald Radioed to Chicago that messages sent from there at 2:00 A. M. were received at 7:00 A. M., in broad daylight, the difference being due to passage of the ship into various time bands. Two days out she reported reception was being made with but one tube, both amplifiers being broken. Under directions from Chicago and help from the Radio officers aboard the S. S. Berengaria she continued Listening in with the aid of two British tubes fitted into the American set's sockets © P. & A.

Daugherty's Kin Claims Amateur Distance Mark

WASHINGTON C. H., O.—H. E. Daugherty, of this city, and a nephew of Harry M. Daugherty, attorney general of the United States, has a claim to having the champion amateur long-distance transmitter in Ohio. Word has been received that the signals sent out by Mr. Daugherty on the night of November 19, were picked up in Manchester, England, an airline distance of about 3,500 miles. The feat of Mr. Daugherty, just made known through letters received from England, is attracting widespread attention.

WILL SLANG OF AIR INVADE 'WEBSTER'?

HIEROGLYPHICS SEEN IN FUTURE VOCABULARY

Abbreviated Messages When Translated Really Make Good Sense for Layman Listener

By A. K. Chenoweth

COLUMBUS, O. — Page the orthodox grammarian!

There is danger that even the modern slang of conversation will be revolutionized and given added stimulus toward lower depths of abbreviated phraseology, if Radio messages become common means of communication, students and professors of Ohio State university claim.

Prof. Charles A. Wright, of the department of electrical engineering at the university, raises the question if amateur Radio operators increase in number, will their abbreviations slip into common usage and thus become a part of the American vocabulary?

Light on the Hieroglyphics

As an example of what might be thrown at a person during informal conversation with one of these fellows, cards received at Robinson laboratory broadcasting station are submitted as evidence. One from San Juan, Porto Rico, reads: "U wr wkg 2 EL. Am I rite? Wold like to hr fm u. Congratulations OM." By way of interpretation, the following may be noted: OM means "old man," wkg "working"; wr, "were"; U, "you"; hr, "hear"; rite "right."

Another card from an operator in Fort Worth, Texas, says: "Ur C. W. sigs hrd hr Sept. 13 Vy QSA and steady. Called u but N. D. Hv u ever hrd me?" QSA is the international abbrevation for "loud." ND means "nothing doing." Otherwise, the message is very convincing to the average reader, is it not?

PICK EXPERT TO TEACH TECH COURSE IN RADIO

Massachusetts 'U' Extension Officials Select Henry B. Phillips

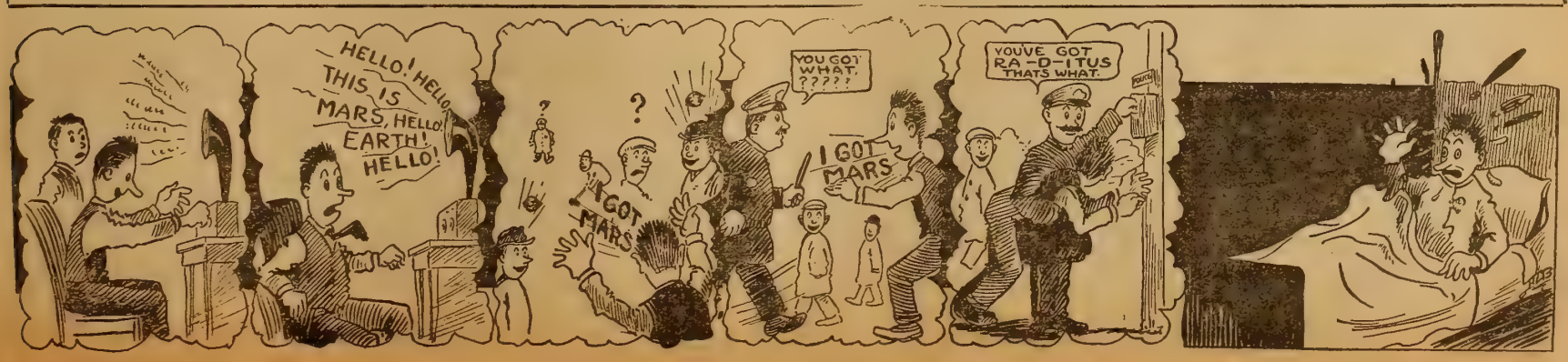
CAMBRIDGE, MASS.—Henry Bayard Phillips of the Massachusetts Institute of Technology, a widely known Radio expert, has been selected by the division of university extension, State Department of Education of Massachusetts, to conduct an advanced course in Radio reception and transmission. Classes will be held in the evening at the Technology buildings, and the course will comprise ten lessons. In this course Prof. Phillips plans to discuss the comparative value of commercial apparatus and circuits, explaining clearly and simply the theory and practice of the latest types of circuits. The following subjects will be studied: Advantages of Regeneration; Value of Super Regeneration; Audio Frequency and Radio Frequency Amplification; Commercial Apparatus; Transmitters; Heterotyne Methods; Reflex Circuits. The course is open to all persons resident in the state who have previously studied Radio.

Europe Hears 125 Plants in Trans-Atlantic Tests

HARTFORD, CONN.—During the recent transatlantic tests no fewer than 125 individual amateur Radio stations in the United States were heard by Europeans, whereas only 24 stations were heard during the entire test last year. Some of the stations were heard 4,000 miles or more. The majority of the stations are located in Connecticut, Maine, Massachusetts, New Jersey and New York, although several are in the Middle West and West.

Many of the developments in Radio have come from boys building and experimenting with sets in the attics of their homes.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Marconi Almost Did It, Too



750 BROADCASTERS AS FIELD TIGHTENS

STATIONS INCREASE MANY TIMES IN YEAR

Month Brings Fewer New-Comers Than Quitters—Seven New Plants During Week

By Carl H. Buttman

WASHINGTON.—For the first time since broadcasting began in September, 1921, fewer new stations were licensed during the past month than dropped out, indicating that the field for broadcasting is practically filled. This is not to be wondered at, officials point out, because the "Saturation point" has been reached. Many fans say, "well, there are enough anyway; we don't want any more; let the better ones survive."

Today, there are 570 broadcasting stations, 28 of which are Class B or 400-meter plants, the balance being on the more popular 360-meter wave. On January 1 there were 576, showing a loss of six during the month. While there were 28 new stations licensed in January, 34 old ones failed to renew their licenses.

Sixteen Times as Many as Year Ago

On the first of February last year, there were but 36 stations licensed in the new pastime of broadcasting. Today, there are almost 16 times that number. Many people believe that this is far too many, particularly since they are not very well distributed on the 360-meter wave.

The Radio bill, however, provides for the distribution of a large number of new waves, which should aid in decreasing the interference. Competition is creeping into the game. The best equipped stations giving the best service to the fans will probably become the permanent ones in the long run, it is believed.

Seven New Broadcasters Within Week

Within the past week, seven new broadcasters were licensed, and two Class A stations were transferred to Class B, allowing them to use the 400-meter wave.

The following are the new 360-meter plants:

WRAV, Antioch College, Yellow Spring, O.; WQAO, Calvary Baptist Church, New York, N. Y.; WPAZ, Dr. John R. Koch, Charleston, W. Va.; KFCV, Fred Mahaffey, Jr., Houston, Tex.; WRAJ, M. H. Pickering Co., Pittsburgh, Pa.; WQAR, Press Publishing Co., Muncie, Ind.; WSAA, Sprague, B. S., Elect. Co., Marietta, O., 25 watts.

Transferred from Class A to Class B Stations on 400 Meters:

KFI, Earle C. Anthony, Inc., Los Angeles, Calif.; KPO, Hale Bros., Inc., San Francisco, Calif.

Broadcasters Which Have Stopped

The thirty-four broadcasters which have not renewed licenses, and consequently were deleted from the records of the Commerce Department during January follow:

WLAO, Anthracite Radio Shop, Scranton, Pa.; KZY, Atlantic-Pacific Radio Supply Co., San Francisco, Calif.; WNAJ, Benson Co., Chicago, Ill.; KFBN, Borch Radio Corp., Oakland, Calif.; WOE, Buckeye Radio Service Co., Akron, O.; KDYO, Carlson & Simpson, San Diego, Calif.; WPE, Central Radio Co., Inc., Kansas City, Mo., (Relicensed at Independence, Mo., Jan. 5th); KFBM, Cook & Foster, Astoria, Ore.; WSX, Erie Radio Co., Erie, Pa.; KDZW, Claude W. Gerdes, San Francisco, Calif.; KFAC, Glendale Daily Press, Glendale, Calif.; WDAQ, Hartman-Riker Elec. & Mach. Co., Brownsville, Pa.; WKAZ, Landau's Music & Jewelry Co., Wilkesbarre, Pa.; WKAD, Charles Looff, East Providence, R. I.; WBAJ, Marshall-Gerkin Co., Toledo, O.; KVQ, James McClatchy, Sacramento, Calif.; WDAV, Muskogee Daily Phoenix, Muskogee, Okla.; KDZP, Newberry Elec. Corp., Los Angeles, Calif.; KFC, Northern Radio & Elec. Co., Seattle, Wash.; WBAB, Andrew J. Potter, Syracuse, N. Y.; WAAX, Radio Service Corp., Crafton, Pa.; KYY, Radio Telephone Shop, San Francisco, Calif.; WNAG, Rathert Radio & Elec. Co., Cresco, Ia.; WGAS, Ray-Di-Co. Organization, Chicago, Ill.; WFO, Rike Kumler Co., Dayton, O.; WPJ, St. Joseph's College, Phila., Pa.; KFBQ, Savage Elec. Co., Prescott, Ariz.; WHW, Stuart W. Seeley, East Lansing, Mich.; WSN, Ship Owners' Radio Service, Inc., Norfolk, Va.; KJC, Standard Radio Co., Los Angeles, Calif.; WCAQ, Tri-State Radio Mfg. & Supply Co., Defiance, O.; WJAL, Victor Radio Corp., Portland, Me.; WNAH, Wilkes-Barre Radio Repair Shop, Wilkes-Barre, Pa.; WAJU, Yankton College, Yankton, S. D.

RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

SEVENTEEN records were made during the last week. Receiving Records Contest aspirants need to produce real mileages now to have the honor accorded them of a place in the published list of record holders.

The new records, miles distance covered, and record holders are:

Station—Miles Away—Record Holder

KDYM—2025, F. B. Steer, Cleveland, O.
KDYU—1525, T. S. Wildman, Nichols, Ia.
KGV—3700, M. C. Bidwell, Grinnell, Ia.
KNJ—1400, Chas. Smith, Weston, W. Va.
KYY—2500, J. R. Purcell, Port Jervis, N. Y.
WDAQ—2375, M. C. Bidwell, Grinnell, Ia.
WHAZ—2550, H. Wilbert, San Francisco, Calif.
WKY—2400, R. Bartholomew, Garrochales, Porto Rico.
WLAL—1300, Perkins Benneyan, Fresno, Calif.
WLAY—3675, M. C. Bidwell, Grinnell, Ia.
WLW—1900, Perkins Benneyan, Fresno, Calif.
WMAC—1300, R. T. Andrea, Cobalt, Ont., Can.
WMAQ—1850, R. Rowe, Santa Clara, Calif.
WMB—1300, R. Hastings, Atchison, Kan.
WNAQ—1000, R. T. Andrea, Cobalt, Ont., Can.
WOAS—1275, L. Hull, Eureka, Kan.
WPAC-1225, R. T. Andrea, Cobalt, Ont., Can.

Youthful Radio Operator Almost Hanged by Wires

NEW YORK.—A most peculiar accident happened to Clifford Webster, aged 14, of this city recently while he was fixing his antenna in the attic of his home. He was placing the wires in position near the attic window, when his feet became entangled and he stumbled forward headforemost through the open window. The result was that the wires slipped from around his ankles to his neck, and he hung there, half-strangled, until some of the other inmates of the house, who had heard the commotion above, rushed upstairs and released him. A doctor was called and after some time managed to revive the lad.

The boy is said to be in a half-conscious condition at his home.

Naval Plants Raise Rates

WASHINGTON.—The Naval Communications Service has doubled its Radio commercial rates. After April 1, all naval stations requested to handle commercial messages will charge at the rate of 12 cents a word. It is believed that this will relieve the Department from further criticism. Emergency Commercial Service will be continued, however, where there are no other facilities.

DAYTON
Superior Products
ACCURATE, EFFICIENT AND BEAUTIFUL IN APPEARANCE
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DEALERS: WRITE FOR DISCOUNTS
HUDSON-ROSS
123 W. Madison St. Chicago

FRANCE SUCCUMBS TO BROADCAST BUG

SEND "RADIOLA" CONCERTS FROM NEUILLY

Plant Operates Daily on 1,565-Meter Wave Length—Celebrated Artists Perform

NEW YORK.—France has succumbed to the lure of broadcasting, and daily concerts from a powerful station situated at Neuilly, on the outskirts of Paris are on the air. These concerts are given by celebrated French artists and have become known as the "Radiola" concerts.

The actual broadcasting station at Neuilly operates on a wave length of 1,565 meters, and a power output of two kilowatts in the aerial is utilized. The transmitting apparatus is actuated under the remote control principle, the studio where the artists perform being located in Paris in the offices of the Societe Francaise Radio-Electrique, owners of the station. The studio follows general practice in this country, the walls and floors being heavily draped in order to kill any possibility of sound echoes entering the microphones.

Description of Plant

The aerial at the transmitting station is supported between two steel masts, each 200 feet high. It has five wires supported on suitable spreaders. The transmitting apparatus is contained in four large metal panels. The first contains the modulating tubes, the next has the rectifying valves for supplying the plate current of the tubes, and the third panel contains the oscillating tubes. These three panels are erected so that they are practically one unit.

The fourth panel contains the tuning elements—inductance and capacity for controlling the wave lengths radiated. The first concert was given on November 6, but recently daily concerts have been undertaken. These are given every evening between the hours of 8:45 and 10 o'clock Greenwich mean time.

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WD 11—or VT 2..... 4.00
The right filament and proper vacuum. All tubes guaranteed as good as new. Mark plainly. Pack carefully.
Radio Supply and Repair Co.
125 WEST LAKE ST., CHICAGO, ILL.
Repair returns 15 days after receipt.

DAILY RADIO PROGRAM FOR SOUTH SEA CRUISE

WWJ to Entertain Passengers on Detroit News' Tropical Trip

DETROIT.—One of the features of the specially conducted cruise to the tropics by the Detroit News in March will be a Radio program conducted daily from the studio of WWJ, the Detroit News broadcasting station here. A special receiving set is being prepared for this trip by the News Radio experts. This set is to be installed on the United Fruit Company's big steamer, Pastores, just before it sails March 3. Officials of the company will install special antennae to care for requirements of the set.

It is expected that WWJ, the Detroit News station, will be heard all the way down to the islands. Of course the steamer entertainments will not be confined to those sent out by the News. Programs from stations in New York, Texas and the South generally, will be received daily. However, special attention will be given to WWJ and its bulletins. In this manner the voyagers will be in touch with Detroit every minute in the day.

4V. Peanut Tubes with Adapter.....$2.75
Improved Radio Detector Tubes..... 2.50
Improved Radio Amplifiers..... 3.00
3 Coil Mounts (Regular $5.00 value)..... 3.45
Reinartz Air Core Coils and Diagrams.. 2.00
$10.00 Automatic Head Phones, long range receivers, pair..... 5.50
2 Slide Tuning Coils, $5.00 value..... 1.75
Complete Radio Receiving Outfit, 4 Tube Reflex, Panel Wired and Ready to Use—3 Radio—3 Audio... $55.00
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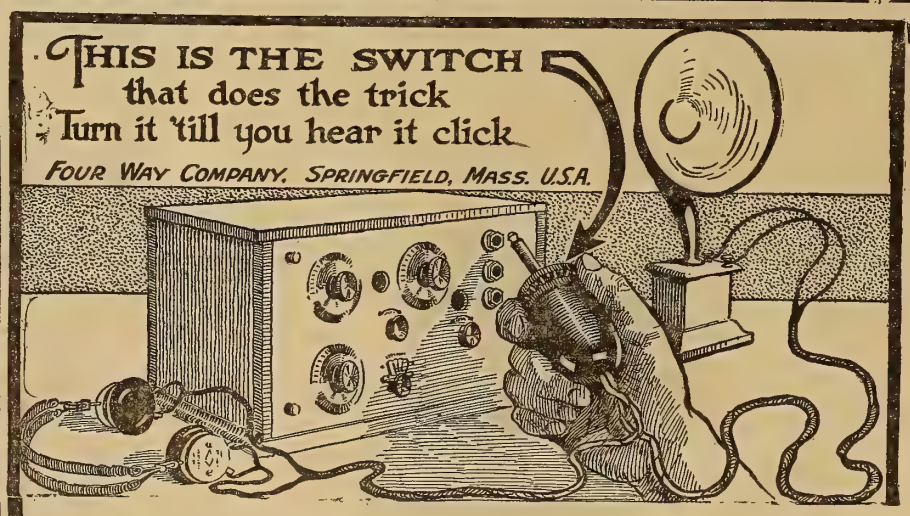
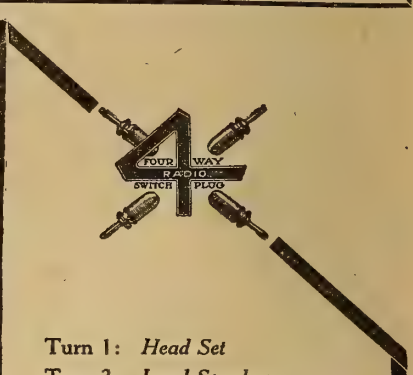

Turn 1: *Head Set*
Turn 2: *Loud Speaker*
Turn 3: *Both in Series*
Turn 4: *Both in Parallel*

—the latest and greatest improvement in Radio!
A switch plug which makes it possible to tune in thru head set and switch in loud speaker by turning dial. Two head sets can be readily attached, or one head set and loud speaker. Both can be used at the same time or either one alone.
$1.50
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YANK STATION ENTERTAINS BRAZIL

Directly above is the ex-mayor of Rio de Janeiro, Dr. Carlos Sampaio, and his family, enjoying opera broadcasts from SPC, the only broadcasting station in Brazil. To the right is the observation tower on the crest of Mt. Corcovado, near which is located the 153-foot antenna. At the left, above, is shown a close-up view of SPC's antenna masts which at times are hidden in thick clouds. Below is a sweeping view of Botofogo Bay which the station overlooks from its mountain peak indicated in the distance by the letters "SPC." The station is reached by the Corcovado rack railway, one of the cars of which is shown in the photo at the right. The trip only takes 30 minutes © K. & H.

Yank Station, Capping Brazilian Mountain, Wins Coffee Land People

SPC Selects Unique Location Atop "Corcovada", 2,000 Feet Above Sea Level—Antenna Vanishes in Clouds—Artists "See" Audience Below in Rio de Janeiro

By Aaron Burrell

Brazil, that progressive South American republic which is now celebrating the one hundredth anniversary of its Declaration of Independence by holding centennial celebrations in the beautiful city of Rio de Janeiro, is being entertained by a Yankee Radiophone broadcasting station licensed as SPC.

The necessary governmental concession to erect and operate a short wave experimental station during the centennial due to the world-wide reputation of American broadcasting stations, was easily secured by L. A. Osbourne, head executive of the Westinghouse International company, who was in Brazil while the feature attractions of the centennial were being made. Mr. Osbourne also secured the co-operation of the Brazilian Light and Traction company in finding a location and later in rendering program and operating assistance.

Select "Corcovado" Location

Entering the beautiful city of Rio de Janeiro the most impressive sight is the exquisite mountainous background of the city, and particularly "Corcovado" an almost perpendicular mountain with its summit over 2,000 feet above sea level.

"Why erect high masts when such a mountain is so near by?" queried the Radio engineers.

"Can we get the location?"

This question was answered in the affirmative by F. A. Huntress, general manager of the Tramway Light and Power company who own the cog wheel railway that climbs "Corcovado." He also assured the engineers that his company would be able to supply current on the mountain top for the Radio outfit.

The party set out to explore the mountain crest. The first 2,000 feet of ascent, or five-mile ride from Rio de Janeiro, was made in 30 minutes, and the final climb of 125 feet, by following the footpath to the circular observation tower on the top.

A quick survey of the available space on the crest disclosed a narrow path about 120 feet long, leading to a concrete parapet on the edge of the precipice.

Engineers See Practical Use

The crest of Corcovado had always been used as an observation point, but the Radio engineers saw more than mere scenery—they had a view of the prospective invisible Radio audience in numerous ships at sea, and the million inhabitants of the capital city several thousand feet below.

The mountain ranges and their peaks, while beautiful to look upon, were viewed as obstacles to be overcome in broadcasting to the distant cities and towns in Brazil. The tropical vegetation also suggested the climatic differences from the United States where these engineers had been active in developing several large stations.

Start Broadcasting; Send Opera

The call letters "SPC" were assigned to the station, and the first concert was broadcast. This concert was heard by many local stations, and three days later the S. S. American Legion, 151 miles out at sea reported hearing the signals clearly. The S. S. West Neres 175 miles out received the signals with one tube only.

The first week of broadcasting completely captured the Southern Republic. The Grand Opera House, rivaling any in the United States from point of architecture, has been equipped with a microphone, connected by direct wire to SPC's mountain top station, and both afternoon and evening performances are now broadcast.

A line has also been connected to the Monroe mansion for broadcasting from Rio. The mountain top studio, in the same building with the operating room, is duplicate in size and arrangement of KDKA at East Pittsburgh, Pa.

Artists Can't Help but See Audience

The artists whose concerts are broadcast in the United States find it difficult to visualize their audience. Those who give concerts from SPC'S mountain top, after looking out to the ships at sea and in the harbor at Rio, with a million population at their feet, as well as viewing the centennial buildings and the presidential palaces, can easily visualize the world as an amphitheater and the mountain top as the stage.

Even though it is prohibited to sell Radio receiving sets in Brazil, the twenty millions of Brazilians now have an opportunity to listen in to the broadcasting through the various receiving sets at the Centennial Exposition. Several loud speakers have been installed in the exposition grounds—one outside of the Monroe Palace and another outside of the American Building. The President of Brazil and his official family listen in through a very attractive receiving station installed in the President's palace.

SPC Has Unique Position

SPC has a unique position in the broadcasting field. At various times the station and antennae are in or above the clouds. Rio de Janeiro is practically on the boundary line between the temperate and torrid zones. The climate is varied by the mountain range Serra do Mar which runs along the coast. The dry season has now changed to the warm and wet season with its subsequent tropical storms. Precautions have been taken to prevent electrical interference.

The observances and records of SPC will, therefore, assist in studying the peculiarities of the air as far as Radio telephony is concerned. The experiences of this station in penetrating the equator and the torrid zone, when co-related with the data being compiled by other stations and close students of the new science, will no doubt result in listing peculiarities of the atmosphere unknown to science today.

In this it will parallel the study of the peculiarities of the ocean bottom which were a closed secret before the laying of the first Atlantic cable by Cyrus Field.

SEEKS FEDERAL GRIP ON COMMUNICATIONS

WASHINGTON. — Representative Sinclair of North Dakota has introduced an interesting bill in the House of Representatives "to secure to the United States a monopoly of electrical means for the transmission of intelligence for hire; to provide for the acquisition by the Post Office Department of the telephone and telegraph network; and to license certain telephone lines, Radio and telegraph agencies." The bill has been referred to the House Committee on Interstate and Foreign Commerce.

ASKS FOR CIVIL RULE OF RADIO IN CHICAGO

Alderman Includes "Silent Night" for City in Appeal

CHICAGO.—Radio regulation may be undertaken by the city council for the benefit of Chicago's great army of Radiophans if an order introduced recently by Alderman John Toman is passed.

The order calls for the drafting and submission of an ordinance providing for the licensing of Radio broadcasting stations and other regulations, one of the chief purposes of the ordinance to be the establishment of a "silent night." This is desired by Radiophans, Alderman Toman says, in order that they may have at least one night a week for long distance receiving.

The order was referred to the committee on gas, oil and electricity.

MAY CALL PLANTS IN FIGHT FOR BILL

STATIONS TO APPEAL FOR LISTENERS' AID

Plan to Arouse Attention to Issues' Plight May Save It from Discard

By L. M. Lamm

WASHINGTON.—An appeal to broadcasting stations to call the attention of their listeners in to the desperate plight of the White Federal Radio control bill and urge them to demand action by the Senate at this session is contemplated as a means of overcoming the obstacles being encountered by this legislation which is designed to bring about regulation of broadcasting activities.

Urgent appeals from a majority of the two million or more enthusiasts to their congressmen and senators will, it is felt, have its effect.

Plan May Save Bill

This plan, together with the reference of the bill to the Senate Interstate Commerce Committee a few days ago served to revive interest in the White bill in Congress, despite predictions made previously that the measure was dead so far as this session was concerned.

If the measure should ever reach the stage of committee hearings, the House members who handled the legislation in that body are expected to appear before the Senate committee and make a vigorous fight against the objections raised to the licensing features of the bill.

U. S. WARNS AGAINST ETHER FOOLISHNESS

WASHINGTON. — Operators of broadcasting stations are warned by the Radio section of the Department of Commerce not to communicate with other stations, receiving included, by either telegraphy or telephony as broadcasting licenses do not permit direct communication. Some stations have been guilty of acknowledging letters, telegrams and telephone calls. Suspension or revocation of the license is the penalty. Owners are cautioned to observe the rules else their station licenses may be endangered.

U. S. MAY USE AIR PHOTO INVENTION

LIFTS VEIL FROM RECENT SECRET TESTS

High Officials of Navy Consider Device After Transmission of Pictures from Station NOF

(Special to RADIO DIGEST)

WASHINGTON.—Plans for the utilization by the government for an invention for the Radio transmission of photographs, half-tones and other pictures are under consideration by high officials of the navy.

Secrecy regarding a demonstration on December 12 of the invention of C. Francis Jenkins, a Washington scientist, has just been removed by the group of navy officials before whom the tests were then made. Mr. Jenkins' apparatus was described some time ago in Radio Digest. Besides the various members of the navy department, there were present at the demonstration J. C. Edgerton, supervising Radio activities for the post office department, and John M. Joy, representing Will H. Hays and the amalgamated motion picture industry.

Send Picture Through NOF

During the demonstration photographs and drawings were broadcast through the ether from the Anacostia station, NOF, to the Jenkins laboratory. The sending unit was superintended by Commander A. Hoyt Taylor, in charge of the Anacostia station, while the rest of the officials witnessed the reception of the pictures on negative photographic plates at the Jenkins laboratory and watched their printing in the developing room.

Four pictures in all were broadcast. Two were photographs, one of President Harding and the other of Secretary of the Navy Denby. Two penciled sketches, one representing a map and the other comprising written and printed letters, were also sent. Although the original photographs were said to be of fair photographic quality only, the prints made from the receiving plate in the laboratory were pronounced quite clear, the heretofore impossible feat of broadcasting half-tones having been successfully accomplished.

Can be Used for Motion Pictures

About six minutes was consumed in receiving each picture, but Mr. Jenkins predicted this could be reduced to one-sixteenth of a second, the speed necessary to produce motion pictures.

A most interesting feature was a demonstration by one of Mr. Jenkins' assistants of his ability to identify the picture being sent by "sound." It had developed in earlier experiments that the picture impulses gave off a series of "groans" and that each picture had its characteristic "sound", which could be recognized after a few repetitions.

How Device Operates

The sending apparatus, consisting of a stereoptican like machine, projects the picture across a photo-electric cell in steady, downward sweeps. With each sweep the projected image is moved slightly to the side, only a thin slice of the image being drawn across the cell at one time. The varying intensity of light caused by the successive "slice" shadows caused correspondingly varying impulses to be broadcast.

At the receiving end an ordinary Radio receiver, on the diaphragm of which a tiny mirror is mounted, was used. Projected on the mirror was a strong beam of light. Vibrations of the mirror as it oscillated with the diaphragm caused the light beam to fluctuate across a filtering shutter, and thence through rotating prismatic rings onto the sensitive photographic plate. In this manner the light impulses are laid down side by side as they are received from the original picture.

Air Talk Tells Fans Why They Should Make Wills

BUFFALO, N. Y.—Make a Will Day was observed in Buffalo recenty by Radio when S. Grove McClellan of the trust department of the Liberty Bank of Buffalo spoke from the Station WGR of the Federal Telephone and Telegraph company, on, "Why You Should Make a Will."

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Book Reviews

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr. E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review of not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

RADIOPHANS ORGANIZE WCX RED APPLE CLUB

WCX Gives Prizes to First Listener In Reporting

DETROIT.—The Red Apple club has been organized by WCX, the Detroit Free Press station here. The club was formed for the benefit of Radiophans in the Middle West, West and the South. The club holds a "frolic" every Tuesday evening from 11 to 12 o'clock midnight. At a recent entertainment a prize of a fountain pen was awarded the first listener from each state and Canadian province who wired in that he heard WCX. In a few minutes messages began coming from all parts of the country.

"Keep the Fleet Mobile" is the Navy's motto, based upon the theory that efficient and uninterrupted communication between all units of the Navy makes for mobility of our sea defense.

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Make First Step to Cross Pacific

Vessel 120 Miles Off Coast of China Hears Amateur Broadcasts; U. S. Surprised

HARTFORD, CONN.—Not content with sending Radio waves across the Atlantic Ocean with the same power that it would take to heat the filament on a 100-watt light and having the voice heard, via Radiophone, by listeners in London, American amateurs have taken, unwittingly perhaps, the first step toward conquering the Pacific as well.

The best evidence that they are really capable of doing this is the report received by the American Radio Relay League headquarters here, that four west coast stations have been heard in Asiatic waters. American amateur signals have been heard now off the coast of every continent. What this will do toward linking up U. S. amateurs in a new bond of relationship with every country where Radio amateurs are to be found, is a problem which progress in Radio this next year may only help to solve.

Heard by Ship 120 Miles off China

The reception of amateur signals by a ship operator 120 miles off the coast of China was one of the biggest surprises that developed during the transatlantic amateur tests.

Not only were the signals from U. S. stations heard clearly, but the operator, in a postal card mailed from San Francisco, stated that he could hear the signals a distance of twelve feet from the headset. The best previous record for amateur long distance transmission via the Pacific was Yokohama, 900 miles this side of the point where the amateur signals were heard.

6ZZ and 6KA Rate as Stars

Of the stations heard off the coast of China, two were heard across both the Atlantic and Pacific Oceans during the transatlantic amateur test conducted under the auspices of the American Radio Relay League.

"With all due credit to the list of successful stations, we think 6ZZ and 6KA are the stars," said Kenneth B. Warner, league secretary, "for they are in the China list and they also got over to Europe, including all the long 2,500 mile drag over the Rockies and across the United States."

Radio is finding its way into college curriculae. According to a report from Philadelphia the University of Pennsylvania plans courses in Radio this spring.

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WOAI STAND AGAINST "AIR CLUBS" PRAISED

Revoke "Guilty" Stations' Licenses, Fan Advocates

SAN ANTONIO, TEX.—Another Radiophan has expressed his approval of the anti-club policy of WOAI, as outlined recently by Ellis Chaney, vice president of the Southern Equipment Company, operators of WOAI. He is H. W. Tribble of Rogers, Ark. Many Radiophans throughout the country have commended the stand WOAI has taken in the abolishment of station clubs and organizations as boresome and uninteresting to the majority of Radio listeners.

Mr. Tribble writes as follows:

"You are to be commended in the stand you have taken with regards to such Radio broadcast organizations as several now in existence and others. Such stations should have their licenses taken from them. If I understand it, the Radio laws require first-class entertainment, and that is only foolishness.

"Yours for better broadcasting,

"H. W. TRIBBLE."

Alexandra Carlisle and Wm. A. Brady on Program

NEWARK, N. J.—Miss Alexandra Carlisle, the charming classic actress of international fame, and William A. Brady, the eminent theatrical manager, were the recent headliners on the program of the L. Bamberger & Company station, WOR, of Newark, N. J.

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3/16" THICK	2¢	PER SQ. INCH
1/4" THICK	2 1/2¢	PER SQ. INCH
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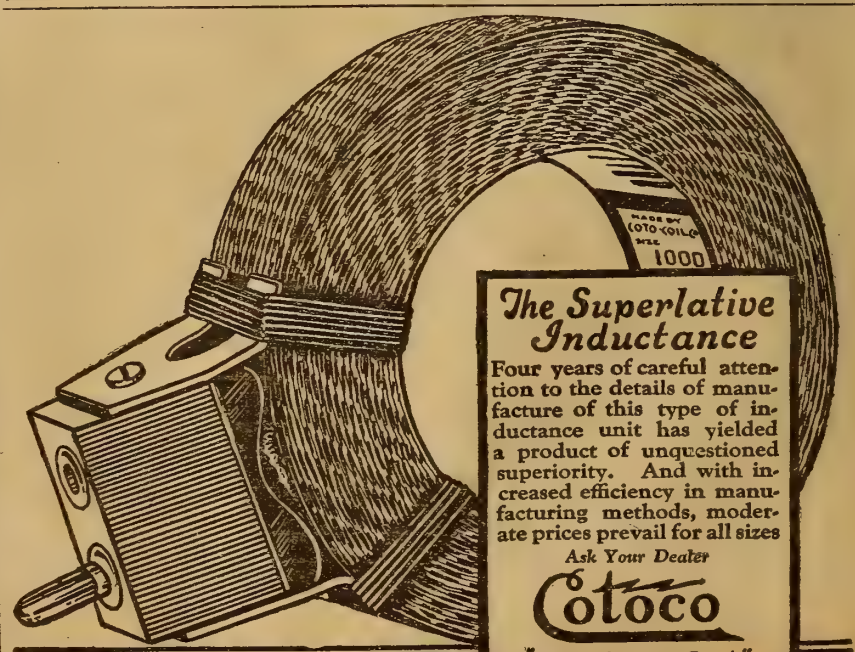

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The "How" of the Simplified Super Circuit

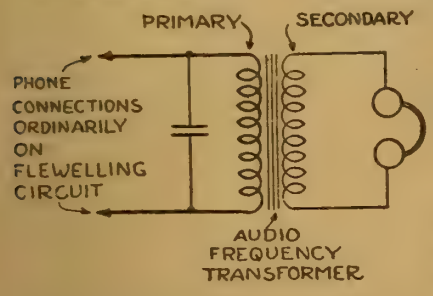
Part IV—Theory of Operation

By E. T. Flewelling

THE next question that enters into our discussion seems to be the matter of capacity effects. Body capacity effects were found quite bothersome until one solution at least was found. The simple secret of this solution was in the removal of the phones from any direct connection with the plate circuit.

If the primary of an audio frequency transformer is hooked up in place of the phones and the phones are connected to the secondary of the transformer as shown in the diagram, it will be found that the body capacity effects are reduced to a point even less, perhaps, than that encountered with the usual set.

It is necessary however to use a transformer having about the right values. The writer in common with several fans,



however, has found that most audio frequency transformers will serve the purpose nicely. Note should be made that it is often, perhaps always, necessary to adjust the leaks to compensate for this change which is of such marked advantage.

Writer's Experiences in Reception

The writer has often been asked to tell what results he has had in the reception of broadcasts with the Flivver circuit. Modesty of course forbids any elaborate statement on this subject. As a rather typical case is occurring as I write this article I think that it might be of a little help to those not familiar with what the Flivver circuit is, if I speak of it.

With the phones on my head, above the sound of the typewriter, I am listening to an announcer from a broadcasting station trying to establish communication with a Miss McDonald, who is on board the S. S. Berengaria. The announcer states that last evening when he succeeded in reaching her, the Berengaria was 2240 miles off of New York, etc.

When it is considered that this is being done with a single tube Flivver circuit using a WD-11 tube with 45 volts on the plate, that no outside aerial is used and the circuit is operating on an only grounded 2-foot loop, and that the announcer says that he is at Station WDAP, The Drake Hotel, Chicago, it will be seen that the Flivver Circuit "gets there just the same."

Hears Distant 20-Watt Plant

If the Flewelling Super is hooked up according to the detailed directions that have been given and is given the same amount of attention and care that the average Radio circuit is given, it will invariably perform in direct proportion to the skill of the operator, taking into consideration of course the fact that so many stations are operating transmitters that differ so much from each other in the amount of power that they use.

It is useless to try to pick up a station a thousand miles away, if that station is only using a 5-watt transmitter. This reminds the writer of a case of reception that he accomplished with the 2-foot grounded loop and the Flivver a few nights ago that is greatly to the credit of both transmitter and receiver even though admittedly, it might have been a case of so-called freak reception. The transmitting station in question was picked up in Wakefield, Mass., with an audibility at least comfortable, and upon signing it was determined to be Station WOAG, The Apollo Theatre, Belvidere, Illinois. This plant was only using four 5-watt tubes, so all in all, the reception was most surely a very creditable performance.

Advantage of Flivver Circuit

The circuit has the additional grid leaks to handle to be sure, but as these are partly responsible for the extraordinary sensitiveness of the Flivver, one surely is willing to make these additional adjustments to get the extra advantages. The Flivver circuit has never been very particular about the kind of antenna it would function on, and for this reason has found its greatest field in the homes of those not able to have an outdoor aerial and others who take into consideration the financial side of their Radio investment. Of such people, the Flivver is not afraid, and will bring in the most surprising stations.

A popular question about the Flivver seems to be "How does it work?" While the writer does claim himself capable of outlining a bomb-proof theory, yet there are some interesting points to be considered. The following ideas are offered in the hope that the question will eventually be answered.

Regenerative Set Distorts Sounds

Thousands of fans using regenerative receivers have wished that they could find a means of carrying regeneration beyond the present limits of their receivers. However, unless some other factor is present, it would be useless to do this, due to the distortion that is more or less present when regeneration is used and which increases as one uses more regeneration. In other words, the more regeneration, the more distortion. We wish for more sensitive receivers because our present ones (meaning the popular regenerative sets), when at their most sensitive point, are unable to give an undistorted reproduction of the incoming signal.

Two reasons at least exist to explain this. Regeneration is advanced too far, and the circuit is in or near the point of oscillating freely within itself, sometimes called a condition of "free and sustained oscillation," which if rectified, will result in the familiar howl.

It will be shown that the Flewelling Super is not able to go into this condition and therefore cannot howl, and that it is capable of bringing in a signal, without distortion, that is so very weak that the ordinary receiver is unable to indicate even the existence of it.

Discussion of Theory Valuable

If we know how the Flewelling Super differs in its action and more or less what its action is, we will be better prepared to handle our set properly. Distasteful as it may be, a little discussion about the theory of the circuit may be of some value to us.

In a Radio receiving circuit there is always regenerating if we place a coil of wire in the plate circuit or if the plate circuit is coupled back to the grid. Even a plain Radio frequency circuit using transformer coupling has a regenerative action in it due to the inductive effect of the primary winding of the R. F. transformer in the plate circuit of the tube.

The familiar tickler coil is an example of plate circuit coil. We know that as we bring it into closer coupling with the tuning inductance of our circuit, that we increase the regenerative effect.

We are also causing another effect that is of more value to our discussion. As we increase regeneration we are lowering, to say it roughly, the resistance of our circuit. This can be carried to the point where the effective resistance of the circuit is at a zero value.

When the point of zero resistance is reached, we are unable to hold it because such a condition allows other reactions to be set up in the circuit. The circuit will then go into either of two conditions, either where the prevailing condition is one of positive or where it is of negative influence. It might be on one side or the other of the zero point but is controllable in this respect by the amount of regeneration that is used. We are interested mostly in the point where the circuit is in a condition of violent regeneration and is therefore easily influenced by any slight change that might enter into it from a case of positive resistance or negative resistance influence.

We are not interested in outlining the theory of super-regeneration, and, having placed our circuit in such a condition that it may be influenced by the slightest change, we will leave it for a moment.

Grid Leak Controls Grid Charge

We are able, by proper manipulation of the grid leak (this is one way in which it may be done, especially when using a hard tube) to completely stop the tubes ability to function in the usual manner. This may be done at any rate of speed that we desire. If as in the case of the Flivver circuit, we block off the A and B batteries from their usual connection with the grid, the grid will take a negative charge from the filament of the tube by way of the space charge in the tube. This charge will build up to the point where it is so great that it blocks the plate circuit and the tube action is "paralized."

Now if a leak is provided for this grid charge, the latter will leak off, the tube

(Continued on page 9.)

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Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAH, Eldorado, Kans. 485 only. The Midland Refining Co. Daily ex Sat, 10:30 am, 1:30 pm, markets, weather. Sat, 1 pm, same. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 50 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4 pm. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30 pm, news, reports, concerts. Central.

WBAQ, Mishawaka, Ind. Lyradion Mfg. Co.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Wed, Fri, 10-11 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central.

WBZ, Springfield, Mass. 422 only. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. 150 mi. Newburgh Daily News. Daily ex Sun, 1 pm, 2, 3, 7. Mon, Fri, 10:30 pm. Eastern.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Rodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Sun, 2-4 pm music. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 100 mi. Wesleyan University. Wed, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:15 pm, music. Wed, 8-9:15, concert. Sun, 3-4:30 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. St. Olaf College. Thur, 11 pm, music. Sun, 8:30 pm, music, concert, lecture. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.

WCAR, San Antonio, Tex. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8:30-10 pm, music, lectures. Mon, Tues, Wed, Thurs, Fri, 5:30-6 pm, code instruction. Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 485 also. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAZ, Carthage, Ill. Carthage College.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm. Tues, Thurs, 3-3:30 pm, music, news. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, reports, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Texas. 485 also. 300 mi. Mine & Smelter Supply Co. Daily ex Sun, 10 am, news, reports. Tues, Thurs, Sat, 7:30-8:30 pm, music. Mountain.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Daily ex Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40, bedtime story; 8:15, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, time, weather; 4-4:30 pm, 8-9, music; 10:05, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAR, Philadelphia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-1:50 pm, industrial reports; 7:45-10 pm, music. Sun, 10:30 am-12, 5-6 pm, church services. Eastern.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Kenneth M. Hance. Daily ex Sun, 12:15-12:30 pm. Tues, Thurs, Sat, 7:30-8:15, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDV, Omaha, Neb. 100 mi. John O. Yeiser, Jr. Daily 7-8 pm. Tues, Sat, 12-1 am. Fri, 10-10:45 pm. Sun, 2-4 pm. Music. Central.

WDY, Roselle Park, N. J. Radio Corp. of America.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 am, markets, music; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news sports. Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:30 pm, 1:30, 3:15, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. 300 mi. Univ. of S. D. Mon, Wed, Fri, Sat, 7:30 pm, music, lectures. Central.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Sheppard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, Ohio. Ohio State Univ.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Tues, Thur, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. 1,500 mi. Will Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program, 8:15-9:15 pm. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. Elec. Supply Co.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Port Arthur, Tex. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 1:15 pm, 3:15, 7:30, reports, music. Tues, Thurs, Sat, 8-9 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 12:40 pm, markets. Wed, 8:30 pm, concert. Wed, Sat, 11 pm, concert. Central.

WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 485 also. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Daily ex Sun, 10 am, reports; 1:16 pm, news; 2, reports; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:10 pm; Sun, 3:30 pm, organ recital. Sun, 4 pm, chapel. Eastern.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAT, Lincoln, Nebr. 100 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program, concert. Sun, 3-5 pm, sermon. Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 500 mi. Am. Radio & Research Corp. Daily ex Sun, 9:30 am, 11:30, 3:25 pm, music; 10:30 am, 1:30 pm, 3, 6, 6:30, reports, news; 5 pm ex Sat, children's hour. Mon, Wed, Fri, 6:15 pm, code practice. Tues, Thurs, Sat, 6:45 pm, code practice. Tues, Fri, 2 pm, Amrad Women's Club. Tues, Sun, 8:30 pm, concert. Thurs, Fri, 9:30 pm, concert. Sat, 8 pm, concert. Sun, 4 pm, concert, 6:30, reports. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. 1,500 mi. The Atlanta Constitution. Daily ex Sun, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Central.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 300 mi. Interstate Elec. Co. Mon, Tues, Wed, Sat, 8-9 pm, music, talks. Central.

WGY, Schenectady, N. Y. 370 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 11:55 am, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 600 mi. Univ. of Wis. Daily ex Sun, 11:58-12 m, time signals; 12 m, weather; 12:07 pm, agricultural bulletin; 12:20 pm, educational lecture. Tues, Fri, 8-9 pm, news, lectures, music. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAF, Pittsburgh, Pa. 200 mi. Radio Elec. Co. Daily ex Sun, 11:30-12 m, 3-3:30 pm, music, news, Sun, 9-10, music. Eastern.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. Hafer Supply Co.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm. 4:30-5-30. 10-11. Sat. 10-11 am. 2-2-:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 9:15-9:45 am, 12:30-1 pm, 3:45-4:15, 7:30-8:30. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 9:30-10 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Daily ex Sat, Sun, 12-1 pm, 4-5, music, agriograms. Sat, 12-1 pm, music, entertainment. Eastern.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 1:30 pm, 6, reports, sports. Mon, Wed, Sat, 8 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 200 mi. Associated Broadcasters, Inc. Daily ex Sun, 7-8 am; 9:15-10:55, 12:55-1:15 pm, 2:15-2:30, 4:15-5:30, 6:15-7, 7:30-8:30, 10:30-12 m. Tues, Wed, Fri, 7:30-8:30 pm omitted. Sun, 1-3 pm; 10:30-12 m. Eastern.

WHX, Des Moines, Ia. 50 mi. Iowa Radio Corp. Daily, 5:30-6:15 pm. Wed, 8-9:30 pm. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeLortin. Tues, 9-10:30 pm, Thurs, 12-1 am, music. Sun, 10-11:30 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:15, 12 m. 1:50 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 100 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music; 8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Sat, 8-10 pm, concert. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 2:30-3:30 pm. Daily, 1:30-2 pm, 7-7:30 pm. Tues, 7-12 pm. Fri, 7-9:55 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 200 mi. American Radio Co. Mon, Wed, 8:30-9 pm. Central.

WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 1,200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star. Daily ex Sun, 9:15-11:30 am, markets, weather; 1:30 pm, closing markets, agriograms. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, church service. Central.

WJAQ, Topeka, Kans. Capper Publications.

WJAR, Providence, R. I. 485 also. 600 mi. The Outlet Co. Daily ex Sun, 10-11 am, 2-3 pm, 5-6. Fri, 8-10 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:30-6 pm, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm; Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7-8:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 25 mi. Denison Univ. Tues, Thur, 5-6 pm, educational lectures. Sun, 5-6 pm, religious stories. Central.

WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.

WJK, Toledo, O. 300 mi. Service Radio Equipment Co. Daily ex Sun, 2-3 pm, reports. Mon, Wed, Fri, 7:30-9 pm, concert. Sat, 2-5 pm, sports, news. Sun 11-12:30 pm, 7:30-8:30, church services. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Radio Corp. and Westinghouse Elec. Co. Daily ex Sun, 9-9:15 am; 12-1:15 pm, 4-4:15, 7-7:30, 8-10:30. Sun, 10:30 am-1 pm, church services; 3-4:30, music. Eastern.

WKAA Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAG, Louisville, Ky. Edwin T. Bruce.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. WKY Radio Shop (Daily Oklahoman). Daily ex Sun, 12 m, weather; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WLZ, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAF, Lincoln, Neb. Johnson Radio Co.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30-12 am, music, market reports; 1:30-3 pm, music, farm news, styles; 3:30-4:45, markets, music; 6-7:30, farm news, children's hour. Thur, Fri, Sat, 8-9:30 pm, concert. Sun, 4:30-5:30 pm, church services. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAR, Marshalltown, Ia. 50 mi. Meikel Music Co. No definite schedule.

WLAS, Hutchinson, Kan. 485 also. 100 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 1:30, markets; 12:30-1:15 pm, music. Wed, 8-9 pm, concert. Central.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

FLEWELLING THEORY

(Continued from page 7)

becomes free, and the action renews itself. By using the exact value for the grid leak resistance, we can time this action to meet our needs. Incidently this is what is done in the Flewelling Super and results in a time element entering into our calculations. By changing the time of this action (which is very audible in the phones when slow enough), we can start and stop at any frequency all action in the circuit.

It is this stopping and starting action that gives the Flewelling super its characteristic sound. It will therefore be seen that the whistle is not caused by the familiar "low frequency oscillation of 10,000 to 15,000 cycles per second", but by this starting and stopping action.

How Condensers Effect Action

It is well known that if a condenser is placed in a suitable circuit and alternately charged and discharged there will be set up in the circuit a surging action that is caused by the endeavor on the part of the circuit to find a position of equilibrium. The magnitude of action depends of course, upon the constants of the circuit.

Now if the frequency of the surges of the condensers is properly timed, and it can be by proper timing of the tube function, we will be enabled to let our circuit "run away" to a point of maximum amplification, and then to stop it from entering into the condition of free oscillation by the application at the proper moment of positive resistance in the form of a surge from the condensers. This cycle of events must occur at a such a rate of speed that it will, if audible at all, not be so slow as to result in distortion and it is therefore necessary to so adjust our leaks that maximum amplification will be obtained and yet block out any distortion.

It will be found that the action's speed will be dependent not upon the leak value alone, but that this value must be changed as other constants in the circuit are changed. For example, in tuning, if the tuning condenser and the coupling of the coils are changed, the leak values should be changed to correspond, and thus keep the time element at the right point.

Flewelling Flivver Differs from Super

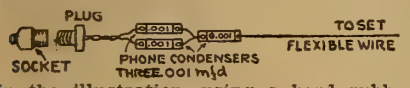
The above outline of action is but roughly drawn. It is given to show that there is a different action occurring in the Flewelling Flivver than in the usual Super, because so many folks have thought that there was no difference in the two except that the large inductances in the latter were replaced by condensers.

Like all questions however, this one has two sides to it.

Consider for a moment a Flivver circuit modified so that it would have no plate coil, and no ground or aerial, a circuit that has no more opportunity for regeneration than that possible by way of the coupling of the grid and plate circuits through the tube elements themselves. If you saw such a circuit bring in a station ten miles away would you blame the writer if he asked the question, "Is this circuit dependent upon regeneration for its action?" Unfortunately such reception is not yet at all reliable. It has been accomplished only in rare cases but the accomplishment brings such an element of uncertainty into our proposition that it seems worth while still to entertain the doubt.

Light Socket Aerial

Phone condensers will make a socket aerial. Procure three .001 mfd. phone condensers and connect them as showr



in the illustration, using a hard rubber base, wood or bakelite.—Arthur H. Phillips, Winnipeg, Canada.

Radio insurance is now being offered covering fire, lightning, breakage and theft.

A Chi-Rad handbook for this Ad and 10c

Because of the astonishing number of requests for Chi-Rad's latest Handbook-Catalog, we are forced from this date on to make this small wrapping and mailing charge.

In this Chi-Rad Handbook are 48 pages of valuable information for every radio fan. It includes the following:

1. Technical discussions of standard radio apparatus and equipment.
2. Complete instructions, including diagrams, circuits, and illustrations on "How to Build a Reinartz Receiver."
3. Radio definitions, codes, wire tables, etc.

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Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loudspeaker or phonograph can be used in place of headset. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel. Complete..... **$12.45**

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct this Set. Complete..... **$11.45**

COMPLETE KNOCKDOWN RECEIVING SET

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial.... **$17.95**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now.....$1.75
$3.70 Value, 23 PLATE, now.....$1.45
$3.10 Value, 5 PLATE, now.....$1.25
$2.70 Value, 3 PLATE, now.....$1.15
$3.30 Value, 11 PLATE, now.....$1.35

U.S.A. SIGNAL CORPS Aviation Type 194-W WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathanial Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at **$9.95**

Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special..... **$4.65**

COMPLETE PARTS FOR FLEWELLING CIRCUIT

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete..... **$12.45**

FEDERAL JACKS FILAMENT CONTROL SINGLE CIRCUIT.....35c
FILAMENT CONTROL DOUBLE CIRCUIT.....50c

MAGNAVOX, LOUD SPEAKER, Type R3 ..... **$34.95**

VARIOMETERS, Genuine Mahogany, $5 Value, Now..... **$1.95**

VARIOCOUPLERS, $4.50 Value, Now **$1.75**

HONEYCOMB COILS

1,500 Turns.....$1.50
1,250 Turns..... 1.50
1,000 Turns..... 1.25
750 Turns.....$1.00
250 Turns.....75c
150 Turns.....60c
100 Turns.....50c
75 Turns.....40c
50 Turns.....40c
35 and 25 Turns.....40c

$8.50 Guaranteed 3,000 Ohm Head Phones... $3.65	Grewol Detectors $1.65	Lightning Arresters 95c	Anti-Capacity Switches $1.50
Rheostats 45c	Signal Corps Super Sensitive Microphone $2.45	2-Slide Tuning Coils, at..... $1.95	Lightning Switches $2.65
Sponge Rubber Ear Caps, Pair..... 50c	Transmitters $2.45	3-Coil Honeycomb Mntgs., with Knobs $4.20	Hydrometers, now at..... 45c
Dials, 2, 3 and 3½ inch 25c	Solid Copper Aerial Wire, 100 ft..... 35c	Phone Caps, for mostly all phones..... 25c	Freshman Variable Grid Leaks..... 95c
Thordarson Amplifying Transformers, $4.50 Value, Now $2.95	Spaghetti Tubing, yard 10c	Signal Cps. Hot Wire Ammeters, at..... $5.45	
	Cord Tip Plugs 60c		

FORMICA PANEL, ⅛" thick, Black or Brown, Square Inch..... 1½c

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, February 24, 1923 No. 7

Pay System in England

Owners of Sets Pay a Yearly License

OWNERS of stations in England are trying to put broadcasting on a paying basis. Artists will be paid for their performances before the microphone and programs will be kept on a very high standard. This is made possible by the British government regulations.

To own a receiving set in Egland one must have a government license costing about $2.20 a year. The government has agreed to pay one-half of the funds thus received to the broadcasting stations for program costs. The other revenue necessary for the operation of the stations will come from the sale of receiving sets by the broadcasting companies.

A Great Silent Audience

To the Speaker the Microphone is the Only Audience

THE Radio broacaster who has had previous platform experience must change his whole mental outlook. He has been accustomed to "feel out" his audience. It may be cold, he must arouse it; it may be critical, he must ingratiate himself; it may be turbulent, he must calm it; it may be sympathetic and "go along" with him from the start.

Talking into a microphone is a good deal like making an impassioned appeal to a wooden Indian—the expended energy is all on one side. The broadcaster must build up a new technic, and draw powerfully on his imagination—and his success will be in proportion to his power to visualize, just as the success of the speaker today lies largely in the ability to "sense" his audience.

He will stand in front of that steel transmitter in the solitude and tense silence of the studio and a greater audience than ever gathered in the Anthenian theater of Dionysius, in the Roman Colosseum, or on the hill of Tara will form in the prospect of his mind's eye. He will visualize the dwellers in the city apartment, in the street crowd that has drifted into the retailer's shop, the farmer and his family gathered around the fireside, the lonely rancher on the western plain, the camping party. Did ever the human voice since man communicated his ideas to man have such an audience as this?

Co-operation Aided by Radio

Country Schools and Farm Bureaus Are Benefitted

NOTHING in the farm field is more impressive to an outsider than the extension of co-operative action in recent years. Just as common interest is a powerful motive in co-operation, so the dissemination of common intelligence and the maintenance of contact are conditions which make the promotion of common interest possible. Some of our states have farm bureaus in every county. Information sent out by Radio under their auspices would further the purpose of such bureaus and get their information and their policies to the individual members with the speed of light.

Perhaps the greatest general utility of Radio to the farmer is in tying up with the extension work of the agricultural colleges and schools and the various state organizations devoted to improvement of farm methods. Today a relatively small number of farmers, workers or owners, benefit from such instruction. The exigencies of farm work do not often permit enrollment for full terms.

Radio would open the door of the argicultural school to tens of thousands who would never otherwise receive such institutional instruction, and it would enable the student who has been obliged to terminate a short course to continue his studies in many cases under the same faculty. With practical men in charge of such instruction the possibilities of Radio in this direction are limitless.

Every high school and even the country schools in remote districts should have the benefits of Radio. It brings them within reach of the lectures, music, and education methods of the metropolis. It means an educational contribution of highest excellence to every rural school. It includes not only direct and interesting instruction to the pupils, but stimulation of the interest of teachers and the increase of their efficiency.

Condensed

By DIELECTRIC

Major Armstrong is quoted as having said that concerts would be broadcast all over the world "in an amazingly short time," and that a central receiving station on each continent would receive the program and relay it. With the exception of jazz I don't know of any distinctly American "accent" in music that could disturb the sensibilities of foreigners and even that is known to a large part of the civilized world. What appeals to me strongly is the possibility of hearing singers and orchestras, which, for one reason or another, do not take kindly to the idea of crossing the seas to this country. Also, be it said, there are American artists to whom Europeans could listen with pleasure and profit. Beyond the mere entertaining of the world's listeners in is the decidedly important feature of broadcasting such information regarding any nation, as would dispel the provincialism so rampant in some quarters.

Now that it is possible to talk through thick walls of steel and concrete, even without the use of aerials or ground connections, the recording of bank officials being locked into vaults from which they cannot communicate with those on the outside will be a thing of the past. It might have its disadvantages as well in certain cases. A meeting of I. W. W. nonconformists might have its proceedings spread abroad if a transmitter were secretly installed in the room where these long-haired gentry were conniving. But we must not let such thoughts deter us from encouraging the development of so useful a device. Let the spirits speak from the dark recesses of a Congressman's cellar!

In calling attention to the astounding increase in the number of receiving sets in use in this country, let me cite an interesting instance where Radio has swept through a commercial village which had been without other sources of entertainment. This colony houses the employees of a large manufacturing establishment. They had no movie houses or other source of providing amusement so they turned to Radio. It is natural that many of them would have done so, even had theaters abounded, but to find one hundred and forty-two sets where there are only two hundred homes is a pretty good average.

Much food for thought is to be found in the announcement by Dr. Hull, of the General Electric Company, of his uni-potential cathode vacuum tube. Consider that the power for plate and filament with these tubes may be supplied from the house wiring, and that a receiver, amplifier and loud speaker may be operated from plugging in to a lamp socket, then you see where such speculation leads. With the advent of the "pickle" tube and others in process of development we shall soon realize a vast improvement over what we have been content to use up to the present. The cost of these tubes should be materially reduced and I doubt very much the theory that such reduction would cripple the manufacturer—very much. Does the set at eighty dollars, or the set at three hundred dollars sell the more quickly? Would not a popular price mean greater sales? Perhaps I have too little "capacity" to hold the facts in mind, though I shall be glad to furnish my hook-up on demand.

Edward J. Nally must have stirred the French Radiophans with visions of the future and caused them to speed up local movements toward progress in this fascinating science. He may well be within the scope of possibilities in predicting before a gathering in Paris the transmission of an entire page of a newspaper with one touch of a telegraph key. Then again, he foretold the relaying of Radio concerts from a central point by telephone to various broadcasting stations. When that is done ('twere well, 'twere done quickly) every owner of a receiving set in every state in the Union may listen in to the Chicago Opera! A slight urge from you fans might hasten that glad day.

I have implicit faith in the pallophotophone as an instrument to be widely used not alone for the transmission of speeches by those who could not easily spare the time to visit a broadcasting station, but as the means of permanently recording a voice, an instrument or the expression of an idea which may fittingly typify the present age and be preserved for future generations. If the material at hand for recording such things is of a destructive nature, then someone should experiment until an imperishable substance be found. With the mental picture so readily formed from the address of Dr. William Gates, which preceded the broadcasting of the Quiche language by a native Guatamalan, it was not difficult to reach some notion of the mode of life in that country and, to a linguist, appreciate the significance of this Indian tongue in its relation to other known languages. It is just such broadcasting that shakes us loose from our local moorings and sets us to realizing how little we know of the rest of the world. Radio is the most cosmopolitan educational medium in existence today.

Atlantic City, N. J., the famous bathing resort, is looking forward to the time when it will enable bathers to enjoy music as received by a central station and distributed through amplifiers along the boardwalk. There is every reason to suppose that some day every summer resort of prominence will have its public receiving set with amplifying devices for the pleasure of all visitors, and even the effort of tuning in will be left to the "town tuner." I am wondering if they will broadcast "No. 2 yellow corn" while stock brokers are seeking recreation on the beach.

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Oh Shame! You've Been Broad-Casting

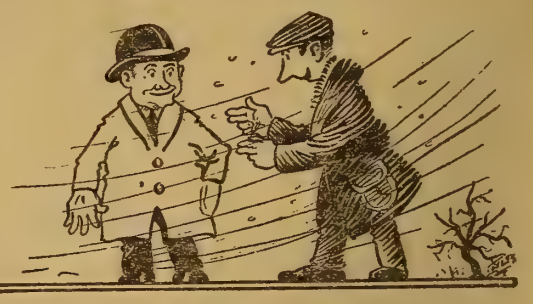
Dear Indi—

I'm very much interested in the latest feminine footwear, especially the Radio Boots! I passed one of these 185-pound dames on the street the other afternoon, wearing a pair of No. 12 Radio Boots. Believe me, boys, she had some wave length!

I didn't even bother to meter! "Watts the use?" I said, "She's on her way ohm!"

So I let Uncle go over after Ant-enna, and he didn't find her, ether! —HARRY C. WOODS.

To Be Seen But Not Heard



"How do you like your new Radio receiving set?"

"Fine! I've picked up broadcasting of every form of entertainment except oriental dancers."—LONDON TIT-BITS.

"It's the Bunk," Says Gamaliel

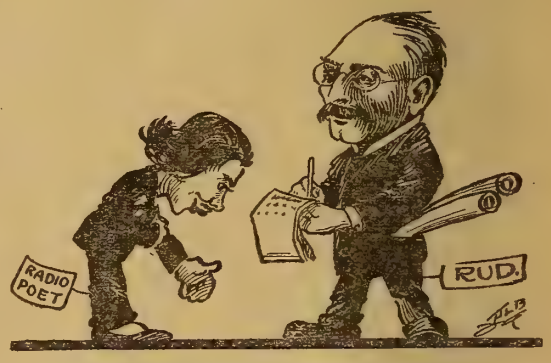
VIA RADIO TO
INDI-GEST, CHICAGO.

SEE YOUR OFFICE SQUIRREL CLAIMS I HAVE OTHER THINGS IN MY CELLAR BESIDES THE SO-CALLED SECRET TRANSMITTING SET STOP IT'S A BASE LIE STOP OWING TO MY ADMINISTRATION I DON'T EVEN HAVE COAL STOP I DO HAVE PRIDE IN MY ADMINISTRATION BUT WHO IN H——L CAN BURN PRIDE THIS SIDE OF STYX QUESTION —GAMALIEL.

A Wag, a Moan and a Blank Despair

(With Apologies to Rudyard Kipling)

A fool there was and he got the desire,
Even as you and I.
He bought some tubing and lots of wire,
Even as you and I.
He wrapped it round and took off taps,
And said the thing may work, perhaps?
Even as you and I.



A panel he got and then switch points,
Even as you and I.
A condenser next and wire for the joints,
Even as you and I.
He listened for days and nary a sound,
Till some poor fish told him he needed a ground!
Even as you and I.

Where Paying Was Believing

The mayor of a prosperous California city recently broadcast an address to the invisible audience by means of one of the new 500-watt transmitters now becoming popular on the Pacific Coast. Being skeptical, he asked all out-of-town listeners in to wire him collect. They did. However, the mayor requested the Radiophans to cease firing just as his telegraph bill reached $3,000. Said mayor is now a hard shelled Radioknut, almost ripe enough to pick, adds the Office Squirrel.

A. B. C. Lessons for Radio Beginners

Chapter VIII—A Crystal Detector Receiver

By Arthur G. Mohaupt

A CRYSTAL detector if properly constructed and used in connection with well-designed antenna will give very satisfactory results for receiving music and other forms of entertainment broadcast from the various broadcasting stations throughout the country.

A crystal detector is inexpensive in first cost, requires very little upkeep and maintenance, and is excellent for becoming acquainted with the general operation of a Radio receiving set. The ability to "tune in" a certain station and to "tune out" other undesired stations can be acquired only through practice and experience, and by beginning with the simplest and gradually working up to the more complex tube sets, the numerous little tricks and stunts can be learned readily.

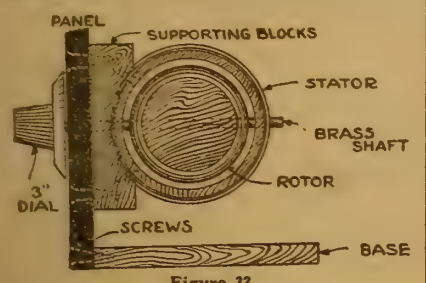


Figure 32

Suitable for Short Range

Although it is generally said that a crystal detector is suitable only for short range reception (twenty to thirty miles), instances are numerous where stations located at distances of 500 to 1,000 miles away have been received, using only a crystal. Of course, the long distance results were obtained with the use of an excellent antenna and under ideal conditions. But there is absolutely no reason why, if some operators can secure such results, others cannot do likewise. Under average conditions, however, a crystal will surely be able to receive and detect signals within a range of about twenty-five miles from the local broadcasting stations.

A crystal detector will not work satisfactory with a loop or other form of indoor antenna, for it is not sufficiently sensitive to catch the weak signals currents generally received with such forms of antennae. However, with a good outdoor aerial it is capable of supplying many an evening's pleasure and pastime.

First to Consider

The antenna is the first part to consider in the construction and installation of a Radio receiving station. As was stated in the previous paragraph, the outdoor antenna produces best results, although an aerial stretched in an open attic of a home will give nearly the same results.

For a receiving station, the single-wire inverted L-type antenna will be found very satisfactory. It is not so subject to interference from other stations operating at the same time, and does not cause as much trouble due to the accumulation of static as do two and four-wire antennae.

Length of Single-Wire Antenna

The single-wire antenna should be about 60 feet in length and mounted at an elevation of about 40 feet. It should be properly insulated and securely mounted, so that in case of failure or swaying in the wind it will not come in contact with electric power telephone wires. Copper or phosphor bronze wire, either solid or stranded, about No. 14 in size, is best suited. Iron wire should not be used on account of its high resistan e.

The antenna is connected to the receiving

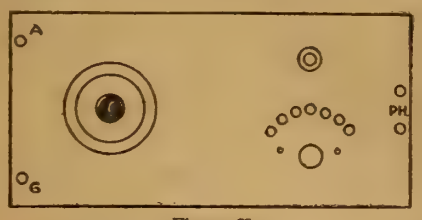


Figure 33

set indoors by means of a No. 14 copper lead-in wire. At the point where the lead-in wire enters the building, an approved form of lightning arrester should be employed. This arrester is grounded to a nearby water pipe or other suitable ground connection. (The complete details of the antenna system were fully explained in the two preceding chapters, both of which will prove very valuable to those who wish to install a receiving set.)

Constructing the Receiving Set

The receiving set itself, we will remember, performs the two important functions: tuning the station to the wave length of the desired signals and then rectifying the incoming electrical oscillations so that when they are passed through the telephone receivers they are capable of producing audible sounds. We will first consider the construction of the tuning unit.

The tuning device to be constructed will be of the variocoupler type, consisting of a primary and a secondary, the primary having a number of taps brought out and the secondary capable of rotating within the primary.

Primary Winding

For the primary of the variocoupler a fiber or bakelite tube is used, 3/32 of an inch thick, 3 inches in diameter and about 4 inches long. On this tube are wound about 60 turns of No. 24 cotton covered copper wire. The winding is begun about ⅜ inch from one end of the tube, and thirty turns are wound. Then a free space of ½ inch is left and the remaining thirty turns are applied.

At each tenth turn of the winding, however, a 1-inch loop is made. Counting the beginning and ending of the coil, there will be seven taps for altering the number of effective turns in the winding. These taps, as will be explained later, are connected to a series of switch points on the panel.

Secondary Winding

The secondary or rotor of the coupler is also wound on a fiber or bakelite tube, slightly smaller and shorter, however, than the primary. The secondary is securely fastened to a ¼-inch brass rod which passes through the center of the tube at right angles to the axis. This rotor is then placed in the center of the primary and the brass rod inserted in the space left vacant by the winding.

The secondary can then be rotated within the primary, and the brass rod acts as the shaft. The secondary is also wound with 60 turns of cotton covered copper wire, about No. 26 in size. About ½-inch space is left vacant in the center to allow room for the brass shaft to pass through.

The coil is then securely tacked to two wooden blocks ¼-inch thick, 1-inch wide, and 4 inches long, and rounded out so as to properly fit the coil. These wooden blocks are then supported against the rear side of the panel and held fast by means of four flathead brass screws entering from the front of the panel. The general appearance of the mounted coil as viewed from the end is illustrated in Figure 32.

The Panel

The panel forms the vertical support on which the various apparatus is mounted. A convenient size to use is 6 inches high by 9 inches long and ¼-inch thick. Although smooth surfaced wood stained black will serve very well, hard rubber or bakelite will be somewhat better. The panel is mounted by means of three flathead brass screws to a wooden base 9 inches long, 4 inches wide, and ½-inch thick. The base can be given one or two coats of shellac to preserve its appearance and to make it moisture proof. The general appearance of the panel with the mounted apparatus is illustrated in Figure 33.

At a distance of 1 inch from the left edge and 2 inches from the top and bottom respectively, ⅛-inch holes are drilled and two binding posts inserted. The upper one is marked A, as the aerial lead-in wire is connected here. The lower one is marked G, as the ground wire of the set is connected to this terminal.

At a distance of 4 inches from the left edge and 3 inches from the top, a 9/32-inch hole is drilled through which the brass shaft of the variocoupler projects for about an inch. On this shaft a 3-inch dial is then fastened. By rotating the dial the rotor of the coupler can be set to any desired position. By means of the graduations on the dial the position of the rotor can be noted, so that it can readily be reset to this position in case a particular station is desired.

Two inches from the right edge and 2 inches from the top and bottom respectively, ⅛-inch holes are drilled and two more binding posts inserted. These terminals are marked PH, for it is here that the telephone receivers are connected.

Mounting the Switch Points

The next step is to mount the switch points and switch lever. For the shaft of the switch lever a 5/16-inch hole is drilled 1½ inches from the bottom and 2½ inches from the right edge. At a radius depending upon the length of the switch lever nine holes are drilled with a No. 18 drill. Through the two end holes switch stops are inserted while in the other seven holes the switch contact points are inserted. The holes for these contact points are drilled ⅝ inch from center to center.

The last thing to mount on the panel is the crystal detector. The holes to be drilled for this detector depend upon the type and design of detector used. It is recommended, however, that a glass covered detector with fixed contact point be used, for these give excellent service and require little attention. If an exposed crystal is used, it may have to be cleaned with a little benzine or alcohol occasionally to remove the dust and dirt that may have accumulated on it. The detector is mounted directly over the center of the switch lever as illustrated in Figure 33. Everything is now ready to be wired.

The Wiring Process

After everything has been securely mounted and fastened according to the above directions, the apparatus is ready to be wired. The wiring should be done with No. 14 or 16 copper wire, preferably tinned. To prevent any possibility of a ground or

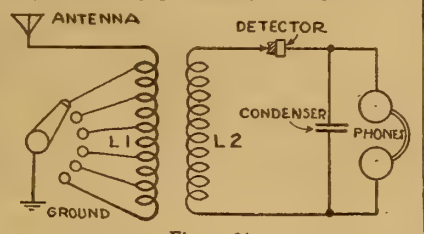


Figure 34

short circuit in the system occurring it is good policy to cover the wire with rubber or spaghetti tubing.

All wires should be run in perfectly straight lines, and should cross each other at right angles. This not only adds to the neatness of the outfit, but avoids to some extent the inductive interference of one circuit upon another. All connections and contacts sould be soldered, for unsoldered connections are likely to become dirty and have their contact resistance increased to such an extent that the apparatus will not function properly.

An efficient hook-up to use for connecting the various pieces of apparatus is given in Figure 34. As shown, the terminal or binding post to which the aerial lead-in wire is brought is connected directly to one end of the primary (L-1) of the variocoupler. The shaft of the rotating switch lever (S) is then connected to the ground terminal or binding post. Thus by adjusting the lever (S) any number of turns of the primary can be "cut" into use so as to tune the receiving set to the wave length of the incoming signals.

One terminal of the rotor (L-2) of the variocoupler is connected to the detector, while the other side of the detector is connected to one of the telephone binding posts. The other telephone terminal is connected to the free end of the coupler secondary. Across the condenser terminals is also connected a .00025 mfd. telephone or bypass condenser. If all the work is carefully and neatly done according to directions, good results can be expected.

The Cabinet

The cabinet for housing the apparatus can be built of good quality soft wood and stained any desired color, although a mahogany stain produces the most desirable finish. If a more elaborate cabinet is desired, quarter-sawed oak can be used.

Three-eighths-inch stock is very suitable, in that it is sufficiently strong and at the same time, easily worked. The two end pieces must be 6 inches long and 4 inches wide, while the top piece must be 9¾ inches long and 4 inches wide. The rear wall is 6 inches wide and 9¾ inches long. The entire cabinet is mounted on a base board 10¼ inches long, 4¼ inches wide, and ½ inch thick. The front is arranged so that the panel and the base on which it is mounted will easily slide in and out.

(Continued on page 12)

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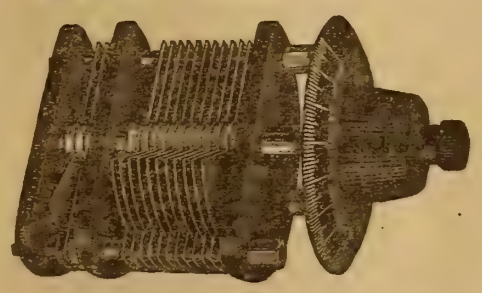

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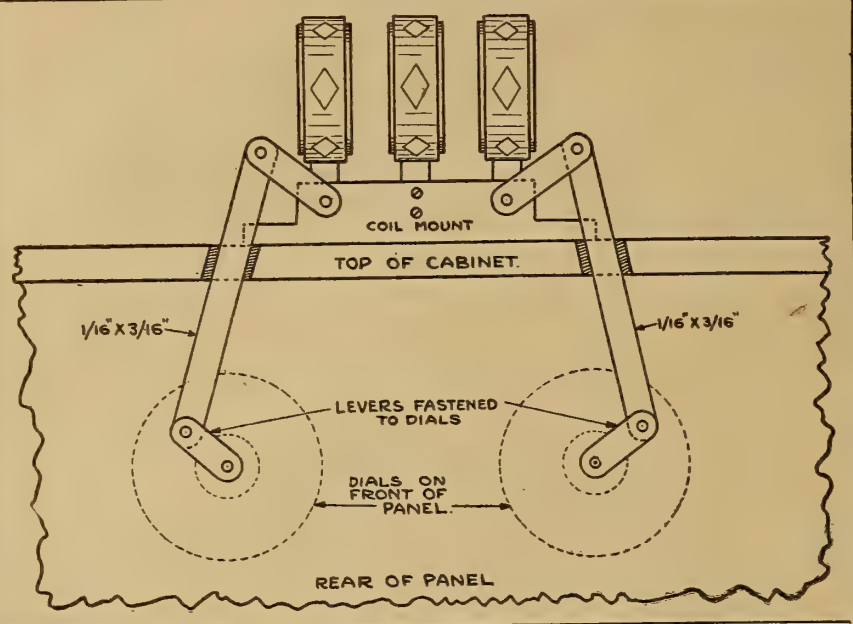
Honeycomb Mounting on Cabinet Top

Logical Place on Set for Duolateral Coils

Regular mounting for honeycomb coils is not liked by every Radiophan. The front of the panel is not the logical place for them. A better way for mounting them is on top of the cabinet. In the illustration the mounting is shown of the regular type, but the unique part about this arrangement is that the coils are operated by regular dials or knobs. Cranks are attached to the dial shaft ends and pitmans act on the two outside coils for making the adjustments.—W. H. Zink, Baltimore, Md.

LEVERS OPERATE COIL ADJUSTMENT



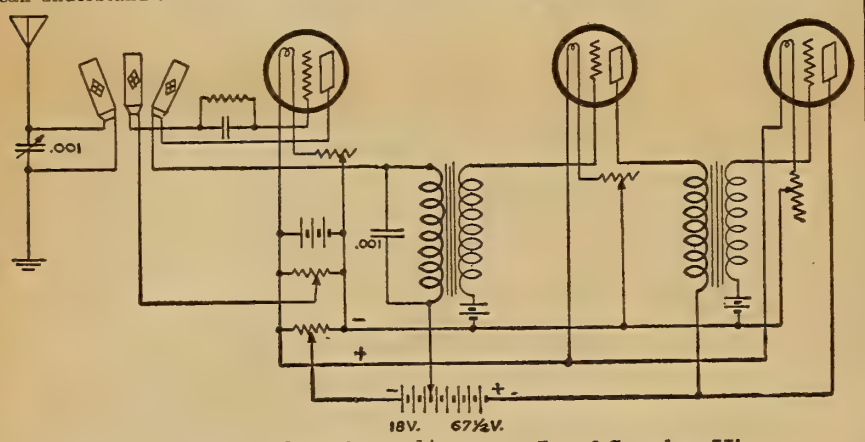
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest Illustrated,
123 West Madison St., Chicago, Ill.

Spider Web Coils in Set

The accompanying illustration shows a new hook-up which I developed recently, which is so far superior to anything that I have had before that I am going to pass it along for others to try. With this hook-up I get Chicago loud enough so that I can understand the announcements 30 feet from the set through a loud speaker and using only the detector tube. With two steps of audio you can hardly stand the phones on the ears, and all the large stations in the country within 1000 miles range come in loud enough so as to be heard all over the room through the loud speaker. In fact I seem to get about all anybody is getting from Canada to Cuba and from New York and the Eastern states to Denver, Colo. Chicago will come in through the loud speaker using a loop aerial but not loud.



I am using spider web coils wound as described by me in the Radio Digest of September 2, using a 2-inch core and from 39 to 43 pegs, the more the better, and going in and out taking two pegs at a time. They are far superior to the regular honeycomb coils and by bringing down the taps to a number of small brass screws on the core and making a little switch lever out of thin brass, they can easily be tuned over quite a wide range. I use No. 22 D. C. C. wire on the primary, tapping at 14, 16, 18, 20, 25, 30, 35, 40, 50 and 60 feet. The turns are hard to keep track of and so in winding I measure off so many feet to the next tap.

The secondaries are wound with No. 28 D. C. C. wire. This size not only seems to work best but it enables one to put on more turns without the coil getting too bulky. It is tapped at 15, 30, 40, 50, 60, 70, 80, 90 and 100 feet. Tickler is same as a secondary. These coils will tune to 1000 meters or more. My aerial consists of two wires about 150 feet long and I am using for broadcasting reception 20 feet on the primary, 30 feet on the secondaries and 30 feet on the tickler. The wiring is the same as a regular hook-up and tuning the same as for the regular honeycomb set. I am using 67½ volts on the amplifying tubes and to get them to take this voltage it is necessary to add a small flash light cell or "C" battery in the grid circuit with the negative to the grid. The potentiometers are a help but not necessary. For broadcasting reception the coils do not have to be so large but the primary, which is the largest, measures over 4½ inches.

Instead of jacks for connections I have five binding posts at the lower right hand corner of the cabinet. The first two are for the detector and the other three for the amplifiers. I have tried adding a step of Radio frequency but without success as the loss in regeneration is not compensated for by the Radio frequency and I get more out of using just the three tubes. This set is very selective, has a long range and is well worth the trouble of making the coils.—J. R. Wilkinson, Kankakee, Ill.

Loud Speaker Hint

If a loud speaker is placed on a soft rubber cushion about three-quarters of an inch thick the sound will be much clearer. The rubber must be of a certain density to prevent a lateral movement of the loud speaker.

A. B. C. LESSONS

(Continued from page 11)

Operating the Receiving Set

The outfit is now ready to be put into operation. One thing needed in learning to operate a Radio outfit is patience. If at first the apparatus does not work, do not immediately condemn it for there are plenty of other places where the trouble may lie. Examine the antenna and lead-in wire to make sure that all connections are electrically secure and that the antenna is well insulated etc.

After everything is in good condition, the lead-in wire is connected to the antenna terminal of the receiving set, and the ground terminal is connected to a water pipe or other suitable ground, adjust the inductance switch lever (S) until the signals can be heard in the phones. Adjusting the switch lever alters the number of turns of the primary in series with the antenna, and in this way the set is tuned to the wave length of the incoming signals. The final step in the tuning process is to adjust the position of the rotor by turning the dial until the signals can be heard loudest in the phones. Adjusting the rotor alters the degree of coupling and in this manner establishes a resonance condition. In case the signals do not come in as clear as they might, adjust the contact point on the crystal until a more sensitive spot is found.

The Telephone Receivers

Successful and satisfactory receiving with a crystal set is dependent to a great extent upon the operation and sensitiveness of the phone receivers. To get best results, as good a quality of phones as the pocketbook will permit should be secured, for the more sensitive and responsive the phones are, the clearer and stronger will be the sounds heard.

Chapter Nine

In Chapter Nine we will begin our study of the principles of operation of the three-electrode vacuum tube as employed in all higher-priced receiving sets. We will first consider the tube as a detector and then as an amplifier. In doing so, of course, we will take up a discussion of all the important circuits used for vacuum tube receivers. Since the successful operation of vacuum tube circuits is dependent upon a thorough knowledge of the characteristics and behavior of vacuum tubes, it is very important that everyone interested in this fascinating and timely subject carefully read the article in next week's issue.

Pins for Coil Winding

In winding a pair of honeycomb coils I had trouble in pushing the pins in the wooden form without bending. Something was needed that would not bend so I procured a box of used phonograph needles and used them instead. They were just the right length and they solved the difficulty. A coin such as penny or dime placed between the finger and the pin end forms an excellent shield when pushing them into the core.—Charles Spaulding, Erie, Pa.

Dry weather in Oregon is held responsible for the prevalence of static which has interfered with broadcasting.

Data on Construction of Fixed Condensers

Most amateurs who have been assembling the Flewelling circuit outfit have experienced difficulty in obtaining the .006 mfd. condensers, and many have built up these condensers from units of other standard capacities.

The construction of fixed condensers of any capacity is a simple matter for any amateur providing he knows the active area of dielectric required. The formula for finding this area is:

$$A = \frac{C \times T \times 10^{10}}{2248 \times K}$$

Where A is the area of active dielectric surface in square inches, C is the capacity in microfarads, T is the thickness of the dielectric in inches and K is the inductivity, which for various materials is as follows:

Air	1.000
Glass (Common)	3.013 and 3.258
Glass (Light Flint)	6.850 and 7.000
Glass (Very Light Flint)	6.570
Hard Rubber	2.050 and 3.150
Mica	6.000
Paper	1.500
Porcelain	4.380

For example, a condenser of .006 mfd. capacity using mica dielectric of .001 inch in thickness must have an active dielectric area of

$$A = \frac{.006 \times .001 \times 10^{10}}{2248 \times 6} = 4.448$$

There should therefore be used four pieces of mica one by two inches and five pieces of foil one by 1.48 inches. The foil so placed that it projects ¼ inch out from between the mica.

The overlapping foil areas will then be ¾ by 1.48 inches, or 1.112 square inches which with four dielectric sheets, gives the required 4.448 square inches.

Attention is called to the fact that the thickness of the foil does not have any bearing on the capacity of the condenser.—E. R. Willard, Berkeley, Calif.

Cat-Whiskers

The cat-whisker of a crystal set should not be too long. Two inches of steel violin E string is about the proper length. The spring should rest very lightly on the crystal. If the spring is longer than two inches external vibration or jarring will cause the spring to change position and jump off the crystal.

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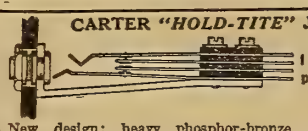

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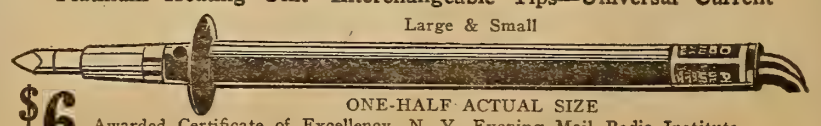

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Reinartz Panel Set Designed for Compactness

Part III—Construction of Cabinet

By H. J. Marx

THE best of amateurs will spend a lot of time and money in assembling an elaborate and efficient Radio receiving set and then usually put it in a box which is called, in name only, a cabinet. Some even omit that, leaving it open for the accumulation of dust and dirt, not only making it unsightly in appearance, but also destroying its efficiency of operation. An open set is always exposed to damage in handling. Wires are bent, connections are broken or become loose, sometimes parts or tools are dropped in between the apparatus, causing short circuits or otherwise damaging the set.

Any well made set deserves a neat, substantial cabinet that not only makes it dust and dirt proof but also enriches its appearance and adds to its attractiveness.

Material Used

In building a cabinet naturally the first consideration is expense. If made at home, the labor is seldom an important item. The expense, then, is simply a question of the cost of materials.

Mahogany is often the first choice. However, not only is its cost high, but in addition the wood is rather difficult to work and also difficult to obtain in the sizes ordinarily required.

Pine is cheap and easily obtainable but is much too soft for cabinets. Light wood screws soon turn loose and the cabinet will then come apart.

Birch is very popular among the cabinet makers. Cedar or cigar box wood is also well adapted to cabinet work. In fact the amateur cannot do better than go to some box factory and get the materials all planed to the proper thickness. This work can be obtained at a nominal cost. Very often the manufacturers will be glad to make up a special order cabinet at a very slight expense.

Size of Stock

The sides and top are made of ¼-inch stock, 8 inches wide. The back is made of ⅜-inch stock, also using the 8-inch width. This width is sufficient to allow for cutting off the ⅜-inch square strip that is fastened to the top for the panel to set against. The baseboard to which the panel is fastened and also the base of the cabinet are both cut from ½-inch stock, 8 inches wide.

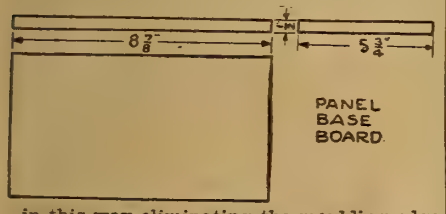
The total stock required for a cabinet is:

25 inches ¼-inch stock 8 inches wide
10 inches ⅜-inch stock 8 inches wide
20 inches ½-inch stock 8 inches wide

Two small brass hinges in addition to the miscellaneous nails and screws are required. It is best to glue all joints for the best sort of a job.

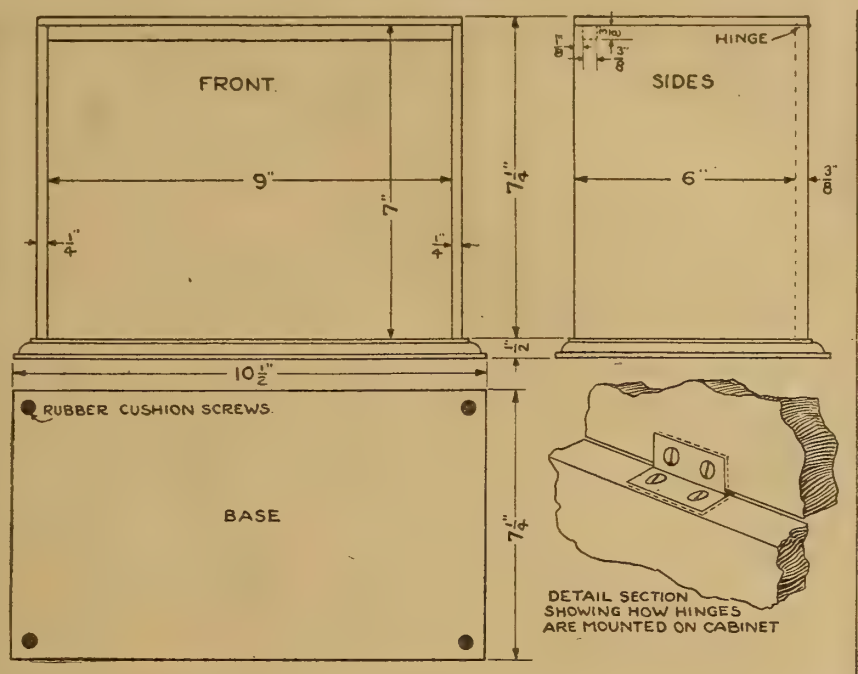
Base of Cabinet

The base of the cabinet can be very simply constructed with a beveled edge,



in this way eliminating the moulding edge shown in the illustration. Naturally at any cabinet maker's, equipped with moulding machines a fancy edge of this kind presents no difficulties.

The sides and backboard can be fastened to the base by means of countersunk woodscrews driven up through the base. Clearance holes should be drilled and countersunk in the baseboard, and in addition, a smaller drill should first be run into the sides and back so as to avoid splitting the wood when tightening the screws. After assembly the base can be covered on the bottom with a green felt to avoid scratching the surface of the table on which the cabinet stands.



Hinged Top Used

The top is hinged to the backboard, and, if desired, a small hook can be fastened to the sides to hold the top down. In order to avoid accumulation of heat in the cabinet a hole can be drilled in the top and a panel bezel inserted.

The ⅜-inch strip is fastened on the underside of the top board ⅛ inch from the front and simply keeps the panel in position flush with the surface of the cabinet.

Staining the Cabinet

Naturally the deciding element in the appearance of any cabinet is the finish. If the wood is well grained, a natural finish presents many advantages. If mahogany, birch or oak are used, these can be carefully sandpapered first using a rough grade and finishing up with an 0 or even 00 grade. The surface can then be oiled or given one very thin coat of a high grade spar varnish or shellac. This should be carefully applied in a fairly warm room, using a good camel's hair brush. Allow the cabinet to dry thoroughly, as handling it before the varnish has hardened will spoil the brilliant finish.

If the wood is stained, it can be given the coat of stain first and then varnished, or a good quality varnish stain can be used. About three coats are usually required, each of which should be given plenty of time to dry and harden. Each coat should be rubbed down with a very fine grade of sandpaper, followed by pumice stone if a piano finish is desired. Too much care cannot be taken in this part of the work. Don't try to rush the job, and above all, don't use cheap stains, varnish or brushes!

Batteries Required

For the Reinartz circuit anywhere from 22½ to 45 volts have been used in the plate circuit, depending on the type of tube used. With the average tube, a six-volt storage battery is necessary. A peanut (WD-11) tube can be used with a dry cell in place of the storage battery. In the dry cell the carbon or center post is the positive terminal, while the zinc or rim post is negative. This tube does not require as much plate or B battery voltage, and most efficient results can be obtained by experimenting to find which voltage is best suited to the tube.

All tubes have a particular plate voltage at which they give the maximum results and clearest reception. This voltage, however, is best determined by experimentation.

Tuning Aid

To neutralize the effect of "body capacity" in tuning in Radiophone signals, place a sheet of aluminum back of the variometer dials. The aluminum strip should be grounded. Care should be taken that it does not touch the frame of the variometer.

Storage Battery Leads

Keep the leads from the storage battery to the filaments of the vacuum tubes as short as possible. There is a loss in voltage in any wire carrying a current. This can be reduced by increasing the size of wire or reducing its length.

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S. A. Twitchell, 1925 Western Ave., Minneapolis, Minn.

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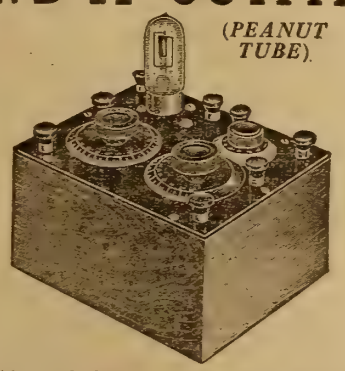
(*PEANUT TUBE*)



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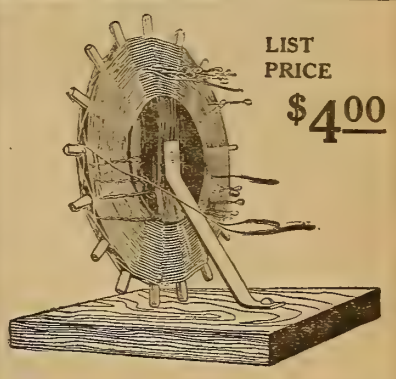

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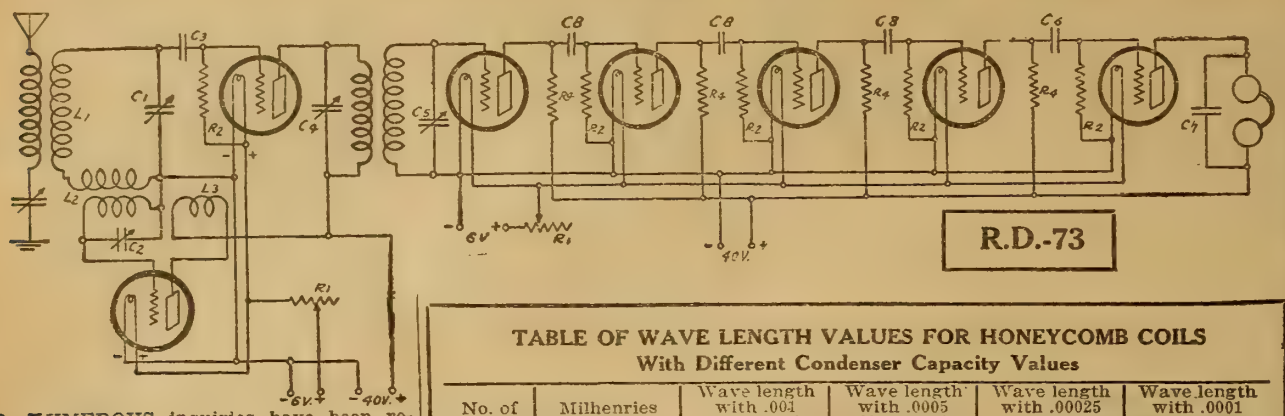


R.D.-73

NUMEROUS inquiries have been received for an authoritative long distance receiving set circuit. The Armstrong Super-Heterodyne Circuit comes nearest to filling the general requirements for a circuit of this sort. For this reason it is given as Hook-Up Diagram R.D.-73.

The tuning unit is best supplied in two honeycomb coils. Their values depend on the wave length range desired for reception. The table of wave length values for honeycomb coils will be found invaluable for determining the proper coil to use for L1. Naturally the inductance of the L2 coil in series in the secondary circuit must be taken in consideration. L2 can be made up of two sets of 18 turns of No. 30 double cotton covered wire wound on a tube 2¼ inches in diameter. L3 is also 18 turns of the same wire wound on the same tube close to L2, running in the same direction.

TABLE OF WAVE LENGTH VALUES FOR HONEYCOMB COILS
With Different Condenser Capacity Values

No. of Turns	Milhenries Inductance	Wave length with .001 mfd. capacity	Wave length with .0005 mfd. capacity	Wave length with .00025 mfd. capacity	Wave length with .0001 mfd. capacity
25	.04	377	267	188	85
35	.075	515	365	258	163
50	.15	730	516	365	230
75	.3	1032	730	516	326
100	.6	1460	1032	730	462
150	1.3	2148	1632	1074	679
200	2.3	2854	2020	1426	901
250	4.5	3992	2822	1996	1263
300	6.5	4802	3445	2400	1517
400	11.0	6244	4415	3622	1790
500	20.0	8429	5960	4214	2658

C1 is a .0005 mfd. variable condenser for secondary tuning. This might well be of the vernier type. C2 should have a capacity of .001 mfd., preferably vernier. C3 should be fixed in value, .0001 mfd. C4 and C5 should both be variable, .0005 mfd. C6 has a fixed capacity of .0001 mfd., C7 of .001 mfd. C8 consists of three fixed condensers of .005 mfd. each.

The resistances for coupling between tubes have the following values: R4, 50,000 ohms; R2, 1 megohm. R1 represents a 6-ohm rheostat, two of which are used. Since each of these controls more than one tube their resistance wire should be able to carry at least 8 amperes.

Tuning will be found somewhat difficult until the operator is acquainted with the set. The circuit is not recommended for the beginner in the Radio field.

The Reader's Review

Wants Better Program

Can the Digest help us in Rochester, N. Y. to secure better broadcasting, or suggest a way whereby we Radio listeners can accomplish the result? The story is this—

Two newspapers were after a permit for a station. The Rochester Times-Union beat the Rochester Democrat and Chronicle to it and established station WHQ. After several months the two papers got together and presented a complete station to the University of Rochester, WHAM. This station was installed in the Eastman School of Music and Eastman Theater—all one institution and one building. After many tedious months of testing, the Rochester fans were repaid for their patience by a daily program as follows:

2:55 p. m.—Weather forecast.
3:00 p. m.—Orchestra music.
4:15 p. m.—Organ and orchestra.
7:00 p. m.—Orchestra selections.
7:30 p. m.—Bedtime story; market report.

Naturally, the weather forecast differs from day to day, yet is given at a time when the farmer, shipper or business man cannot listen in. This should be given in the evening. The bedtime story also is different from day to day. For the balance of the program the organ and orchestra play to the movies, and the music once heard Monday is repeated with monotonous regularity, note for note, on Tuesday, on Wednesday, on Thursday, on Friday and on Saturday. Sunday we are granted a blessed relief.

Now let me tell you of the Eastman School of Music and the theater, housed in a most magnificent building, a gift of George Eastman to the citizens of Rochester, held in trust by the University of Rochester. The theater is on a scale of grandeur and adaptability worthy of a prominent place in the life of a city like Chicago or New York. The organ is the last word in organ construction, the orchestra is a high-class symphony of some sixty pieces and the music as rendered could not be greatly improved, but oh the monotony!

This may be overcome if the right pressure is brought to bear for instance: The school of music has a staff of artists teaching violin, cello, piano and voice. The university has a staff of noted professors. I have written to the president of the university, Dr. Rush Rhees, suggesting that the school artists and the university professors devote maybe a half hour on alternate evenings to concert broadcasting and educational talks. My letter was unanswered. I have been to the owners of the two newspapers with my plea for relief of this monotony and they refer me to Mr. George Eastman. I have talked to him and he says see Dr. Rhees—a very tight and interlocking ring for ease in passing the buck.

With a fine Station WHAM has every advantage for diversified entertainment and amusement, yet we get six days of movie music, each performance exactly like its predecessor, the organ even playing the same music as the orchestra with some slight exceptions.

Two to three times a month for one half of one hour we are allowed to listen to a brief part of the concert given by some very noted artists in the Eastman Theater. Elman, Homer, Bonnet, Paderewski and others perform in person, and their concert is broadcast for just thirty minutes. If 9:15 p. m. comes in the middle of a number the switch is thrown regardless, and the station signs off.

Mr. Editor, I am voicing the complaint of a big lot of listeners in Rochester where we are used to the best. "Rochester Quality" is world-known. Station WHAM has unlimited facilities, but provides movie music. Will you help us smoke this circle in the open and give us diversified music and instruction?—H. H. K., Jr., Rochester, N. Y.

(The situation expressed by this letter is being investigated and will be remedied to the satisfaction of all, it is hoped.—Editor's Note.)

Flewelling Suggestions

Referring to Question and Answer 1768 MLL, San Diego, Calif., I note that he must keep the coils at right angles, thus securing very little regeneration. I am inclined to think that this is due to the fact that the leads to the coils are wrong. If they are, the induction set up in the coils would be against each other, therefore blocking the induction in both circuits. The receiver would cease to function, therefore, as the coupling is made closer. (This is not so pronounced in H. C. coils as in single layer coils.)

I have found that to make the set work at its best, the lead running from the plate to the tickler coil must be connected to the **outside** of the H. C. coil and the lead from the grid leak to the other coil should connect to the **inside** of that coil, or if the first connection is made to the **inside**, the other connection should be made to the **outside**.

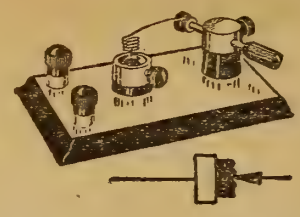
I have noticed that this very mistake was made in the diagram of the Flewelling circuit shown as R.D.-70, page 14, January 20 issue. By changing the lead from the grid to coil L50 from the right hand side of said coil to the left side and connecting the lead from the .006 mfd. condensers or the ground to the right side of the L50 coil instead of the left, much better results will be obtained.

I trust this information may be passed on to our friend in California, and any others who may be having trouble with their sets refusing to operate except on very loose coupling.—J. H. H., Wayne, Neb.

About Radio Parts

The Crystal Detector

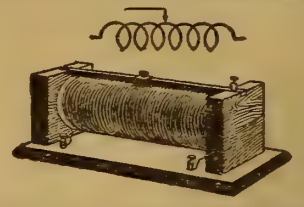
The average person, when first afflicted with Radioitis, begins his activities with a crystal set. That is to say, he uses a crystal detector rather than a



vacuum tube for changing the Radio current or waves as received through the antenna, into direct current to operate the receivers. The crystal is inside of the little cup and held in position by a small set screw. The cat whisker is the thin wire spirally wound and terminating in a projecting point, which rests lightly on the surface of the crystal. It is fastened to a universal mounting joint so that it can be moved over the entire visible surface of the crystal in order to find the sensitive spot.

Single-Slide Tuning Coil

This is about the simplest and oldest form of tuning unit and is used for tuning the circuit to the proper wave length. In the same sense that any musical instrument string must be tuned to the proper tone, so any receiving set must



be tuned to the same wave length as the broadcasting station in order to receive their concert. Wave length does not mean the distance to the station, but rather refers to the period of vibration, similar to the musical tones of any stringed instrument. Only one slide is used for tuning.

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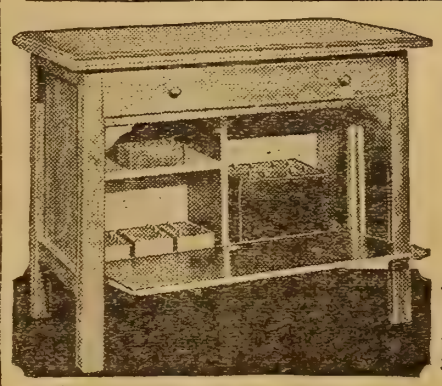

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QUALITY RADIO SHOP, RICHMOND, IND.

Questions and Answers

Allen Circuit

(1894) CHN, Paoli, Pa.

Referring to diagram O 1321 (A. J. Allen) which you very kindly furnished me, will you please give me a new diagram of this circuit, introducing Radio frequency? In doing this, will you kindly insert telephone jacks at the detector and each stage of audio amplification.

How many stages of Radio frequency should I have for this hook-up? This question, of course, will be answered in your diagram.

I have purchased DX transformers. They read 170-450 meters. Is it all right to use on each stage of Radio frequency one of these transformers? Or, does each stage of Radio frequency require a different type of DX transformer?

What is the best tube to use for Radio frequency? I understand that the smaller the tube the better.

In regard to the potentiometers, should these be all 200 or 400 ohms resistance? I am using Bradleyometers. Why are potentiometers made with different ohmage?

Is a variable grid condenser better than a fixed grid condenser?

In putting a condenser across the phones at the detector is a large capacity condenser an advantage?

In building this particular set, it is my purpose to put it in units, or sectional, each section being shielded with copper on all sides, this copper being grounded. Does this have to be a separate ground? Or would this ground go right to the regular ground? If it goes to the regular ground, why wouldn't this affect the operation of the set?

What does "Mu" or "Himu" mean?

On my present set which is an ordinary variocoupler, variometer, regenerative hook-up, I get concerts very clearly from as far south as Fort Worth, Texas, and as far north as Minneapolis, Minn. Using the Allen set with Radio frequency, would I be able to increase this range?

Is Radio frequency only of value in connection with the use of a loop? In other words, if a Radiophan has a good set with a range as indicated, is there any advantage in his changing to Radio frequency?

I shall greatly appreciate the courtesy of your answers to the foregoing questions.

A.—Referring to your desire to employ Radio frequency amplification to A. J. Allen circuit, would advise that its value is negligible and would not warrant making the addition.

The same type of Radio frequency transformer will function on each stage.

Tubes of the highest internal capacity are best for Radio frequency amplification.

Potentiometers may be of two or four hundred ohms resistance; it makes no material difference.

A variable grid condenser is not superior to a fixed grid condenser. A .001 condenser across the fones is advantageous, beyond that capacity has no advantage.

Copper shielding ground may go to the regular ground. Shielding is not wholly desirable since about ten per cent of energy will be lost.

"Mu" and "Himu" tubes are simple trade names of Myer's tubes.

In our opinion the employment of Radio frequency with the circuit in question would not increase its range.

While Radio frequency is not advantageous with the Allen circuit it has its virtues with a standard regenerative circuit in which case it is worthy of experimentation.

More Flewelling

(2021) CK, Akron, Ohio.

As I am interested in the Flewelling receiving circuit would you please give me the following information:

First, what distance will it cover? I have been receiving Havana, Cuba, Fort Worth and Dallas, Texas, Denver, Colorado and Winnepeg, Canada, besides the East Coast stations, Atlanta, Ga., etc., on my single-circuit set. Can this set cover the same range?

By using a 55-foot aerial what is the proper size honeycomb coils I should use? What are the advantages of this set and also how will the amplification compare with that of my single-circuit?

I am interested in this circuit and am anxious to get the results of the contest now on.

A.—The Flewelling circuit will afford you reception equal to that you are enjoying with your present circuit. The advantages enjoyed with this set lie in its selectivity, sensitivity and principally in its amplification and ease of adjustment. It is altogether desirable and we cheerfully recommend it as worthy of all that is claimed for it.

L50 and L75 honeycomb coils are correct with this circuit.

Resistance and Transformer Coupling

(1879) JCDeP, Port Clinton, O.

What is the relative efficiency that exists between resistance coupled and transformer coupled Radio frequency amplification at 200 meters? At 400 meters? At 5,000 meters?

A few tubes more or less are not particularly important with me; what we want is adjustment which is not critical and a long wave-length range. All 'round information solicited on the subject.

A.—It is best to use transformer coupling for two or four hundred-meter work and resistance coupling for over eight hundred meters wave length. Noting your reckless attitude toward employment of tubes, more or less, would advise that extreme amplification is not favorable to the uncritical adjustment you are desirous of attaining. Would not advise over three stages of audio frequency amplification.

Induction Operation

(1890) EB, Akron, O.

In your issue of December 16 a regenerative tuner and detector circuit is described. I have been reading it over and it certainly looks good, but I would like some additional information on it. I would like a sketch showing this hook-up, for two additional steps of amplification with automatic filament jacks. Also would like to know how primary of tuning coil works, not being connected in any way with secondary and tickler.

A.—For employment of amplification with receiver cited, merely add in the usual manner; output of detector to input of amplifier.

In explanation of the operation of unconnected tuning coil: this is known as inductive coupling; that is, electricity flowing through the primary circuit creates a magnetic field which acts as a medium for conducting or inducing current in the secondary circuit.

1½-Volt Tube

(1931) RB, Tiffin, Ohio

I would like to know if I could use a 1½ volt vacuum tube and a 1-cell battery instead of the 6-volt vacuum tube and 3-cell battery without changing the hook-up? If so, please show how it is accomplished on the diagram in the letter?

A.—A 1½-volt tube and dry cell battery can be employed in any standard circuit without change other than substitution of 1½ for usual 6-volt A battery.

A Time and Labor Saver

Always lay out the various instruments on an experimental table and try out the circuit before building up a receiving set. This may eliminate the necessity of tearing the system apart and rebuilding after being once assembled in the cabinet.

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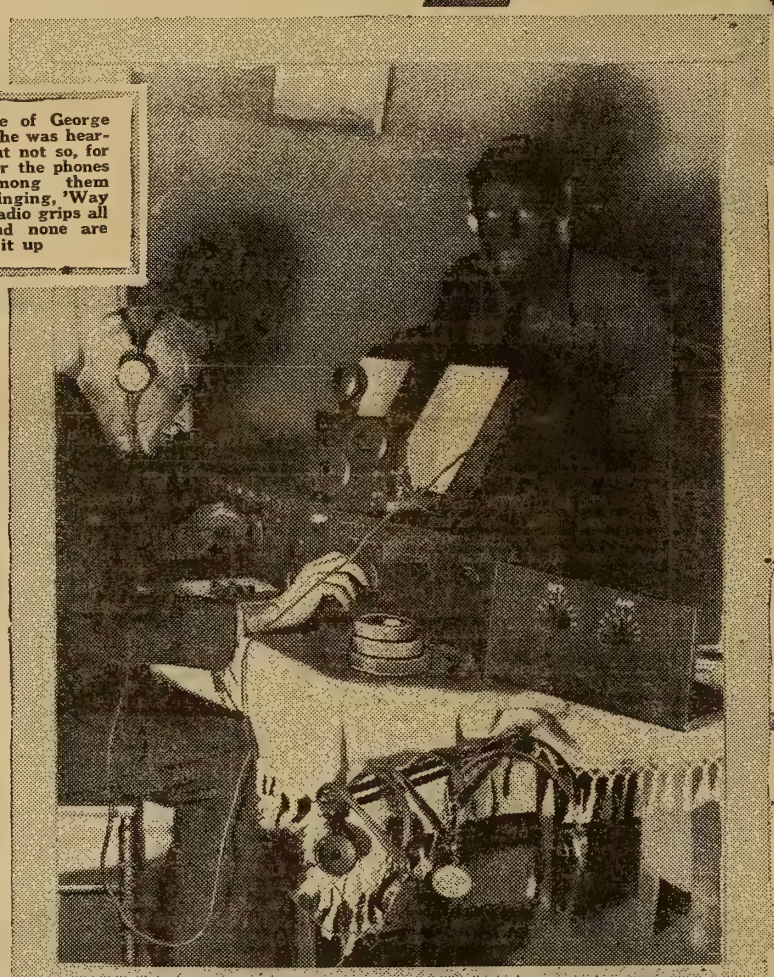
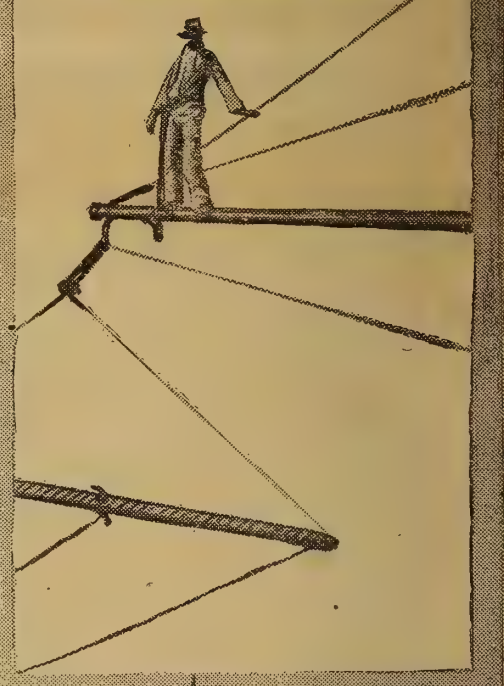
Radio Illustrated

It is worth while to see the eyes of the waifs brighten and smiles of contentment come over their faces when they listen in on music at the Kentucky Children's Home Society at Louisville, Kentucky

Erecting aerials for the highest Radio station in the world on Mt. Corcovado, Rio de Janeiro, where the workmen experienced many thrills and faced death in the depths below if they made a misstep. The station is placed at the very peak of the mountain © Int.

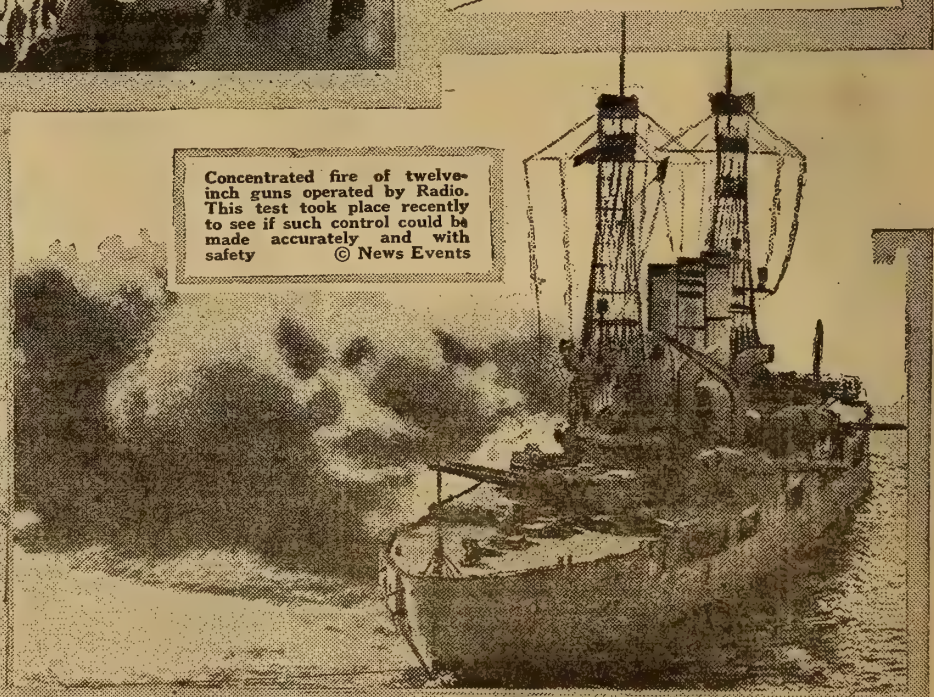


From the appearance of George you would think that he was hearing a ghost story, but not so, for there are coming over the phones sweet melodies, among them "Hear Dem Banjos Ringing, 'Way Down in Alabam." Radio grips all nationalities alike and none are prone to pass it up



Little Miss Wagoner listens in on a new Radio receiving set which is operated with the new peanut tube. The set is entirely void of storage cells © Int.

Concentrated fire of twelve-inch guns operated by Radio. This test took place recently to see if such control could be made accurately and with safety © News Events



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"How" of the Flivver Super—by E. T. Flewelling

Radio Digest

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FOIL TRAIN CRASH PERIL

WAVES BRING ENDANGERED CARS TO HALT

New German Invention Ends Travelers' Fear of Death at Throttle

U. S. May Adopt Device

William Dubilier Brings Remarkable "Look Out" Control System to America

(By Evelyn Lanzius, Special Correspondent)

NEW YORK.—Death at the throttle will no longer be a worry or fear for the railroad traveling public if the German Radio train control invention just brought into this country by William Dubilier is applied to the steam and electric railways. When the device is in use it is claimed train wrecks will be at a minimum. Even though the engineer should fall dead or helpless at the throttle, the speeding steed of steel will be stopped automatically by ether waves.

Mr. Dubilier is president of the Dubilier Condenser and Radio Corporation and has just returned from a trip abroad.

The device, one of the most remarkable of its kind, is of German design and origination. The United States Railroad Commission required the use of some form of automatic control only a short time ago, and this instrument promises to fill the requirements and even surpass the fondest dreams of present day inventors.

Stands Tests in Europe

The system of train control by Radio has been in successful operation in some of the European countries and has met every claim of the inventors. The new invention requires no apparatus placed along the tracks, the entire apparatus being placed within the cab of the locomotive and is directly connected with the usual air brake mechanism now in use.

(Continued on page 2)

BOSTON BROADCASTS SECOND GRAND OPERA

BOSTON, MASS.—In recognition of the enthusiastic response of the Radio audience to the broadcast of "Aida," as sung by the Chicago Civic Opera Company, WNAC (the Shepard Stores) gave a broadcast of "The Jewels of Madonna," by the same company, February 3, at 7:50 P. M. This was to stimulate invisible listeners to the cultural benefit of grand opera.

Columbus Radio Forces Band for Good of Fans

Set Hours for Silence, Broadcasting, Sparks, and Testing

COLUMBUS, O. — Columbus' Radio forces are now banded together for the good of all fans in the city. Station WEAO, Ohio State university, represented by Prof. Roy A. Brown, of the department of electrical engineering, is now a party to the agreement which was signed by the Columbus Radio club, two members of the rank and file of listeners and members of the mayor's committee and the three other broadcasting stations in the city.

This agreement definitely fixes the quiet hours, from 7 to 10 P. M., on all nights except Saturday. Columbus broadcasting stations agree to transmit their evening programs between 7 and 9 P. M., all spark, continuous wave and amateur Radiophone sets will refrain from transmitting during the period of the quiet hours, and all testing of apparatus must be done between 6 A. M. and 5 P. M.

The new regulations go into the Radio rules of Columbus along with the break-in rules formulated last spring. Both will be combined in pamphlet form by the Columbus Dispatch for distribution by the Radio club to all persons interested. The complete code, which has been recognized more or less by all parties for a year and now is given full sanction, is to be known as "The Columbus Plan," according to President Fred W. Redding, of the Columbus Radio club. It is believed that Columbus, at the time the decision was made, was the only city of its size in the country where all forces were combined to such an extent.

Exactly 942 letters commented favorably on the singing of seven-year-old Clarabelle McDonald of Bellefountaine, Ohio, after she had appeared recently at the studio of Station WLW, the Crosley Manufacturing Company, Cincinnati

"Fiddlin' John" Carson, Blue Ridge Mountaineer and Dixie champion fiddler, whose fame was spread far beyond Dixie recently by WSB, the Atlanta Journal

Miss Edna Geertsen makes many "hits" every time she hammers the xylophone at the studio of KDYL, The Salt Lake (Utah) Telegram, if one is to judge from the number of letters received after each one of her appearances there. She is a member of the KDYL Marconi Opera orchestra

Radio Positions Open

NEW ORLEANS, LA. — Examinations will be held here, May 1, at the New Orleans customhouse, to fill the positions of Radio Engineer, Assistant Radio Engineer and Associate Radio Engineer. The positions are with the government and pay from $2,000 to $5,000 a year.

THREE FROM FAMILY BROADCAST AT WBAV

COLUMBUS, O.—A unique program was broadcast from Station WBAV, of the Earl and Hopkins Company here, when three members of one family were on the same bill. Thomas J. Enright, baritone, and his two sisters, Mary, violinist, and Mildred, pianist, made up the trio. Walter R. Jones, who is well known in the vocal music world, was also on the program.

NEW PICK-UP GIVES TRUE TONE QUALITY

MICROPHONE OF RADICAL DESIGN USED AT WGY

Pallophotophone Inventor, C. A. Hoxie, Adapts Device to Broadcasting Direct—Sound Quality Excellent

(Special to RADIO DIGEST)

SCHENECTADY, N. Y.—Surprising results have been obtained by the General Electric Company's broadcasting station, WGY, following the recent installation of new microphone embracing the Pallophotophone principle. This station has acquired a remarkable true tone quality through use of this instrument as those Radiophans who have listened in will testify.

A new use has been found for the remarkable device which photographs sound on motion picture film and then reproduces the sound from the film. C. A. Hoxie, the Pallophotophone inventor, devised the pick-up or microphone using the principle of the reproducer.

How Pick-Up Operates

In the Pallophotophone pick-up a very sensitive diaphragm is set vibrating by sound. The movement of the diaphragm is communicated to a mirror three sixty-fourths of an inch square. A strong light strikes the dancing mirror which reflects the light beam at a sensitive light cell. The variation in the beam of light, caused by the vibration of the mirror varies the effect on the light cell and thus produces a corresponding variation in the electric circuit. Amplification is then obtained in the ordinary way.

Moving Part Weight Half Pinhead

The new pick-up eliminates the hiss which accompanies the use of the ordinary microphone, and it is said to be more sensitive and responds more readily and accurately to sound waves, capturing harmonics which would ordinarily be lost.

A feature of the new pick-up is the weight of the moving or vibrating part. The diaphragm and mirror combined weigh one-tenth of a grain, or half as much as the head of a common pin.

The Pallophotophone pick-up is now a permanent part of the studio equipment of station WGY. Many letters complimenting WGY on the improvement of its tone quality were received after the program of January 30, when the play "Bought and Paid For," which was broadcast through the new pick-up was presented.

Plan for Silent Night Will Allow Fishing for Outsiders

CHICAGO.—Representatives of broadcasting stations and the Federal government, appeared before the Radio subcommittee of the Chicago city council committee on gas, oil and electric light recently and discussed the proposed "silent night" plan by which only one station would broadcast each night and one night each week would be allowed Radiophans to "fish" for outside stations.

The representatives of the various stations agreed to confer on the plan and were to report at a meeting to be held at a future date.

One interesting point brought into the discussion was that the proposed local ordinance could in no way conflict with the existing federal regulations and the rights granted by these. It is doubtful on this account whether or not an ordinance will be passed.

FOIL TRAIN CRASH PERIL

(Continued from page 1)

It can be installed in any existing locomotive in a very short time and at a cost of about $20 or $30.

The main features of the control system are now a secret on account of patent reasons, but the following information was given the Radio Digest's representative by Mr. Dubilier, who brought plans for the control device to this country.

Better than Block Signals

The system will do the work more efficiently than is now performed by the present block signal system and is entirely free from the human element, that is to say with the use of Radio it will be absolutely impossible for two trains to enter into the same block. Another advantage of the system is that it is free from any interference caused by either static or Radio currents not inteded for its operation.

In case the engineer becomes disabled upon approaching a signal a loud speaker will repeat the words, "Look Out," and if no action is taken the train will be caused to come to a standstill. The indicator will then have to be readjusted before the train can be moved. The apparatus will fullfil the recent requirements laid down by the Railway Association Engineers for such devices.

Radio telephone messages have been sent successfully from balloons to the ...nd for distances up to 25 miles.

Listeners 9,000 Miles Apart Pick Up WGY Broadcast of Christmas Greetings

Transmission from Schenectady Station Is Heard in Every State of Union, Also Panama Canal Zone, Santo Domingo, Canada and Mexico—Record Claimed

SCHENECTADY, N. Y.—Electrical pulsations from the antenna of WGY, the Schenectady broadcasting station of the General Electric Company were radiated so widely that they were received on two different days in places 9,000 miles apart.

Postmaster Costa of Wailuku, Hawaii, and a radio engineer in London, England, at practically the same instant were greeted with "Merry Christmas and a Happy New Year" from Secretary of Navy Edwin Denby. The postmaster, A. L. Costa, heard the message of good-will at 5:45 p. m., December 24, and Captain H. J. Round picked up the words at 4:15 a. m., December 25. The message was broadcast at 11:15 p. m., December 24, but the actual words of the greeting were spoken December 13 at 1 p. m. in Washington, D. C., where a photograph of a speech by the secretary of navy was made by the Pallophotophone. This photograph, made on motion picture film, was reproduced at WGY, Christmas eve.

Possible New Record

In writing WGY Postmaster Costa stated that "I heard your station very clearly and picked you up just as a man with a solid voice was finishing his talk which ended by saying: 'I wish you all a Merry Christmas and a very Happy New Year.' The time he finished was exactly 5:45 p. m. our time which must have been 11:15 over there. After that talk you announced very clearly the name and call letters of your station thus: "This is WGY, the General Electric Co., Schenectady, New York. The next number on our program will be —."

The time given by Mr. Costa and the words heard checked up with the log WGY. The "solid voice" referred to was that of Secretary of Navy Denby.

Christmas eve transmission of WGY established a new record for the station and, it is believed, a record which is not exceeded by any other broadcasting station. WGY was heard that night in every state in the Union, in the Panama Canal Zone, in London 3500 miles from Schenectady, in in London 3500 miles from Schnectady, in Cuba, Santo Domingo, Mexico and Canada.

French Trawlers Have Radio

WASHINGTON.—The use of Radio on French fishing vessels has become so general that there is now hardly a trawler in operation without complete Radio equipment according to Vice Consul W. W. Corcoran, Boulogne. This development is the result of years of experience and is due largely to the active aid given by the French government. In actual operation Radio installation has proved more valuable for the receipt of broadcast news, storms warnings, notices to mariners, time signals, etc., than for communication with the shore.

Radio Taught at College

COLUMBUS, MISS.—The Mississippi State College for Women here has installed a Radio set in the Physics classroom where the students will be taught the principles of Radio reception. A new set was also recently installed by the University of Mississippi, located at University, Mississippi.

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Looking Ahead

Jackie Coogan Broadcasts at WOR—and then gives an exclusive interview to Radio Digest. Read what "Jackie" has to say when you buy the March 10 issue. It's Good.

Charles V. Logwood vs. Edwin H. Armstrong for the Title to the Super-Regenerative Circuit Patent will be an interesting case and full of potentialities. The U. S. Patent Office agrees that it was a little hasty in issuing this patent to Mr. Armstrong and has reopened the case inasmuch as Mr. Logwood really had a patent application on file previous to the "Major." Read the exclusive scoop and the only statement or interview Mr. Logwood has made as yet for the press in the March 3 issue of Radio Digest. Compare the two circuits and judge for yourself.

Flewelling Tells How to Mount the Parts of the Flewelling Flivver Super in the next issue of this paper. This will be the sixth article of his exclusive series for Radio Digest. Read the fifth article, page 7, this issue.

H. J. Marx Will Continue His Series on the Reinartz Set. Next week he will tell further details regarding the making of the two-step amplifier for the compact Reinartz panel set.

Arthur G. Mohaupt's Article for Radio Beginners next issue will give a number of popular vacuum tube circuits and discuss them. He will give pointers on operating tube sets.

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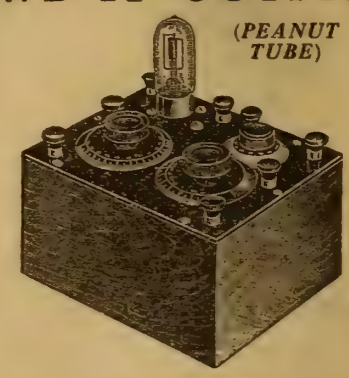

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TORONTO RESIDENT CLAIMS BIG PATENT

LONGWOOD VS. ARMSTRONG FOR SUPER CIRCUIT

Patent Office Admits Error in Not Fully Considering Logwood's Claim Before Award

TORONTO, CAN.—Who was the first man to conceive the principle of what is known as the "super-regenerative" circuit for Radio receiving sets? Without going into any technical details, it may be explained that this circuit is claimed to be more sensitive than any other—in other words that it enables reception over a longer distance than is possible with any other circuit.

The bringing out of the "super" circuit was hailed by engineers all over the world as the greatest contribution to the improvement of Radio during the past year. It follows that the man who is officially credited with priority in inventing the circuit must be assigned a permanent niche in the Radio hall of fame.

Rival Claims

At the present time representations are being made to the United States patent office by rival aspirants to this honor. Last year a patent for the circuit was awarded to Major Edwin H. Armstrong, a young American Radio engineer now connected with Columbia University. It is contended that at least one other person had made application for a patent on the same principle as discovered by Armstrong.

That other person is Chas. V. Logwood. His claim of priority over Armstrong is of especial interest to Canadians, owing to the fact that Mr. Logwood has been living in Toronto for more than a year, and that a circuit on which he holds a patent has been used in the design of nearly every big Radio broadcasting set in Canada.

Long Experience

His experience with Radio dates back to 1903, when he started working on Radio telephone developments. At that time it was possible to talk, without wires, a distance of one mile, under best conditions, and when apparatus was not inclined to be "mulish."

Mr. Logwood is best known, so far for his work with Dr. Lee De Forest, who revolutionized Radio science by his development of the vacuum tube. The young Toronto resident is registered as joint inventor with Dr. De Forest, of the famous "ultra-audion" circuit, which is patented all over the world.

There seems to be good ground for believing that Mr. Logwood may be awarded the much prized "super" circuit patent. The United States patent office has tacitly admitted that there was an error in not more fully considering his application before granting that of Major Armstrong. This means much, and the outcome of the deliberations which are now going on in this connection will be awaited here with deep interest.

HIGH SCHOOL DEBATE TO BE HEARD ON AIR

Arrangements to Be Completed to Broadcast from Platform

BUFFALO, N. Y.—A nation-wide high school debate to be held in the spring will be broadcast from several middle western and far western states. Arrangements are now being completed to have the debates broadcast from some of the platforms. Where this is not possible the broadcasting will be done in exhibition debates.

The debate will be between Canisius High School of Buffalo and high schools in Cleveland, Toledo, Chicago, Omaha, Denver, San Francisco, Los Angeles, Kansas City, St. Louis, Indianapolis and Pittsburgh. The Buffalo team will take the affirmative side of the question:

"Resolved: That Buffalo has greater industrial advantages than any other city in the United States."

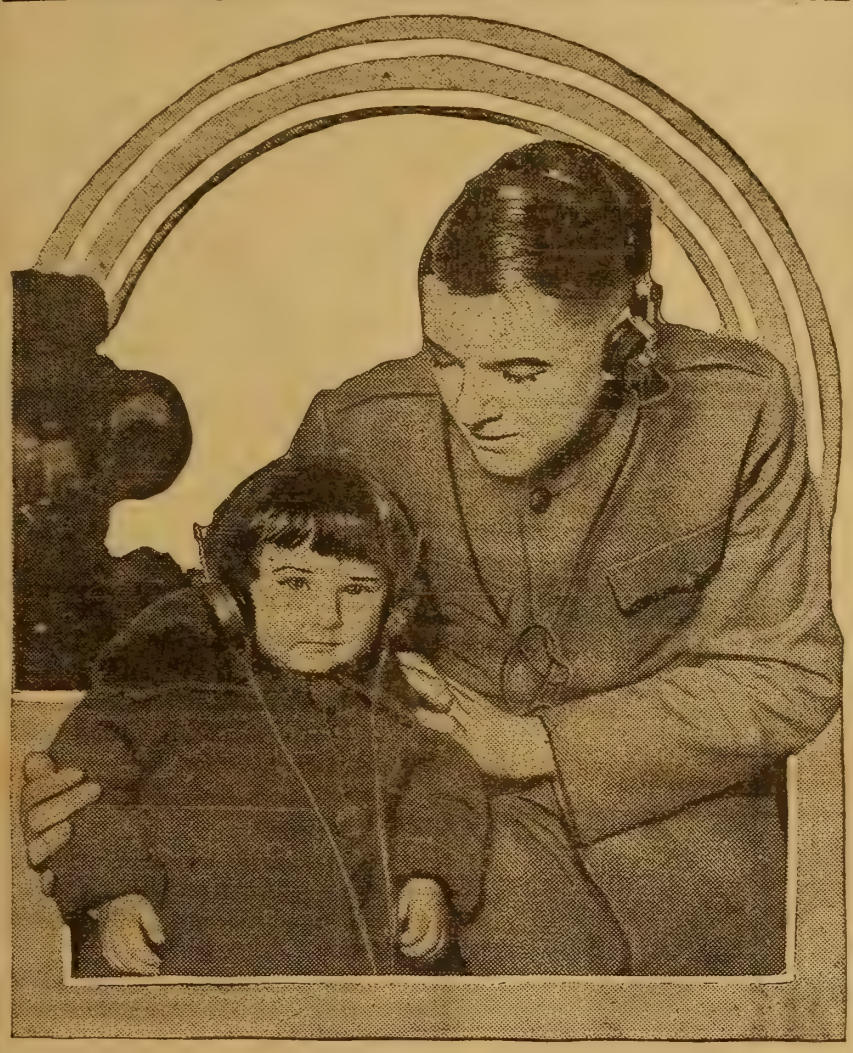
SPRINGFIELD TO GET PUBLICITY VIA ETHER

SPRINGFIELD, O.—The Erner & Hopkins company, Columbus, has asked Mayor Furry to appoint a man to come to the broadcasting station in Columbus and give an address pointing out the advantages of Springfield. Mayor Furry has advised Manager Hansell of the Springfield Chamber of Commerce of the letter and has asked him to cooperate in arranging the program.

HEAR WMAK IN CAPE BRETON AND SIDNEY

LOCKPORT, N. Y.—Official tests of a new microphone attachment which has been added to the equipment of the station of the Norton Laboratories here, WMAK, show that programs broadcast have been picked up as far as Porto Rico, Sydney, Cape Breton and points in Florida. Further experimental work is underway with the new device.

"SPARKS" TUNES IN FOR KIDDIES



Radio Operator C. P. Morgan of the S. S. St. Mihiel is one of the busiest men on the ship, entertaining all the children of the Army of Occupation. Many crying babies were hushed by the tune of the Radio. The picture shows "Sparks" Morgan entertaining little Anna Cauthorn, born in Coblenz. A few minutes before this picture was taken she was screaming at the top of her voice but was soon consoled by listening in © K. & H.

Alma, Stopped by Victor Uses Records for Kiddies

Famous Singer Makes Talk to Children Over Ether

COLUMBUS, O.—Radiophans in this city and throughout the state and country were disappointed when the announcement that Madame Alma Gluck-Zimbalist, famous singer, would not be permitted to sing over the microphone as had been announced.

Victor Talking Machine company contracts were the cause of the failure of the noted artist to carry out the program. Accompanying the Victor objection to the plan of the singer to give a half-hour concert, was an explanation of why the company had compelled the restriction. Spurious records have been made through Radio transmission, it was stated, two being known to have been produced in this manner. For this reason and to protect themselves and the artists, the Victor company requested that the personal appearance of the singer be dispensed with.

Madame Gluck, keeping her promise as best she could to her children in New York who had been acquainted with the plan of hearing their mother over the radio, had several Victor records of her best numbers played for the radio. She prefaced each record with a little talk to her children after informing other listeners that she regretted the original program could not be carried out.

The average transmitting range of all broadcasting stations in the United States is given by one authority as 368 miles.

WEIRD STORIES TOLD BY DISTRESS CALLS

CUTTER SNOHOMISH GIVES AID TO SOS CALL

Pacific Coast Listens to Air Messages of Tragedy in "Graveyard of Ships"

(Special to RADIO DIGEST)

SEATTLE, WASH.—"We are on fire. Help." "Are breaking fast. We are going down." "In dangerous position off Umatilla reef. Lost rudder." Such were the messages listened in on by Pacific coast Radiophans working on 600 meters during the recent coast storm.

Filled with stories of despair, heroism, of disregard to danger, men facing almost sure death in the teeth of one of the worst storms that has swept the Pacific in years to rescue other men trapped aboard doomed ships, the Radiograms came one upon another with hardly an hour passing without the SOS call.

Word by word, the messages halted and broken, some trailing off into dead silence, the Radio brought the story of the storm's toll into Seattle during the day and night. The fitful flashes from stricken vessels formed a weird tale of the tragedy of the "graveyard of ships."

Cutter First on Air

First came the Radio from the coast guard cutter Snohomish: "We are going to aid of Steamer Nika." The Snohomish was then at Port Angeles, only eight hours run from the disabled Nika.

Later came the message that the Coolca had been abandoned by her crew who were picked up by the steamer Algerene. The operator of the naval Radio station at Bremerton, Wash., heard something about "Nika on fire" but the message was indistinct and was without signature. Numerous Radiograms were heard like this without the completing signature or position of the ship, probably due to the fast sinking of the vessel.

In no other tragedy of such scope has Radio played such a large part in the saving of human lives and valuable property as it has in the recent coast storm. It is this development of modern science that was the large factor in giving aid to those in peril.

Herbert Hoover Loses License Fight in Court

District Court of Appeals Sustains Action of Supreme Court

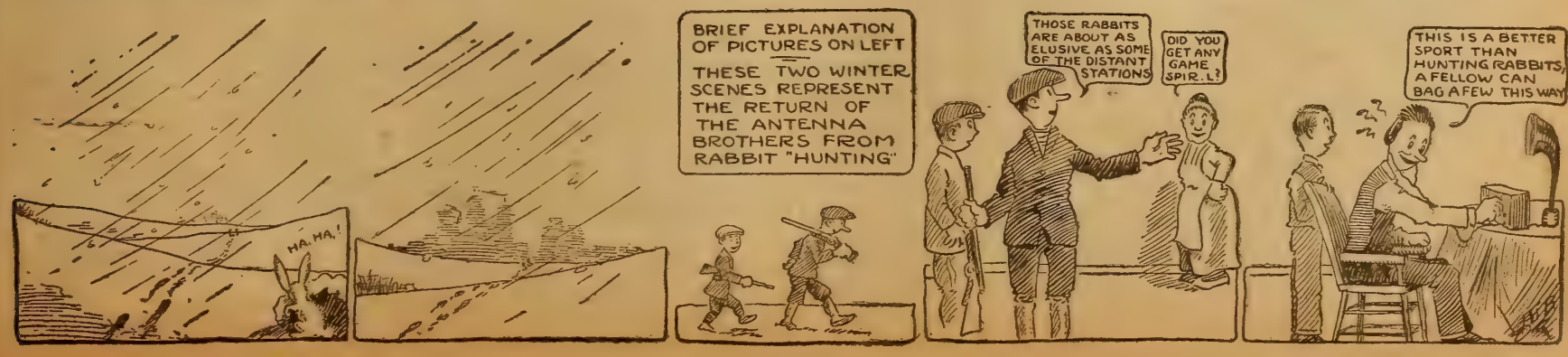
WASHINGTON, D. C.—Herbert Hoover, Secretary of Commerce, lost his appeal from a mandamus requiring him to issue a license to the Intercity Radio Company to operate a Radio station in the city of New York. The District Court of Appeals in a decision by Justice Van Orsdel sustained the action of the District Supreme Court for the writ of mandamus.

The act under inquiry reposes no discretion whatever in the Secretary of Commerce, the court finds, in issuing licenses to persons and corporations coming within the classification designated by the law. His duty is mandatory and the courts will not hesitate to require its performance.

Secretary Hoover refused the license because the Radio station was claimed to be interfering with the sending of government messages from naval and military stations. The court finds that Congress recognized there would be interferences, and the act undertakes to prescribe regulations by which the interference may be minimized rather than prevented.

"The only discretionary act," says the court, "is in selecting a wave length within the limitations prescribed in the statute, which, in his judgment, will result in the least possible interference. The issuance of a license is not dependent upon the fixing of the wave length. It is a restriction entering into the license. The wave length named by the Secretary merely measures the extent of the privilege granted to the licensee."

THE ANTENNA BROTHERS — Spir L. and Lew P. — Spir Becomes a DX Hunter



THEORY IS THE BUNK SAYS NOTED EXPERT

RECEIVING STATIONS CAN NOT STRENGTHEN WAVES

"Regeneration of Receiving Stations Serve to Weaken Signals" —Dr. Pickard

BOSTON, MASS.—In a recent letter to Lloyd C. Greene Dr. Greenleaf W. Pickard, the famous Radio inventor and expert of the Wireless Speciality Apparatus Company, gives some notable information on Radio and explodes a popular theory that the remarkable receptions by crystal detectors, of broadcasts from distant stations, reported from time to time, are caused by re-radiation from neighboring vacuum tube receiving sets tuned in to the distant transmitting stations.

Dr. Pickard says that this theory is entirely fallacious, and that one of the things a receiving station of any kind cannot do is to strengthen the electric wave field in its neighborhood. Inevitably it acts to weaken this field, he says. The greater amplification or regeneration employed by one station the weaker is the electric field around its antenna and the weaker becomes the reception of a neighboring station.

"From the distant broadcasting station wave trains pass the receiving antenna, and as a result a varying electric field exists in its vicinity," says Dr. Pickard. "This wave field induces a current in the antenna and in turn the current produces a field around the conductor which is out-of-phase with the signal wave. The resultant field around the antenna, which is the sum of the fields in the wave and in the current around the antenna is always less than that of the signal wave. If the impedance of the receiving antenna is lowered by regeneration increase the current in the antenna and consequently the electric field aroud it, will increase, but the resultant field will still further decrease.

"Finally, if regeneration is increased until the effective resistance of the antenna is zero, the field due to the current in the antenna will exactly equal the wave field and will be 180 degrees from it in phase, and thus the field resulting in the immediate neighborhood of the conductor will fall to zero and reception will be weakened materially.

"If regeneration is increased to such an extent that effective resistance is less than zero, having a negative value, oscillations will be produced and the field around the antenna may have greater values than the wave field of the signal. But, representing, as they do, an unmodulated field they only produce the all too well known squeal.

"In a large measure a good crystal reception is due to a good antenna, a good location for the receiver and efficient tuning, but primarily, however, to the abnormally high transmission which occurs now and then, particularly on winter nights."

For the greatest economy in broadcasting, many Radio engineers believe the range will have to be extended to the greatest possible extent and intermediate stations eliminated.

JUDGE SCRATCHES HEAD OVER REFLEX

Developments in Priess Case Causes Confusion in Massachusetts' Court

BOSTON, MASS.—Radio and its developments have caused so much confusion in the Massachusetts courts that Judge McLaughlin of the superior court has sought the advice of the supreme bench before he adjudicates a Radio inventor in contempt or not.

William H. Priess of Belmont, inventor of the Radio reflex circuit, amplifiers and other Radio devices, is the central figure in the court tangle. Some weeks ago the Wireless Specialty Apparatus Company brought a bill in equity asking that the inventor be restrained from disposing of his patents or applications for patents to anyone else. They claimed that he worked for them under an employment contract.

After this company had received an order of notice Priess executed an assignment of his patents to the De Forest Radio Telephone & Telegraph Company. The Wireless Specialty Company then asked that Judge McLaughlin adjudge Mr. Priess in contempt of court, arguing that the order of notice was to all intents and purposes the same as a temporary injunction. It is this point that Judge McLaughlin will present to the supreme court to have the whole matter threshed out.

KING OF MARDI GRAS HEIGHT OF MODERNITY

Communicates By Ether from "City Care Forgot"

NEW ORLEANS, LA.—Messages from Rex, leader of the annual Mardi Gras pageantry climaxing the pre-Lenten festivals, were sent by Radio during his 1923 "trip across the Atlantic." Until unmasking at sundown, the king of the carnival always conceals his identity, but traditions of the festival have it that he, with his court, sails for the "city care forgot" in a royal barge, and during the trip "messages" are received faithfully recording his progress. On Mardi Gras day he is met at the wharf, tendered a giant key to the city, and frivolity rules the day.

Rex has one virtue discernible above all others and about which he is consistent year after year, that quality is the ability to keep up with the times. He will hold his centenary in just three more years, so he can easily recall when sending his messages by telephone was the height of modernity. So, in 1923, the up-to-date all Radiophone and receive important messages that way, and the press heralded the approach of the incognito monarch in keeping with the march of progress.

Mexican President Is Fan

MEXICO CITY.—President Obregon of Mexico is an enthusiastic Radiophan, a set now being installed in Chapultepec Castle. Secretary de la Huerta has ordered a set installed in his home near the lake in Chapultepec Park.

COPS OF 100 CITIES PLAN BROADCASTS

Others to Follow in Footsteps of Detroit Police Plant, KOP

DETROIT.—The police of 100 cities in the United States, Canada and the West Indies have agreed to cooperate with Supt. W. P. Rutledge of the Detroit police department in developing a system of broadcasting police information.

The plan was first broached by Supt. Rutledge at a convention of police chiefs as long ago as 1920, but at that time the scheme was looked upon as visionary. The rapid development of Radio since then has proven the plan is of practical value. The Detroit police department at present is broadcasting police information twice each day, giving particular attention to stolen cars. Departments in other cities with receiving sets have formed the habit of listening for these messages. Those without sets have made arrangements with amateurs.

It is the hope of Mr. Rutledge that notice of each major crime in America soon will be broadcast to all police departments within a few minutes of its commission, together with a description of the suspects, thus eliminating the old method circularizing departments.

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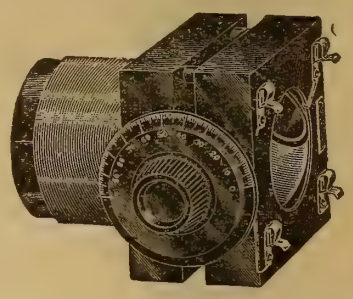

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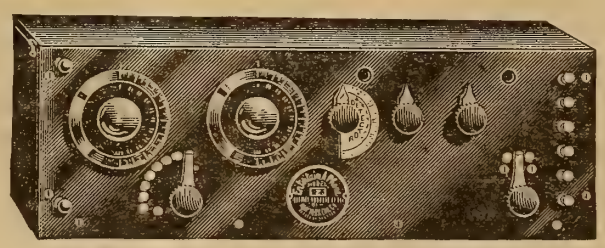

NEW YORK COIL COMPANY, Inc.
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WGM "OLD RELIABLE" OF SOUTH

Atlanta Constitution's Broadcasting Plant Plays Part in South's History

Southern Station Heard for First Time from Georgia Railway and Power Company's 50-Watt Plant—Now Uses 500-Watt Station of Their Own

By S. L. Huntley

There are few listeners on Radio receivers capable of long distance reception who have not heard Station WGM, the Atlanta Constitution. Especially is this true east of the Rocky Mountains. However, there are scores of listeners west of the Rockies who have also received concerts from the "Old Reliable" of the South.

The history of broadcasting in the South is closely coupled with the Atlanta Constitution. More than two years ago, just before the San Francisco Democratic convention, one of the first really comprehensive aerials in Atlanta was erected on the roof of the Constitution building in the hope that the Constitution's staff correspondent might be able to transmit some of his articles by Radio. But this experiment ended in failure.

Broadcasts for First Time

In the latter part of February, 1922, the Constitution's executives put their heads together for a Radio conference. Radio broadcasting then in the South was something to be considered perhaps only by semi-scientific minds. It was the middle of March when the Constitution started broadcasting. Installation of an efficient broadcasting transmitter in the Constitution's building could not be accomplished for some little time.

The Georgia Railway and Power company had a 50-watt transmitter it used sometime before this for straight messages. An agreement was reached between the Constitution and this company for the Constitution to broadcast, using the power company's station. It was, then, the middle of March, when the Atlanta Constitution first went on the air with a program.

Dubbed WGM

As soon as the Constitution began broadcasting, it was assigned the call letters, WGM, and these were used with the Georgia Railway and Power company's station. P. C. Herault and A. W. Shropshire, of the power company, were given the contract immediately to erect a 500-watt broadcasting station for the Atlanta Constitution.

The Constitution's own broadcasting station was heard on the air for the first time the night of September 1, 1922. Since then Station WGM has operated every night. Its week-day programs are given between 6 and 7 o'clock and between 9:30 and 10:30 o'clock in the evening, Central time. The Sunday schedule calls for a broadcasting between 3:30 and 4:30 o'clock in the afternoon and between 9:30 and 10:30 o'clock in the evening.

Since it started broadcasting in the South, Station WGM has had reports from every state, every province of Canada, south of the Arctic regions, Mexico, Cuba, Yucatan, Porto Rico, Central America and Alaska.

When Station WGM began operations its operator was Mr. Shropshire. When the Constitution commissioned its own station, Mr. Shropshire came with the newspaper. G. C. Congdon, Jr., at the beginning of broadcasting by the Constitution, was placed in charge as director of the Radio department. Several months ago L. O. Moseley was added to the staff as program director. He announced each program.

Heard Only Twice Daily

Station WGM was one of the first broadcasting stations to receive a Class B, 400-meter license, and operates under such a license now. It is a notable fact that WGM comes on the air only twice daily. The schedule of two programs daily was decided on for one reason alone. It was in consideration for the type of programs to be given.

The number of listeners who comment especially in their reports on the excellent quality of Station WGM's programs is notable. The Constitution's executives believed that it would be possible to give only two programs daily from Station WGM as long as quality was to be the prime consideration.

Variety in Programs

As soon as Station WGM's big transmitter was commissioned, the second Radio orchestra organized in America was presented by the Constitution. This orchestra, Warner's Seven Aces, said to be the premier dance orchestra of the South, gives the program from Station WGM every night of the week at 6:00 o'clock. The orchestra plays dance music principally, but frequently gives semi-classical and classical numbers.

The 9:30 o'clock program is devoted largely to instrumental and vocal presentations of classical numbers. In this connection it is well to mention Signor E. Volpi, noted director of opera, who furnishes from his studio the 9:30 o'clock program for Sunday, Tuesday and Friday nights.

"Old Reliable" Silent First Time

During its six months of age the Constitution's new station has enjoyed a remarkable record of service. WGM has not failed its listeners in with programs a single day with the exception of January 23 and January 24, when one of the heaviest sleet storms that has struck Atlanta in years put "Old Reliable" off the air for the two days.

Station WGM's aerial is an 85-foot cage of six wires supported by two 75-foot

(Continued on page 6)

"Old Reliable" mixes jazz with the classics in order to give its listeners a blended program. In the upper left picture is shown Charles A. Sheldon, Atlanta organist, whose recitals are transmitted by WGM from the Atlanta City Auditorium. Warner's Seven Aces, at the right, claim the title as the second Radio orchestra organized in America. They play exclusively for WGM

New Language Developed by Code Fans Makes Hit

Da-Di-Da Talk Popular with Those Learning Code

Radiophans have a new code to play with, and almost any night listeners hear this new "da-di-da" talk, that sounds much like a fond papa talking to his newly-arrived baby. According to experts, the new language is the best method of memorizing the Radio code, and is an adaptation of the language used by signal corps officers in France during the world war. In this code they telephoned much information over open wires, and "Fritzy" never knew the difference.

To the uninitiated, however, it is bewildering, although simple to learn once you start. A dot in the International, Morse or Continental code is denoted by the syllable "di" and a dash by the syllable "da." So one can carry on a conversion in code by means of the Radiophone, as well as converse by spoken word. By making the dots and dashes represent certain words when used in combination, one has a secret code for use on Radiophone or ordinary telephone lines. The full Radio alphabet in the "da-dit" code is as follows:

Letter	Code
A	Di-da
B	Da-di-di-dit
C	Da-di-da-dit
D	Da-di-dit
E	Dit
F	Di-di-da-dit
G	Da-da-dit
H	Di-di-di-dit
I	Di-dit
J	Di-da-da-da
K	Da-di-da
L	Di-da-di-dit
M	Da-da
N	Da-dit
O	Da-da-da
P	Di-da-da-dit
Q	Da-da-di-da
R	Di-da-dit
S	Di-di-dit
T	Da
U	Di-di-da
V	Di-di-di-da
W	Di-da-da
X	Da-di-di-da
Y	Da-di-da-da
Z	Da-da-di-dit

WEAN Gives First Opera

PROVIDENCE, R. I.—For the first time since its installation, WEAN, station of the Shepard Stores here, gave an entire opera program. This was heard not only by Rhode Island and Connecticut fans, but by many in Massachusetts. WEAN is heard quite frequently by Boston listeners. The production was given by the F. B. C. entertainers of East Providence, and the cast included some of the best talent in the state.

Data covering 340 of the American broadcasting stations shows that 40 stations have a range of 55 miles, 69 stations a range of 100 miles, 73 of 200 miles, 43 of 300 miles, eight of 400 miles, 61 of 500 miles, eight of 700 miles, 17 of 1,000 miles, 19 of 1,500 miles, and two of 2,000 miles.

RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

SOME of these days we are going to let all the readers of Radio Digest "in" on the kind of sets the 2,300-mile and over record holders possess. That ought to be something most Radiophans would be interested in. At least the readers of this column are eager for this information.

Last week 24 new records were set. These are given below. Next week the complete list of record holders to date will be given. Watch for it.

Station—Miles Away—Record Holder

CHXC—1500, M. B. Gilbert, Douglas, Wyo.
KFAY—2200, L. A. Graf, Dunkirk, N. Y.
KFEL—1050, H. B. Wunder, Cheviot, O.
KFI—2425, J. H. Mitchell, Elmhurst, L. I., N. Y.
KJJ—2175, M. P. Jacot, Copley, O.
KNT—2150, John Kiener, Cleveland, O.
KQV—1325, M. B. Gilbert, Douglas, Wyo.
NAA—1150, H. S. Johnson, Chandler, Okla.
WAAJ—1725, M. B. Gilbert, Douglas, Wyo.
WAAM—1575, M. B. Gilbert, Douglas, Wyo.
WDAH—1825, W. M. Brown, Pittsburgh, Pa.
WGAD—2575, L. Jang, Hanley Falls, Minn.
WGAM—1275, H. B. Porter, Lynn, Mass.
WGF—1175, B. S. Watkins, Bridgeport, Conn.
WEAD—1000, John Kiener, Cleveland, O.
WFAZ—1000, Doyle Getter, Arkansas City, Kans.
WKAQ—2600, Edwin Perkins, Jr., Sioux Falls, S. D.
WLAY—4200, M. P. Jacot, Copley, O.
WMC—1125, C. T. Mower, Malden, Mass.
WNAF—1525, W. Rankin Woodfords, Me.
WNAS—1200, B. S. Maynard, Detroit, Mich.
WOO—1575, M. B. Gilbert, Douglas, Wyo.
WQAM—1150, R. Clark, Bridgeport, Conn.
WRR—1425, B. S. Watkins, Bridgeport, Conn.

Unique Concert by WSY

BIRMINGHAM, ALA.—WSY, the Alabama Power Company broadcasting station here, recently gave a unique concert program especially for Alabamians. A number of musical selections composed by Alabamians and played or sung by the composers made up the program. The selections were heard at many places all over the state. Among the composers who rendered selections on this occasion were people from Birmingham, Selma, Montgomery and other points in the state.

NEW STATION BOWS TO WESTERN FANS

OLD TIMERS GIVE AWAY TO NEWCOMER

Dedication Program Presented in Three Parts—Lasting from Eight Until Midnight

(Special to RADIO DIGEST)

LOS ANGELES, CALIF.—Saturday evening, January 27, will remain a red letter date in the Radio world for sometime, for at the hour of 8 o'clock, the great Examiner-Anthony Central Radio station was formally dedicated to the ether world. It was presented to an unseen audience of millions, located over an area of thousands of miles.

The new station is to be known as the Central Radio Station, and from it, programs which will be arranged by the Los Angeles Examiner, Earl C. Anthony, Inc., the Evening Herald, Leo J. Meyberg Company and the Western Radio Electric Company, will be broadcasted at different hours of the day and evening.

Replaces Old Stations

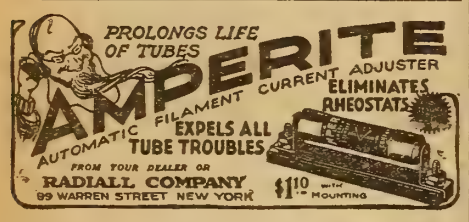
The new station will replace in the ether KWH; the old KFI; KOG; and KYJ; all of whom have been familiar for so long to the public and who have completed their work; have passed on as individual broadcasting units, with the exception of KWH, the Los Angeles Examiner, which will continue to operate as an individual station for the purpose of broadcasting weather reports and other Government bulletins on the 485 meter wave-length.

The dedication program was presented in three parts. Part One, opening at 8 p. m., was presented by the Anthony Studio. The Second Part was from the Examiner Broadcast station, between 9 and 10:30 p. m., while Part Three from 10:30 to mid-night was from the Anthony Studio. Among those who were presented on the dedication program were: George E. Cryer, Mayor of Los Angeles; William M. Garland, distinguished for city adadvancement work; Len E. Behymer, internationally famous music impresario; and Sid Grauman, managing director of the Grauman Theatre interests of Southern California.

Radio Products Corp. Fraud Says Canadian Government

LONDON, ONT., CAN.—In a list of mail order concerns which have been denied the use of the Canadian mails under a fraud order issued by the Dominion postal department is a New York firm styling itself the "Radio Products Corporation of America," with offices at 55 Broadway, New York City.

It is alleged that this firm has been offering stock in its various undertakings for sale by mail, and that its character has not been found satisfactory upon investigation by the Canadian postal department. Many Radiophans in London and Western Ontario are said to have purchased stock in the New York concern and as a result of the postal ban on the concern, are now wondering whether they will ever receive any dividends on their investment.



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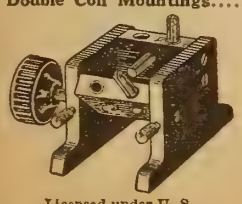

A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in.

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Book Reviews

The Radio Amateur's Handbook. By A Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

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KHJ and KFI Both Work 400 Meters

Broadcasting of Two Class B Stations First Time in History of Los Angeles

LOS ANGELES, CALIF.—For the first time in Radio history, two Class B, 400-meter broadcasting stations went on the air in the same city, at the same time and presented their programs simultaneously, when on Saturday evening, January 27, in this city, KHJ, the Los Angeles Times, presented its regular concert and the new KFI, the Examiner-Anthony, Central Radio Station, held its dedication program. The event was made possible through a conference between those in charge of the stations and Maj. J. F. Dillon, federal Radio inspector for the sixth district.

Major Dillon believes that this may be common practice soon if Congress will pass the contemplated legislation providing a wider band of wave lengths for stations. He expects that the legislation will give wave lengths sufficient meters apart so that listeners in will have no difficulty in tuning in the station they desire to hear.

Forty Meters Necessary

KHJ will continue to broadcast on its wave length of approximately 400 meters, and the KFI will broadcast with a wave length near 400 meters. The two stations have tested this plan recently, both being on the air at the same time on wave lengths varying from 15 to 25 meters.

With a selective tuning device it was found that ten meters difference did not permit of separation, while 15 meters made it possible to tune the station desired moderately well, although there was found some interference. At a difference of 25 meters, perfect elimination of interference was found. It is therefore expected that a difference of 40 meters will make possible the relatively easy reception of concerts which will be presented by both KHJ and KFI at the same time.

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68 WEST WASHINGTON ST., CHICAGO

"WGM" OLD RELIABLE

(Continued from page 5)

wooden and steel masts located more than 100 feet above the ground on the roof of the Constitution's building. The wires are No. 6 stranded cables and after six hours of sleet Tuesday afternoon, January 23, these wires were coated with three inches of ice. The tremendous weight of this was too much for one of the wires and it snapped at the center hoop.

Operator Makes Repair

Operator A. W. Shropshire lowered the antenna with a view to cutting the dead end of this broken strand and replacing the antenna. The storm was too intense to contemplate immediate repair. Mr. Shropshire had raised the antenna to the top of the masts and had just entered the operating room of Station WGM to retune the transmitter to the changed aerial when the entire antenna crashed down on the roof of the Constitution building.

Now Station WGM has an entirely new antenna system since the antenna in falling crashed through the wire counterpoise.

According to heads of the Radio Chamber of Commerce, immediate limitation in the number of stations will have beneficial results in every way.

CARTER *"HOLD-TITE"* JACKS

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New design; heavy phosphor-bronze springs; no spacer washers required. Write for Bulletin on these Jacks, "TU-WAY" Plugs and other Carter products.

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DEALERS: Send dollar bill for two copies and resell over counter at list price. This exceptional offer will not be repeated after our advertising schedule has been worked out.

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Read a few of the many letters we have received from Dictograph Headset users. You, too, can enjoy the utmost in Headsets if you own one.

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Ellis Island, N. Y.

"The Undersigned has for the past sixteen years been an amateur, commercial, and government operator, and has used every known make of radio receiver on the market. On April 21st one of your Type R-1 3000 ohm receivers was purchased and it can be safely said without dispute that they are absolutely the best radio receivers on the market today, bar none."

C. H. West, U. S. P. H. S.

Laporte, Ind.

"I wish to compliment you on the 3000 ohm headset you now have on the market retailing at $12.00 (now $8.00). I have been experimenting with the radio game for the past year. In my experience I have tried out 14 different headsets, including the ——, which I purchased for $16.50. I at last have found the ideal phone where tone quality excels and harshness is eliminated, and I cannot express myself in words as to the wonderful results I have obtained."

J. T. Bachman.

Go to your dealer's today and listen in with this supreme instrument. Note the difference. Buy two or three Dictograph Headsets and let the rest of the family enjoy your set.

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The "How" of the Simplified Super Circuit

Part V—The Importance of, and How to Make Variable Leaks

By E. T. Flewelling

THE Flewelling Super Circuit and the functions performed by its various parts have been pretty well covered by now, so far as its general requirements are concerned. We haven't bothered much about the theory of its action, because it is believed that no more than a rough outline of this is desired by the fans, most of whom haven't the time for it.

It will be noticed however, that a question might be raised as to how the circuit operates, because of the article last week. If we know what is happening in the set, we are much more liable to get the most pleasure and results from it. Let us settle the operation, if we can, and then discuss in detail a few points that have to do with getting the maximum results from the Flivver.

Operation of Flivver

The explanation of how the Flivver circuit operates really was covered in Part IV, last week's article. The action is due primarily to the starting and stopping of the tube action, and this action working on the super circuit is responsible for the results. It is pointed out that there is no

E. T. Flewelling, Inventor of the Flivver Super Circuit

low frequency oscillation in the circuit. By that statement we mean that there is not the usual train of oscillations imposed upon the circuit that are produced by a tuned auxiliary circuit, as is general in former types of super circuits.

Of course, the starting and stopping, which results in more or less charging and discharging of the condenser bank, will result in oscillations of a type. However, that the predominating action is the starting and stopping of the tube, is what we wish to emphasize. It will then be seen that the operator should learn to handle the starting and stopping rather than a separate oscillation. This is really the keynote to success with the Flivver Circuit.

Action of Leaks

Because the most important action of the circuit is controlled mostly by the leak resistances, let us take these up first in our consideration of the best parts and proper handling of the circuit.

An important point to remember is, that if the blocking action is allowed to take place at too slow a rate, about all that one will hear will be the sound caused by this action. The blocking action must be controlled and timed properly to get the results, and the leaks give us the ability to handle this timing.

Time your set then with the two leaks and you find that when you change the coupling of the coils, or tune with the condenser, that you change the timing. Quite often the speed will be too slow at the point where the set is tuned to the sending station, and, although the broadcasting is heard, it is not at all satisfactory because one hears too plainly the blocking and freeing noises occurring. Then the thing to do is to speed up the blocking by changing the grid leak resistance values.

Bring the speed up to the point where the reception of the signal is satisfactory and oftentimes you will find that by careful tuning and setting of the leaks that perfect reception is accomplished but that the squealing sound caused by the blocking is entirely gone. It really is there still, but it is occurring so fast that the resultant note is too high in pitch to be audible to the average person.

Importance in Flivver Circuit

It is probably very clear now, just how important it is to have a grid leak that can be changed in value to suit the station desired. Pencil or ink marks on the condensers have been given as the simplest and cheapest way of doing this. It is conceded, however, that it is difficult to make a permanent setting for these leaks which is satisfactory at all points in tuning, and it is believed that better work can be done if both leaks are readily adjustable.

If you buy your grid leaks purchase the best obtainable because your success depends much upon their being of good quality.

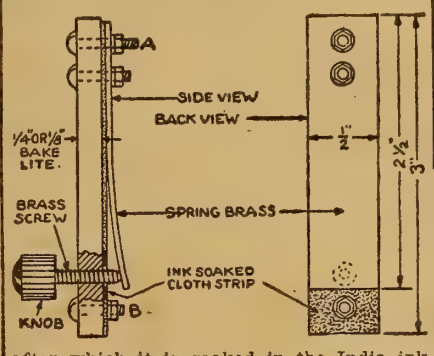
The Durham variable resistance is good, but for the Radiophans who prefer panel mounting one may use a leak that is controlled by turning a knob. Good leaks of this type are the CRL and the Freshman. A number of manufacturers have sent in for test purposes several of their variable grid leaks. Once in a while we have found a defective one that we could not operate. Be careful that you are not trying to make your set work with a leak that looks all right but is defective in reality.

Making Your Own Leaks

If you prefer to make your own leaks it may be done very easily in the following way:

The materials required to make the leak are some India ink, a strip of closely woven, smooth linen cloth, a strip of phosphor bronze or spring brass ½-inch wide, 2½ inches long and about 1/32-inch thick, a piece of bakelite or hard rubber ⅛ or ¼-inch thick, ½-inch wide and 3 inches long, four brass screws, 4/36 or 6/32, three washers and three nuts to fit, and an insulating knob with an internal thread.

First cut the bakelite strip and drill the necessary holes. The control knob screw hole is drilled small and then tapped to fit the thread of the screw used. The cloth is then cut to the size of the bakelite strip,



after which it is soaked in the India ink ad laid on one surface of the bakelite. The spring brass is bolted down over the cloth at one end with two of the screws and nuts, using a washer under each nut. Cut a ¼-inch hole in the cloth where the control screw comes through, so that no electrical contact is made between the screw and the cloth. Otherwise the leak would be short-circuited at this point. See that the spring lays flat against the cloth all along. Another screw and nut with washer holds the other end of the cloth and makes a connection for the circuit.

The body part of the remaining screw with its nut is used for making the adjustment. The head is removed from the screw and the insulating knob is substituted. The manner of making the adjustment can be readily understood by the illustration. In purchasing screws be sure to select the proper thread to fit the insulating knob. The end screws, A and B, are used for the connections in the circuit.

The fabric is of high resistance and the spring resistance negligible. The more spring we lay on the fabric the less fabric the current has to go through and the lower the resistance of the leak. The sketch and description for making are for a type that the writer has been using successfully. Several points however should be noted in the construction of this leak. Be sure that when the spring is screwed down that it works from one end of the fabric to the other uniformly. This may be done by laying a stiff piece of metal on top of the spring and working the screw on this more substantial piece. Change the width of the fabric until the correct value is reached, but be sure that this is not done until the ink has had a day or two in which to dry thoroughly. This type of leak can be adapted to panel mounting. With both leaks mounted in this way, the set may be coaxed into doing its utmost.

No Trouble in Condenser Bank

The bank of condensers, C3, C4 and C5, when once assembled properly, needs no changes and can be forgotten. In fact, this point should be emphasized. Be sure to use condensers having a mica dielectric, and then don't be afraid that you have the wrong values. If you buy reliable apparatus, you will find that these condensers will be of such values that the set will at least function.

The set will operate even when the values of these condensers have large variations from the value .006 mfd. The value .006 is given as the best, all around value. Values from .002 to .012, in fact, have been used successfully, but results, of course, were not so good. If your set doesn't "fire" don't blame the condensers if you have good ones, but check up on your leaks, coil coupling, tuning condenser, and whatever you may be using as an antenna.

An ordinary amount of patience is needed, no more. The time to find out whether you can improve on the condenser capacity values you are using, is after the set is in operating condition. It is then suggested that you do this experimenting while receiving signals, in order that you may know when the right point has been reached.

Weight for Aerial on Tree

An aerial that is attached to a tree should have a balance weight attached at one end to prevent the wire from snapping during severe wind storms. The weight should be suspended so that it will take up a maximum of 15 feet of the rope's length.

TWO SUPERSENSITIVE CIRCUITS

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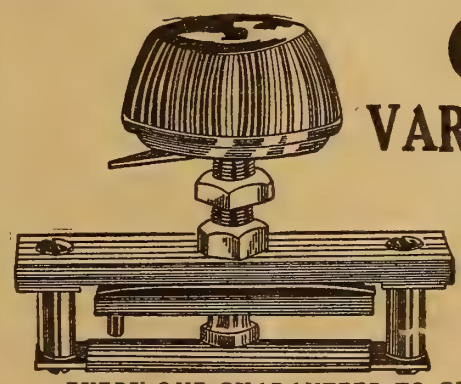

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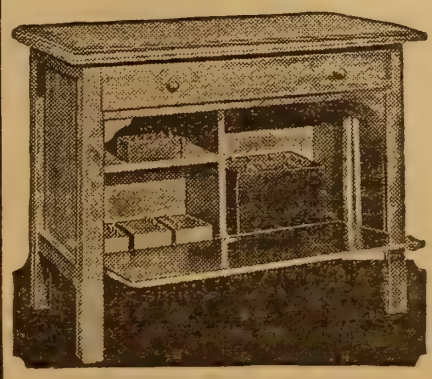

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California:
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Bakersfield, KDZB, KYI
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San Francisco, AG1, KDN, KDZG, KDZX, KFDB, KLS, KPO, KSL, KUO
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KLZ
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WWX

Florida:
Jacksonville, WDAL
Miami, WIAZ, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

Georgia:
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College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO

Idaho:
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Moscow, KFAN
Thomasville, WPAX
Wallace, KFCC

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Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH
Decatur, WBAO, WCAP, WHAP
Galesburg, WRAM
Mattoon, WQAL
Peoria, WJAN
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

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Brookville, WSAL
Evansville, WNAM, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK, WOH
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
Richmond, WOZ
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

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Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, WGF, WHX
Dubuque, WQAK
Fort Dodge, WEAB
Iowa City, WHAA
Le Mars, KFCY, WIAU
Marshalltown, WLAR
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
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Atwood, WEAD
Beloit, WPAR
Eldorado, WAH
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Manhattan, WNAK, WTG
Marion, WRAD
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
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Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS, WKAG, WLAP
Paducah, WIAR

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WGAQ

Maine:
Auburn, WMB
Bangor, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
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Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
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Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
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Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

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Butte, KFAP
Great Falls, KDYS
Havre, KFBB
Polytechnic, KFED

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Fremont, WOAE
Hastings, WQAY
Lincoln, WFAV, WGAT, WJAB, WKAC, WLAF, WMAH, WQAP, WSAS
Norfolk, WJAG
Omaha, WAAW, WDV, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
York, KFDR

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WAAT, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Roselle Park, WDY
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WWZ
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

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Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WJAJ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WLAM, WNAP
Stockdale, WJAK
Toledo, WJK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
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Enid, WNAF
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

Oregon:
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Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hood River, KQP
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Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WHAF, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC, WPO

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WOAI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KDZL, KFCP
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Pullman, KFAE
Seattle, KDZE, KDZT, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Arlington, NAA
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJGY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 2-2:30, 3-3:30, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 2-4 pm, 8:30-10. Central.

WLW, Cincinnati, O. 485 also. 2,000 mi. Crosley Mfg. Co. Daily ex Sun, 10 am-3 pm, music, reports. Tues, Fri, 8-10:30 pm, Thurs, 10-12 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Daily ex Sun, 9:30-10:30 pm, music. Fri, 11:30-12:30 pm. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. R. R. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 also. 600 mi. Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 2:15, weather, markets. Central.

WMAK, Lockport, N. Y. 485 also. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Eastern.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 1500 mi. The Chicago Daily News (Fair Department Store). Daily, 4:35-5 pm, 9:15-10. Mon, Wed, Fri, Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 485 also, 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMC, Memphis, Tenn. 400 and 485 only. 2,000 mi. The Commercial Appeal. Daily, 12 m, 3 pm, weather, markets; 8 pm, entertainment. Central.

WMH, Cincinnati, O. 485 only. 500 mi. Precision Equipment Co. Daily ex Sun, 11 am, 4 pm, reports. Mon, Wed, Sat, 8:15 pm, entertainment. Central.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAF, Enid, Okla. Enid Radio Dist. Co.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind, 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone .Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. 485 also. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Groves, Mo. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAO, Mishawaka, Ind. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 7, concert. Central.

WOH, Indianaoplis, Ind. 1,000 mi. Hatfield Elec. Co. (Indianapolis Star.) Daily ex Sun, 10-11 am, music; 10:15, financial, markets; 1-2 pm, music; 1:20, markets; 4-5 pm, music; 4:15, police notes; 4:50, sports. Mon, Wed, Sat, 8:30-10 pm, Concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 and 485 only. 500 mi. John Wanamaker.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WOZ, Richmond, Ind. 485 also. 300 mi. Palladium Printing Co. Daily ex Sun, 12-12:25 pm, 4-5, 6:30-7, music, markets. Central.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, time, 2:30-3 pm, 6-6:30, 9-9:30. Sun, 3-3:30 pm, 9-9:30. Mon, 11-12 mid. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB. State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 1,000 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7, music. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. Concordia College.

WPAV, Laurium, Mich. Tinetti & Sons.

WPAW, Wilmington, Del. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.

WPAX, Thomasville, Ga. 25 mi. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music. Mon, Wed, Fri, 8:30-9:30 pm, music. Sat, 10-11 am, codes. Sun, 11:30 am-12:30, 8:30 pm-9:30, church service. Eastern.

WPAY, Bangor, Me. Bangor Radio Lab.

WPAZ, Charleston, W. Va. Dr. John R. Koch.

WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. Elec. Supply Co.

WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

WPO, Memphis, Tenn. 100 mi. United Equip. Co. Daily, 7:15-8:15 pm, music. Central.

WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 200 mi. E. B. Gish.

WQAD, Waterbury, Conn. Whitall Elect. Co.

WQAF, Sandusky, O. Sandusky Register.

WQAH, Lexington, Ky. Brock-Anderson Elect. Eng. Co.

(Continued on page 9)

STATION SCHEDULES

(Continued from page 8)

WQAJ, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, Ia. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. Cole County Tel. & Telg. Co.
WQAM, Miami, Fla. 500 mi. Electrical Equip. Co. Daily ex Sun, 5:15-5:45 pm, news, stocks, weather; 7:30-9 pm, music. Sun, 9-11 pm, music. Eastern.
WQAO, New York, N. Y. Calvary Baptist Church.
WQAP, Lincoln, Nebr. Am. Radio Co.
WQAQ, Abilene, Tex. West Tex. Radio Co.
WQAR, Muncie, Ind. Press Pub. Co.
WQAS, Lowell, Mass. 50 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WRAA, Houston, Tex. Rice Institute.
WRAC, Mayville, N. D. State Normal School.
WRAD, Marion, Kans. Taylor Radio Shop.
WRAJ, Pittsburgh, Pa. M. H. Pickering Co.
WRAM, Galesburg, Ill. 200 mi. Lombard College. Wed, 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Wed, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. 100 mi. Jacob C. Thomas. Tues, Fri, 7-9 pm. Central.
WRAU, Amarillo, Tex. 50 mi. Amarillo Daily News. Tues, Thurs, 7:30-8:30 pm, music. Central.
WRAV, Yellow Spring, O. Antioch College.
WRAY, Scranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7:8:30, bedtime stories, music. Sun, 3 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thur, 8:30-8:50 pm, 9-9:30 news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Daily ex Sun, 10:30-12 m. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAA, Marietta, O. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. Southeast Mo. State Teachers College.
WSAH, Chicago, Ill. A. G. Leonard, Jr.
WSAJ, Grove City, Pa. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. Franklin Elec. Co.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 9:30 am, 9:45, 10, 10:30, 10:45, 11, 11:30, 11:40, 11:50, 12 m, 1:15 pm, 1:30, 1:45, reports.
WSAV, Houston, Tex. 300 mi. Clifford W. Vick, Radio Const'n Co. Mon, 8-10 pm, concerts. Daily, 7:15-8 pm. Central.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:45 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSN, Norfolk, Va. 100 mi. Shipowners Radio Service Inc. Mon, Wed, Sat, 8:15-9:30 pm, concert. Eastern.
WSX, Erie, Pa. 75 mi. Erie Radio Co. Tues, Thurs, Sat, 10-10:55 pm, news, concert, lecture. Sun, 12:15-1:30 pm, sermon. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Mon, Wed, Fri, 3-3:30 pm, 8-8:45, reports, concert. Sun, 11 am, 7:30 pm, church services. Central.
WTAH, College Station, Tex. 200 mi. Agri. & Mech. College of Texas. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7 pm, church services. Central.
WTAG, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 200 mi. Sanger Bros. Daily ex Sun, 10 am, weather, 1:30 pm, music. Mon, Wed, Fri, 8:45 pm, music. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWB, Canton, O. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400 and 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:40 am, household hints; 9:40-10:25, health talks; 10:25-10:30 am, weather; 11:55-12 m, time; 12:05-12:45 pm, music; 3-3:30 music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports; 7:30-10, entertainment. Sun, November 11, and every other week, 11 am, 4 pm, church services. Sun, fill in weeks, 2 pm, 7:30, church services, special. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.
WWX, Washington, D. C. 1,160 only. 600 mi. Post Office Dept. Daily ex Sun, 10 am, weather; 10:30, markets, 12:30, 2:15, 3:30, markets, 5 pm, 7:30, markets; 9:45, weather. Eastern.
WWZ, New York City. 200 mi. John Wanamaker. Daily ex Sun, 1:15-2:15 pm. Tues, 7:30-9 pm. Fri, 7:30-8:30 pm. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

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3/32"	THICK	1¢ PER SQ. INCH
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3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2 1/2¢ PER SQ. INCH
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$161.00 VALUE — WESTERN ELECTRIC NO. 10-A LOUD SPEAKER OUTFIT — Complete with loud speaking Horn, Two Stage Power Amplifier and 3-216-A Western Electric Amplifier Tubes. SPECIAL AT..... $98.45

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete..... $11.45

Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loud speaker or phonograph can be used in place of headset. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel. Complete $12.45

Moulded Variometers		$3.45
180° Moulded Variocouplers		$3.45
Mahogany Variometers		$1.95
180° Bakelite Variocouplers		$1.75
Freshman Variable	Grid Leak and Condenser	75c
CRL Adjustable	Grid Leak and Dubilier Condenser	$1.35
Master Baldwin	Type C Units with Cord	$3.95
Master Baldwin	Type C Head Sets	$6.95
Brandes Superior Headset		$5.75

Phone Connectors (take 4 sets of phones)	35c
Antenella Aerial Plug	$1.15
3 Coil Honeycomb Mounting	$3.45
2 Coil Honeycomb Mounting	$2.60
WD-11 Bakelite Sockets	50c
4 (Four) Way Plug	$1.35
Barchass Coils	$1.95
Firth Cord Tip Plugs	60c
Thordarson Amplifying Transformers	$2.45

Complete Knockdown Receiving Set

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial $17.95

Complete Parts for Flewelling Circuit

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete $12.45

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now..... $1.75
$3.70 Value, 23 PLATE, now..... $1.45
$3.10 Value, 5 PLATE, now..... $1.25
$2.70 Value, 3 PLATE, now..... $1.15
$3.30 Value, 11 PLATE, now..... $1.35

U.S.A. SIGNAL CORPS Aviation Type 194-W WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathanial Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at $9.95

Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special..... $4.65

3000 OHM Guaranteed Headsets $8.50 VALUE $3.65

FEDERAL JACKS — FILAMENT CONTROL SINGLE CIRCUIT..... 35c; FILAMENT CONTROL DOUBLE CIRCUIT..... 50c

MAGNAVOX, LOUD SPEAKER, Type R3 ..... $34.95

HONEYCOMB COILS

1,500 Turns	$1.50	750 Turns	$1.00	75 Turns	40c
1,250 Turns	1.50	250 Turns	75c	50 Turns	40c
		150 Turns	60c		
1,000 Turns	1.25	100 Turns	50c	35 and 25 Turns	40c

Rheostats	45c	Signal Corps Super Sensitive Microphone Transmitters	$2.45	Lightning Arresters	95c	Anti-Capacity Switches	$1.50
Sponge Rubber Ear Caps, Pair	50c	Solid Copper Aerial Wire, 100 ft.	35c	2-Slide Tuning Coils, at	$1.95	Lightning Switches	$2.65
Dials, 2, 3 and 3½ inch	25c	Spaghetti Tubing, yard	10c	Phone Caps, for mostly all phones	25c	Hydrometers, now at	45c
Grewol Detectors	$1.65			Signal Cps. Hot Wire Ammeters, at	$5.45		

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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, March 3, 1923 No. 8

Small Receiving Sets in Favor

Simple Set Is Desired by Most Radiophans

ENTHUSIASM for the large and complicated set has abated and most of the amateurs are now using or experimenting with the simplest form of a receiver. A large portion of those who listen in are beginning to demand a small set that will receive broadcasts at a reasonble distance. The call for a set having a large number of tubes with Radio and audio frequency is abating, and in its place there has come a steady demand for a very simple form of apparatus that will do the work required of it. "Super" sets cease to be objects of experiment. The added effect produced by the extra parts and accompanying complication does not compensate for the expenditure.

There are many Radio bugs who like to fuss with super sets, but the large portion of Radiophans want to sit down and enjoy a concert and do not care to be bothered with complicated apparatus. Then, too, these sets cost more to build.

One of the main reasons the Flewelling set has been such a success is found in its simplicity. It is not necessary to use several steps of amplification with this circuit, and in many instances only one tube will be sufficient to pick up stations that usually require a five-tube set.

The crystal set has its advantages, not only in cost but in upkeep. It is not necessary to use an A or B battery or to have a large number of parts, and there is no oscillation to cause squealing and noises.

The entire receiving set is undergoing many changes and engineers are working on processes to simplify it. When a very simple and easily controlled set is produced there is a large market waiting and the business will flourish. The receiver has ended being a plaything and now is in the realm of useful entertainment.

Directing Motion Picture Plays

Large Armies of Players Directed by Radiophone

THE Radiophone has not had much time in which to acquire a history, but it has found a new application of itself in directing large numbers of actors in scenes for making motion picture film. Recently Rex Ingram, producer of "The Prisoner of Zenda," used the Radiophone in giving commands to a young army of extras in the great coronation scenes.

Practical tryouts of the Radio idea brought approval from Mr. Ingram. The working out of the scheme was not so complicated as he had anticipated. By placing sub-directors to issue orders to every group in the crowds and so arranging the positions of these subordinates as to hide them from the camera and equipping them with receiving apparatus tuned in to his master phone, Mr. Ingram was able to direct the mass of people with instantaneous response.

Expensive Apparatus Not Required

Farmers Benefited by Simple Equipment

TO RECEIVE Radiophone messages requires only a limited equipment, simple and inexpensive. Thousands of farmers have installed receiving sets recently, with the result that isolated rural homes have been brought instantly in touch with the many kinds of information and instruction which are being broadcast continually.

Weather information thus reaches the farmer as promptly and effectively as any urban business man. Farm operations are absolutely dependent for success upon the knowledge of weather conditions, and the protection of crops from disaster due to frost, drought, storms and other weather phenomena is only possible if adequate warnings are received in time. Heretofore a large number of farmers of the country were so located that they could not be supplied by newspapers or telegraph with the daily forecasts and warnings of the weather bureau of the United States department of agriculture in time to be of service to them. Radiophony has changed all of this. Also the number of broadcasting stations has increased to meet the needs of those equipped to receive the messages.

Condensed

By DIELECTRIC

Much has been said in support of the plan to have only a few of the better equipped broadcasting stations transmit programs for the entertainment of all Radiophans. Whatever the ultimate outcome of propaganda so directed may be, it seems certain that the American Telephone and Telegraph Company is satisfied that it can provide a single program simultaneously from a number of toll stations situated in various parts of the country. This was made evident through its recent experiment with Station WNAC in Boston. There seems to be little difference of opinion among those who listen to WEAF as to the quality of their programs and the excellence in transmission. If, when this chain of stations is completed, they can persuade the Metropolitan Opera Company to broadcast their performances from the New York station, everybody will have a chance to listen to grand opera.

It is a natural source of pride for a broadcasting station to be able to point to instances of reception of its entertainment by fans in distant parts of the world. While not so long ago it was a rare thing for Radiophony to be heard over distances of several thousand miles, today such records are becoming quite general. So fine are the spinal adjustments of Station WOC at Davenport, Iowa, that an amateur in France, 4700 miles away, heard part of an address by Major Atkinson at this station. Pearl Harbor, Hawaiian Islands, is about 5100 miles removed from the City of Brotherly Love, yet WIP was heard by a government Radio operator at the former place. Philadelphia may be accused of being slow, but here she is setting up a great record for the "speedy" towns to equal or surpass. Of course, WJZ has been getting across fairly often, they have to live up to their announcement—"the international broadcasting station." It is really WGY to whom must be awarded the medal for distant reception. It is said that a member of the British Marconi Company picked up the Schenectady station one night and the volume of sound which came from his loud speaker when a piano solo was broadcast, awakened a sleeping child in an adjoining room. From the U. S. to England, and then an indefinite distance into slumberland!

To that perturbed Doctor, whose letter of protest against broadcasting "No. 2 yellow corn" appeared in the columns of this paper, little of joy may be found in the announcement of the purchase by the Chicago Board of Trade of Station WDAP. However, this city is to be congratulated on having (since we shall continue to hear futures, etc., by Radio) so modernly appointed a transmitting system as the glass booth, from which quotations are directly sent from the floor to the world. I am quite sure that stock quotations are limited to certain hours in the day, and that periods in the evening are not so utilized. Be that as it may, the fact remains that to a great many this particular feature is of prime importance and greatly appreciated. Health talks are mostly elementary, yet they are essential to many comprising Radio audiences. No, we must not cut out the corn, rye, or Bourborn quotations, though, of course, they should fall to at least one-half of one per cent; nor should the instructions in the care of infant feeding be prescribed, but broadcast all the information available.

I have heard a number of well-meaning individuals declare their objections to broadcasting church services, on the ground that church attendance was thereby reduced. It is not possible to quote figures to substantiate my contention that few regular attendees remain at home because they can hear the service through a receiving set, but I feel confident that such is the fact. Those who attended irregularly may be influenced by home comforts. Others because of dislike for the minister may avail themselves of the opportunity to remain at the dials and tune in whom they please. It is the countless number of afflicted, who in no other way could feel themselves a part of a worshipping congregation, to whom broadcasting church services are of inestimable worth. What will they say of the services in Tremont Temple, Boston, being broadcast every noonday as well as Sunday mornings, which has resulted in the conversion of one man and the contributions by many to the furtherance of this work? Not being a licensed preacher perhaps I had better leave you to think it over.

What is a Radiowl? Well, it depends upon the authority you select for answering this question as to the exact definition you will get. "The Voice of the South" would give you a roseate view of this particular species of "bug," while from other quarters would come beseeching pleas for the quick extermination of every specimen of Radiowl. To the ordinary listener in of local broadcasts (not situated in the sunny southland) one of these birds of ether flight might arouse no antagonism, because that one would have turned out his lights and retired before the Buzzard, Hoot, Ananias and Screech Owls had begun their nightly play. It is when you sit up to hear what follows the Bedtime Stories that you form an opinion of Radiophone fraternities. Listening to the reading of a long list of Owls who have communicated with the Big WHOO-Whoo-whoo may equal as a thriller hearing the letters of a distant station, and if it does, then don't write Station WOAI for a definition of Radiowl. As a matter of fact, there are comparatively few fans ignorant of the purpose and personnel of this club, whether intentionally or otherwise.

This is Station DIELECTRIC, located between the humorous and serious columns of Radio Digest, signing off till next week. Good day!

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Give Her a Radio Set

Lily's vacuum tubes were burning,
While my heart was wildly yearning
  For a kiss!
Lil forgot me quite completely
As she tuned her set so neatly—
  Frigid miss!

Lily's hair, intoxicating,
Tantalizing, aggravating,
  Brushed my cheek.
How I longed to kiss these tresses—
With my own lips' fond caresses
  Hers to seek!

"No!" her answer was emphatic
As the crashing of the static—
  What a din!
As I murmured: "Dear, take pity,"
Lily shouted: "Kansas City—
  Tuned 'em in!"

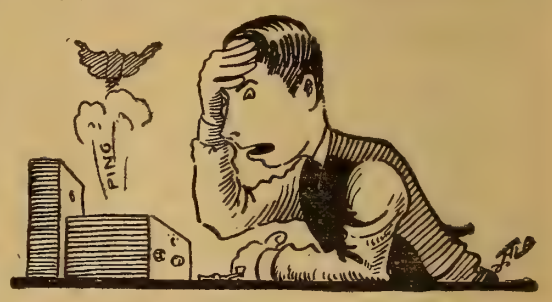
As the signals came in clearer,
Lily's head kept coming nearer—
  Glossy head of black—
Then she said: "Such oscillation
Justifies some osculation"—
  Smack! Smack! Smack!

—Arthur L. Lipmann.

Sh! I. Spy, Only a Ham Can "Get This"

Sing to tune of "Wabash Blues"

One dreary night, Bill Sparks sat down to pound the key awhile,
He slowly turned the rheostat and fiddled with a dial,
He thought he'd try to raise some bug that lived around the state
So he confidently pressed the key, but alas! it was too late!



A bluish flame! A little ping!
The bulb was heard to sputter and sing.
Poor Bill arose and began to totter.
Alas, the wreck of a fifty-watter.

—I. Spy.

No, They Drink That Stuff

Bathing by Radio is one of the last broadcasts from the Public Health Service, but whether ether waves were recommended was not made known.

It Books Along with the Short Circuit

Dear Indi—

I have heard so much about the Flewelling Circuit I would like to know where they play. Is it similar to the Orpheum Circuit? —Polly W.

A. B. C. Lessons for Radio Beginners

Chapter IX—The Three Electrode Vacuum Tube

By Arthur G. Mohaupt

THE three-electrode vacuum tube has played a greater part than any other piece of apparatus in furthering the progress of the Radio art. In fact, Radio telegraphy and telephony would not be at its present high stage of development if it were not for the introduction and perfection of the three-electrode vacuum tube. The vacuum tube has now been developed to such an extent that many results are accomplished with it which were formerly considered impossible.

Prior to the advent of the vacuum tube Radio made slow progress. Numerous detectors and other devices were tried out,

Figure 35

but none proved exactly satisfactory. However, in the few years that the vacuum tube has been available, progress has been made in so many ways and in so many directions that it was almost impossible for the average man to keep pace with it.

Electrons from Heated Objects

In order to fully understand the details of operation of the three-electrode vacuum tube, it will first be necessary to spend a little time on the so-called electron theory. According to this now generally accepted theory, the atom as known by the chemist is no longer the smallest particle of matter; but the atom itself is said to be composed of a large number of still smaller quantities known as electrons. At the center of the atom is a nucleus bearing a positive charge of electricity, while surrounding the central charge are a large number of small negative charges of electricity called electrons. These electrons are in a constant state of motion or vibration, the degree of activity depending upon the temperature of the object.

The higher the temperature, the more active are the electrons; and when the temperature reaches a certain degree, the activity becomes so great that some of the electrons actually leave the metal (are flipped off, we might say) and travel outward into space with great velocity. Some metals are capable of emitting (sending off) more electrons than others. Also, the electronic emission can be greatly increased by coating the metals with various metallic oxides, such as thorium oxide for example.

Charges Space Negatively

It is interesting to note at this point that according to the electron theory matter is really a form of energy, electrical energy, and that it manifests its presence only by the effects it produces on our physical senses.

Since the emitted electrons are tiny negative charges of electricity, if the emission is permitted to continue for a short time, the surrounding space will soon become negatively charged. The result is that it is rendered a conductor for electric current. It is this fact which forms the basis of operation of the vacuum tube as used in Radio receiving and transmitting apparatus.

Emission Controlled by Filament Heat

Another important factor to be considered is that the rate at which the electrons are given off can be readily con-

Figure 36

trolled by regulating the temperature of the hot metal. The presence of a nearby electrically charged object also influences the rate of emission, for a positive charge will attract the electrons and thus accelerate their flow, while a negative charge will repel them and thus retard their flow.

Let us now see how these principles are employed in the vacuum tube construction and operation.

Construction of the Three-Electrode Tube

The three-electrode vacuum tube consists of a glass tube out of which the three elements or electrodes are mounted and hermetically sealed (air tight). One of these elements is known as the filament, another as the plate, and the third as the grid. Each of these plays its individual and important function, as we shall presently see. The general appearance of the three-electrode vacuum tube is illustrated in Figure 35.

The filament forms the unit which is heated to incandescence and from which the negatively charged electrons are emitted. The filament is heated by means of an electric current generally supplied by a 6-volt storage battery, although there is also a tube on the market which is so designed that the filament can be heated by means of a 1½-volt dry cell. It is evident that a tube of the latter kind is very desirable in that the expensive and troublesome storage battery is not needed. The filament is generally in the form of an inverted V.

Filament Circuit Connections

The storage battery for supplying the current to the filament is commonly known as the A battery. The temperature of the filament is controlled by the current strength supplied to it, and the current in turn is regulated by means of a rheostat connected as is illustrated in Figure 36.

As is shown, the negative terminal of the A battery is connected directly to one terminal of the filament, while the positive terminal of the battery is connected to the rheostat. The other terminal of the rheostat is connected to the free terminal of the filament. As the position of the rheostat R is changed, the current, and hence also the filament temperature is regulated accordingly. The entire circuit including the filament, A battery and rheostat is known as the filament circuit.

The Plate and B Battery

The filament, when heated to incandescence, sends out the negatively charged electrons, and soon the space in the tube becomes so densely charged negatively that no more electrons can possibly escape from the filament. In order to avoid this condition and to make possible a continuous stream of electrons, the plate is inserted and sealed into the tube. The plate is generally in the form of a rectangular or circular cylinder surrounding the filament.

In order to bring the plate into action,

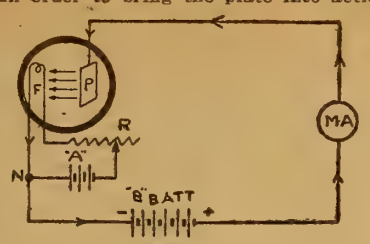


Figure 37

another battery is employed known as the B battery, Figure 37. This battery is hooked into the circuit so that its positive terminal is connected to the plate and its negative terminal to the point N in the filament circuit. The point N is commonly known as the neutral or zero potential point.

What Lets Current Flow in Tube

The result of the B battery in the circuit is that the plate will always be at a positive potential with respect to the filament. Consequently, since opposite electrical charges attract each other, the electrons (negative) emitted from the filament (negative) will be attracted by the plate (positive), and thus form a continuous stream between these two elements. The intervening space is by this action rendered a fairly good conductor of electricity, and current can flow through the plate circuit as is indicated by the arrows.

Leaving the B battery at the positive terminal, the current flows through the milliammeter MA to the plate P, within the tube it flows from the plate to the filament, and then returns to the negative terminal of the B battery. The milliammeter is inserted to measure the strength of the current flow in the plate circuit. It is a peculiar condition, and is a little difficult to comprehend at first, that the current in the plate circuit travels in a direction opposite to that in which the electrons within the tube travel. We must satisfy ourselves by assuming that the stream of electrons provides a conducting path over which the current can flow.

Cold Filament Stops Flow

The circuit between the plate and filament, including the B battery, is generally called the output circuit of the tube, for it is into this circuit, we will learn later on, that the telephone receivers are connected when the tube acts as a detector. As long as the filament is cold, no electrons are being emitted, and hence the space between the fialment and plate is an insulator and no current can flow in the plate circuit.

Under these conditions the B battery can be left in the circuit indefinitely without being discharged. As soon as the filament is heated, the electrons close the circuit and current can flow.

Control of B Voltage

The strength of the current flowing in the plate circuit depends upon the temperature of the filament and the E. M. F. (voltage) of the B battery. If the B battery is provided with taps for varying the potential of the plate, the plate circuit current can be varied accordingly. However, when the potential has reached a certain value, any further increase will not affect the strength of the current, for under this condition all of the electrons coming from the filament are taken up by the plate as fast as they can be furnished. The saturation point is thus said to be reached. However, if the temperature of the filament is raised slightly by increasing the current flow through it, a high plate potential will again cause a further increase in the plate circuit current, for more electrons are being emitted at the higher temperature.

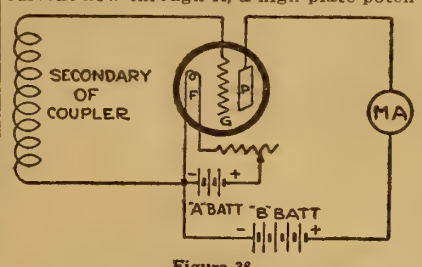


Figure 38

Every vacuum tube has a particular plate potential and filament temperature at which it functions best, and these values can be found only by experiment.

The Grid and Its Functions

The grid, or third element of the tube, is in the form of a wire network or perforated plate, and is placed between the filament and plate of the tube, as is illustrated in Figure 38.

The grid acts as a sort of control valve or regulator for the current flowing in the plate circuit. If the grid is charged positively, it will assist the plate and cause an increase in the electron emission, and hence also in the plate current flow. However, if the grid is charged negatively, it will repel some of the electrons, thereby opposing the plate action and decreasing the plate current flow.

Tuning Apparatus in Circuit

To bring the grid into play, it is connected to the secondary of the coupler or tuning coil, and is thus affected by the electrical waves as they are received by the antenna and enter the receiving set. Under normal conditions the grid is thus at a negative potential with respect to the filament. As the incoming electrical oscillations pass through the primary of the coupler, they induce in the secondary an alternating potential which passes from zero to a positive maximum and then to a corresponding negative maximum value.

Signals Control Flow Via Grid

Since the coupler secondary is connected across the filament and grid, the alternating voltage pulsations from the received signals will be impressed on the grid. As the grid becomes less negative, the electron flow will be greater and the plate circuit current will be increased; but as the grid becomes more negative, the electron flow will be retarded and the plate current flow decreased. Pulsations will thus be set up in the plate current which correspond in every detail to the potential pulsations induced in the coupler second-

(Continued on page 12)

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Bank Winding Gives Selective Tuning

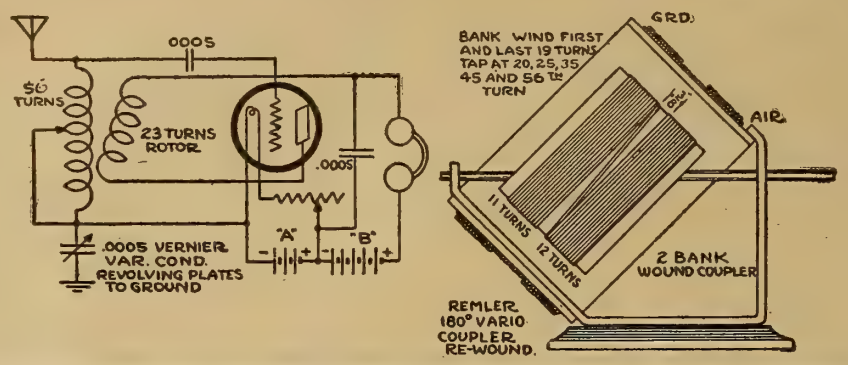
Coupler Design Allows Choice of Plant Desired

The accompanying circuit is very sensitive and selective providing the variocoupler is used as outlined. I use a variable B battery and have a variable condenser with a vernier and two fixed condensers. Best results will be obtained with condensers using mica as a dielectric.

The volume of tone will be surprising the first time it is used and with one step of amplification, 10 to 1 ratio, it is all that can be desired.

I am using this pet hookup in preference to one with a variometer and variocoupler. I use an indoor aerial, two wires 32 feet long, and a soldered ground. Just a detector tube is used in the set. I have heard out of town stations clear and distinct while local stations are in the air. There is practically no body capacity in this set. —C. W. Miller, Chicago, Ill.

SENSITIVE AND SELECTIVE HOOK-UP



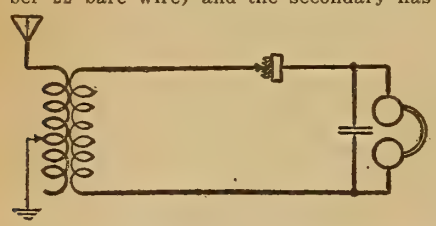
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest Illustrated,
123 West Madison St., Chicago, Ill.

Special Coil Winding

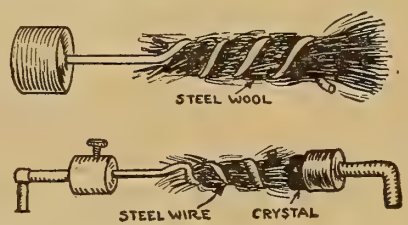
I have been getting good results with my crystal set which, outside of the coil, is extremely simple. The hook-up contains one coil only. On this coil are wound alternately the primary (60 turns of number 22 bare wire) and the secondary has



60 turns of number 30 cotton or silk covered wire. The coil is about 6 inches long and 3 inches in diameter—oval shaped. As the bare wire is larger the slider touches it and not the small insulated wire. The slider is controlled by the dial and it turns in a semicircle.—Bill Keating, Minneapolis, Minn.

Multiple Catwhisker

If you have trouble in finding a sensitive place on the crystal try the method which I have used with much success.



Secure a small piece of steel wool and then wind a piece of wire around it, allowing some of the steel to stick out at the end. Cut the end off with a pair of tinner's snips to make a "broom" end and spread the ends out evenly. Attach this steel wool whisker to the set. Apply the broom end lightly to the crystal. You will have many steel points out of which one or more will find a sensitive spot.—Eli Nemensky, New York, N. Y.

Don't Throw Set Together

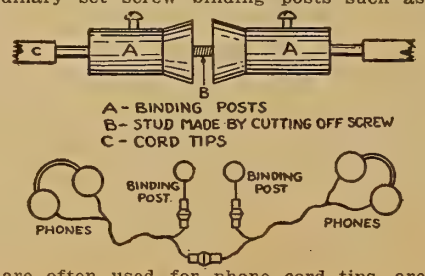
It is only necessary to glance at many homemade Radio receiving sets to find out they have been literally "thrown" together. Carelessness is a fault, and explains why so many sets will not function efficiently.

For instance, wiring is allowed to loop and stray around in every direction, connections are left unsoldered, wires are merely twisted around one another, poor connections are made to the binding posts, and coils and other apparatus are loosely mounted. The reason for all of this is "it is only temporary." As a matter of fact, all this poor work interferes seriously with efficient operation and tuning of the set.

It is evident that many leads and bad connections on low tension circuits lead to a waste of current and are still more disastrous on high tension circuits. Loose by means of solder. Small soldering lugs provide a ready and neat means of doing this.

Extra Phone Connectors

An excellent and inexpensive multiple phone connector is shown in the illustration. This device can be used where it is desired to use an extra head set. Two ordinary set screw binding posts such as

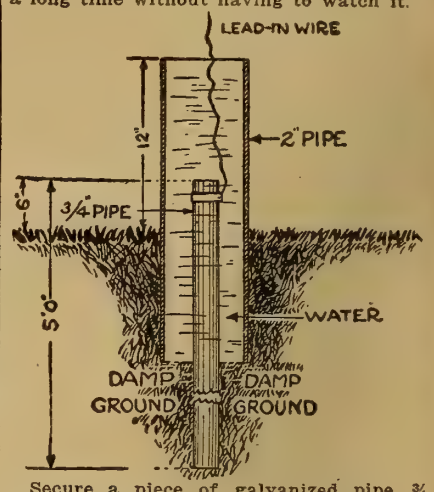


are often used for phone cord tips, are fastened end to end with a stud made by cutting off one of the screws of the post. The phone tips are then connected in series as shown.—H. L. Peterson, Charles City, Iowa.

Small pieces of rubber hose or tubing make fair insulators for the lead-in wire where it passes around the cornice of a building. The wire is run through.

Ground Line Kept Damp with Water Pipe Well

Most fans in hooking up a Radio outfit either have a poor aerial and a good ground or a good aerial and a poor ground. Almost always it's a poor ground. Here is a very simple way to make a good ground, one that will keep itself wet for a long time without having to watch it.



Secure a piece of galvanized pipe ¾ inch in diameter and 5½ feet long, also a piece of 2 inch pipe 3 feet long. Drive the ¾ inch pipe into the ground about 1 foot. Fill the pipe with water and let it settle, then fill it up again. The water in the 2-inch pipe serves to keep the smaller pipe full all the time and also keeps the ground wet around the smaller pipe.—Dick H. Roberts.

Don't Boil in Paraffin

Spider-web coils should not be boiled in paraffin, as this causes a considerable increase in the distributed capacity of the coils. In order to protect the insulation of the coils, from absorbing moisture, they may be painted with or immersed in collodion.

Like everything else you buy, do not expect too much from a cheap ready made set.

A. B. C. LESSONS

(Continued from page 11)

ary by the osillations received from the antenna.

The operation of a vacuum tube will vary somewhat with different relative adjustment of filament current and plate voltage. It is these changes in operating characteristics with different adjustments that makes it possible to use the vacuum tube for the various purposes in Radio practice.

The A Battery

The A battery is the one used for supplying current to the filaments of the vacuum tubes, and ordinarily must have a terminal voltage of 6 volts. The battery may be either of the lead-sulphuric acid type or the Edison-alkaline type. A greater pressure than 6 volts must never be used, or otherwise the filament is likely to be burned out. After the battery has been in service for some time, it will be exhausted, and consequently must be recharged.

The B Battery

The B battery is the one used for supplying the required potential to the plate, and for the average detector tube has a terminal voltage of 22½ volts. Ordinary door bell dry cells could be used for this purpose, providing enough of them were connected in series to produce the necessary 22½ volts.

This amount of pressure is needed because most detector tubes are made to work best under these conditions. In other words, at this pressure maximum electron flow occurs and hence maximum current flows in the plate circuit.

Tubes used as amplifiers, however, require a higher plate voltage. The B battery need not be of the storage battery type because the current they are required to furnish is only a few thousandths of an ampere, and this does not warrant the higher cost.

Life of B Battery

A question that is often asked is how long will the B battery last? This is quite difficult to answer, for there are a number of different factors that enter in and determine the life of a battery. Among these are the care exercised in the making of the battery, and the use and abuse the battery receives in the hands of the owner. A good grade of B battery will give reliable service for a long period; from 500 to 1,500 hours of use.

In the course of time, however, every battery will gradually wear out and become weak. The usual indication of a B battery becoming weak is given by the telephone receivers, for at the start the signals come in strong and firm and then gradually decrease in intensity or "fade." It is true that at times this condition may also be due to some other cause.

Testing Cells

A battery can be tested fairly satisfactorily with the aid of a battery voltmeter connected across the terminals of the battery. This test, however, should be made only after the battery has been in use for an hour or so, and not after the battery has been resting for a time. Try the test on the various battery terminals, and if the readings are much below the markings for these terminals, the battery is practically run down and should be replaced by a new one.

Of course, any of the common wet cells can be used with good results, but their bulky size makes their use a little awkward and inconvenient. Since the voltage required for a B battery is 22½ volts, and since a single wet cell has a voltage of only 1.1 volts, about twenty such cells would have to be used connected in series.

Chapter Ten

Having completed our study of the principles of construction and operation of the three-electrode vacuum tube, we are now ready to see how it is employed in Radio receiving circuits. Chapter Ten which will appear next week, will consequently be devoted to a number of efficient vacuum tube circuits. It will be a most interesting chapter and contain many practical operating hints for the owner of a vacuum tube set.

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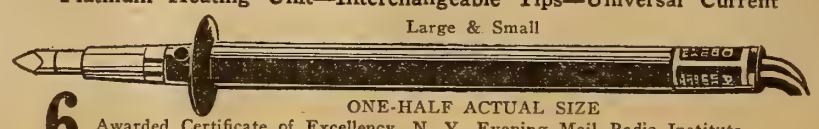

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Reinartz Panel Set Designed for Compactness

Part IV—Two-Step Amplifier Panel Layout

By H. J. Marx

AS WAS anticipated, the publication of the first of this series on the Reinartz Panel Type Receiving Set brought in a voluminous mail requesting details of a two-step audio frequency amplifier panel. Numerous letters also asked for jacks in the circuit so that receivers could be plugged in any stage of the set, including the detector alone.

After due consideration, it was decided to use double circuit jacks instead of filament control. All three jacks are of this double circuit type since the last jack cuts out the loud speaker binding posts when the phone is disconnected. The lighting of the filaments is controlled entirely by the individual rheostats.

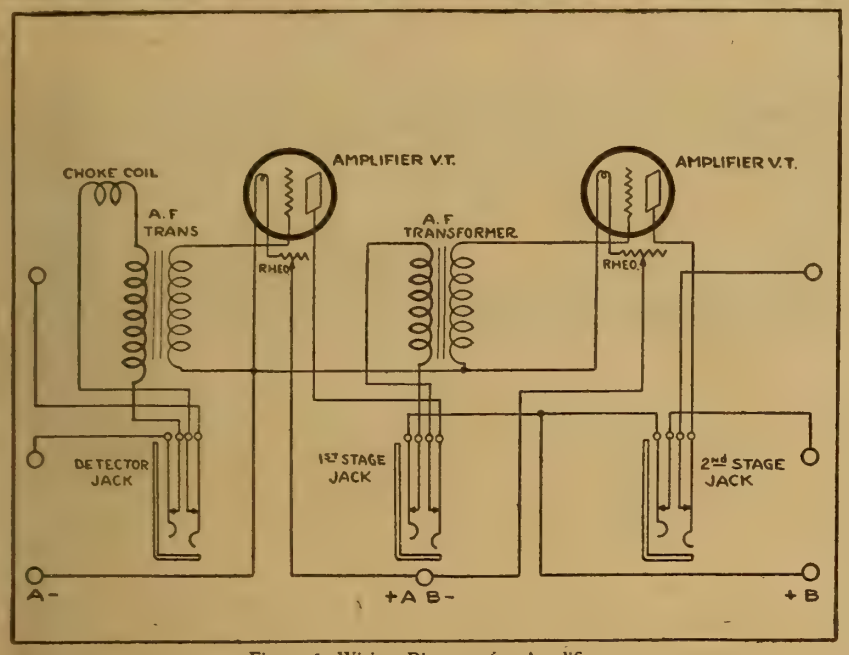

Figure 1—Wiring Diagram for Amplifier

Panel Layout

The panel layout is shown in Figure 2. The two sets of three holes at the top of the panel are for the filament rheostats. Vernier type rheostats are not necessary. The three large holes below these are for the stage control jacks. The diameters are not given since these will vary with different makes of jacks.

LIST OF PARTS

1 Panel 7x9x⅛ inches
2 A. F. Transformers
2 Tube Sockets
2 Rheostats
2 Amplifier Vacuum Tubes
3 Double Circuit Jacks
1 Choke Coil
7 Binding Posts
3 Flathead Wood Screws
1 Cabinet and Panel Baseboard
50 Feet Tinned Copper Bus Bar Wire

The three countersunk holes at the base of the panel are for the three flathead wood screws fastening it to the baseboard. The remaining seven ⅛-inch holes are for the binding posts. The two upper ones on the left side are the input posts for connection to the detector unit. The two upper posts on the right side are for loud speaker connections. The one in the lower left corner is connected to the negative side of the A or filament battery; the lower right post is for the positive B battery connection. The lower center binding post connects to the positive side of the filament battery and the negative side of the plate battery.

Parts Required

The list of parts required is given in the box elsewhere on this page. The panel is the same type and size as that used for the detector unit. The cabinets for both the detector and amplifier stages, as stated in the previous articles, are alike.

Two audio frequency transformers of any efficient commercial type are necessary. Two tube sockets, two amplifier or hard tubes and two rheostats are required. The sockets and rheostats should, for appearance sake, be the same type as used in the detector set. The three jacks are of the four spring double circuit type. The wire used for connections should preferably be of the tinned copper bus bar type. This wire not only makes a very neat job but in addition takes solder quickly and easily, thus insuring more efficient electrical connections.

Choke Coil Employed

The choke coil called for in the list of parts and shown in the diagram will no doubt puzzle many fans. In some localities special chokes of this type have been placed on the market. If not they can be wound very easily.

On a tube 1¾ inches in diameter and 1¼ inches long, about thirty turns of No. 26 double silk covered wire are wound. The actual number of turns necessary will vary, but after the circuit has been completed, tests can be made by unwinding or adding turns until the point is found where reception is loudest and clearest.

The writer personally made this coil with six taps and used a spring wire clip to connect to the taps. After the set was completed and the best adjustment was found, the unused turns were unwound in order to avoid any dead end losses. Another method of varying the value of this choke coil was to wind about ten turns and then lay a number of light 1-inch brads inside of the tube, thus building up an iron core. Brads were added until the best results were obtained. The nails were then tied in a bundle and sealed in the tube using sealing wax. Paraffin can be used also for this purpose.

It will be found that with some vacuum tubes this choke coil is not necessary. However, it will usually be the case that the plate battery potential can be built up higher when the choke coil is used.

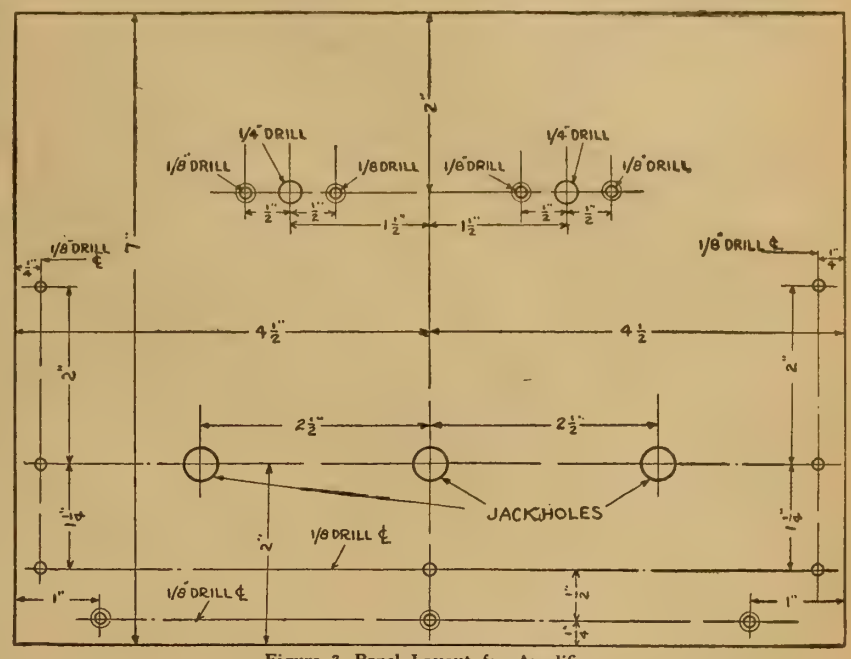

Figure 2—Panel Layout for Amplifier

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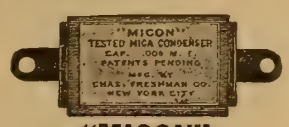

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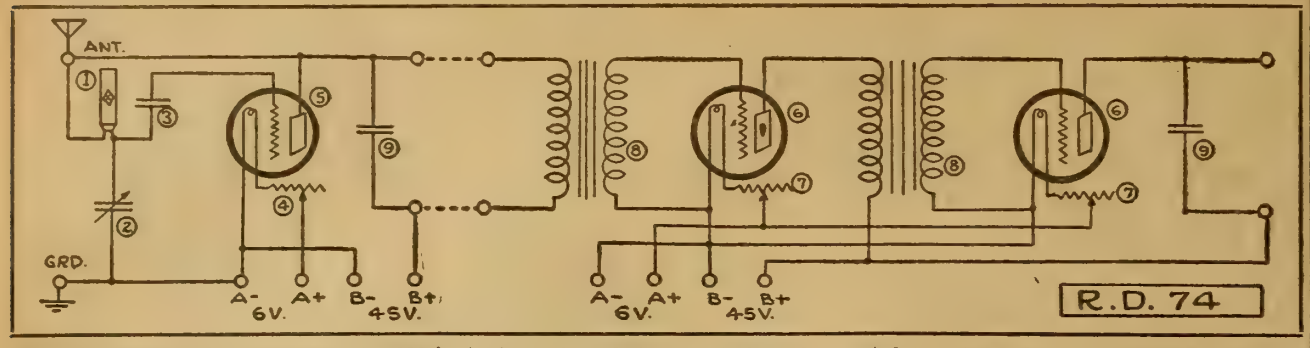


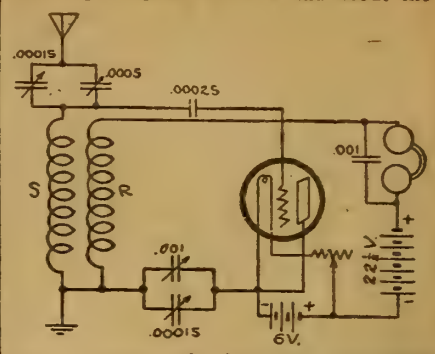
WAY back in the November 4, 1922, issue of Radio Digest, a simple regenerative receiving circuit was published. This hook-up was sent in by L. W. Martin, of San Antonio, Texas. Since then it has been republished numerous times in various publications, each time with a different name attached as the so-called inventor of the circuit. Its simplicity and efficiency of operation has appealed to the fans to such an extent that innumerable letters have been received not only in praise of the circuit but also requesting details of how to add two stages of audio frequency amplification.

The initial detector circuit has been kept the same as the original. No. 1 is a 50-turn honeycomb coil, No. 2 is an ordinary .001 mfd. variable condenser, but it is suggested that a vernier be used. No. 3 is a .00025 mfd. grid condenser. In some cases a grid leak was found necessary, and when used, a megohm resistance or more gave best results. No. 4 is a vernier filament rheostat. The tube 5, is a soft detector tube, but a potential of 45 volts was used in the plate-filament circuit.

In the amplifying stages, 6 represents hard or amplifier tubes, each using a filament rheostat, 7, which need not be vernier. No. 8 in both cases is a standard audio frequency transformer. No. 9 is a typical .001 mfd. phone condenser. The plate voltage for the amplifying stages is also 45, so the same batteries can be used for both detector and amplifier stages.

Different Style of Hook-Up

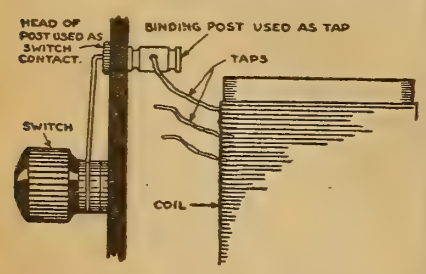
The hook-up shown in the illustration seems to work as good as a detector and one stage amplifier for DX and about the



same as a one tube for local. The coils represented are the rotor and stator of a variometer.—Fritz Franke, Chicago, Ill.

Binding Posts Make Contacts

Experimenters who desire to make changes do not like to unsolder wires from switch taps. The illustration shows a method of making switch points out of binding posts and if a change is desired it can be done without much trouble. The



knurled set screw head is used for the switch points. The base, which is back of the panel, is used for the connection and it may also be held with the screw for attaching the binding post to its base.—Chester Wilson, Chicago, Ill.

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Questions and Answers

Tuning Unit

(2082) BS. Ludlow, Ky.

I would like to know if the choke coil shown in the December 30th, 1922, issue is an R. F. or an A. F. and will a Myers choke coil do?

Will a high resistance grid leak of a range of from 1,000 to 100,000 ohms. Answer for that 50,000 ohms resistance?

I am thinking of using a variocoupler for tuning one with 72 turns of 22 D. C. C. on primary and 28 turns of 22 D. C. C. on secondary.

A.—Answering your inquiry referring the three tube Reflex receiver appearing in December 30th issue of Radio Digest, would advise that the audio frequency choke coil is indicated. A Myers coil should answer. Resistance as suggested will be alright, and variocoupler may be used.

32-Volt Tubes

(1966) GEC, St. Francis, Kansas.

Kindly inform us if there are as yet any vacuum tubes on the market having filament that can be used on 32-volt current. We have in mind the many farmer prospects for Radio equipment, who already have lighting plants with standard 32-volt battery. If such tubes are not now on market, will it not be likely that manufacturers will soon awaken to the demand for such a tube?

We are often asked by the prospective purchaser if it is not likely that the broadcasting stations will cease their operations in course of a year or so and thus render the receiving outfits valueless to them. What is your opinion on this matter, and if the broadcasting is to continue, what will support it?

A.—There is no tube such as you describe on the market at the present time. The party with a 32-volt battery should consider himself in luck from a radiofan's viewpoint. He can use six-volt tap for the filament and the entire 32 volts for B battery.

Relative to the art of broadcasting, in our opinion it is but now in its infancy. We believe that it has come to stay and there is not the slightest possibility of having to scrap our receivers for the lack of it. There are many considerations to make it a worth while venture for the broadcaster, not least its value from the advertising standpoint.

RD 68 and 69

(1963) RCS, Muncie, Ind.

I am a constant reader of your magazine and as such take the liberty of asking a few questions about your drawings RD-68 and RD-69. This is the circuit I have been looking for and want to know the resistance of the potentiometer. Also, is the tickler as used in this circuit very effective, or would the circuit work nearly as well without it? The reason I ask this is because in most regenerative sets to which you add Radio frequency, most of the effect of regeneration is lost. However, I note the tickler in your circuit is used on the Radio frequency amplifier tube instead of the detector tube. Possibly this makes quite a difference.

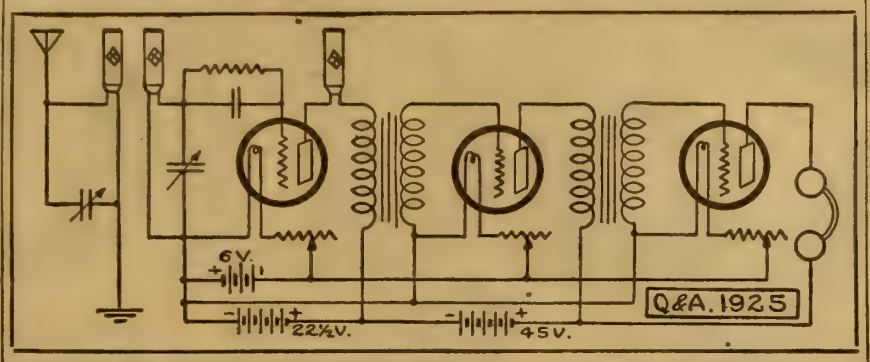
A.—The tickler as shown is essential for best results. Any standard potentiometer will serve, resistances vary from two to four hundred ohms.

Triple HC Coil Hookup

(1925) RB, Amsterdam N. Y.

Will you kindly forward to me the best hookup for triple honeycomb coils and two step amplifier.

A. We show on this page a diagram of



circuit employing triple honeycomb coils and two stages of amplification.

Reflex Circuits

(1985) LJS, New York City, N. Y.

With reference to the article on Reflex Circuits, part 2 in the January 6 issue, will you please answer the following questions?

Can a WD 11 tube be used in place of the Myers tube?

If so, will it be necessary to change the capacity of the condensers?

What is the capacity of the condenser across the phones? Of the condenser across the A. F. transformer?

A.—W. D. 11 tube can be used in place of Myers tube. However, results are not quite as good.

It will not be necessary in so doing to change capacity of condensers.

.001 condenser across the fones, also across amplifying transformer.

The above relating to Reflex Circuits is treated on in that series of four articles.

Condenser Spacing

(2080) GMF, Los Angeles, Calif.

I wish to use three variable condensers, Primary, Secondary and Grid, mounted on a panel with one inch space between them. Please advise me if they will affect one another in such close proximity.

A.—Answering your inquiry would advise that the use of variable condensers in close proximity, as suggested, will have no detrimental effect.

Flewelling Again.

(2105) EMP, Niagara Falls, N. Y.

Would a 43 plate and a 23 plate condenser work in the Flewelling? I am using these condensers at present in a three coil honeycomb outfit.

Would the actual distance covered by the Flewelling be greater than the distance I cover now, on a regualr 100 ft. single strand aerial?

Would it be possible to use "peanut" tubes?

Using a two foot loop, what range could I reasonably expect to cover under ideal conditions? What range using a regular 100 foot single wire aerial? Just a general idea is all I require, as I realize it is impossible to rate a receiver for range.

A.—Answering your several inquiries with reference to Flewelling circuit the only variable condenser needed is a twenty-three plate, although a forty-three plate may be used in the series with antenna.

The circuit has a possible range of one thousand miles and greater under favorable conditions. You can determine if the range is greater than obtained with present receivers only through experimentation as there are so many factors entering into consideration in this relation.

Peanut tubes may be used with any standard circuit.

It is probable that a range of five hundred miles, perhaps greater, could be obtained with aerial described. It is difficult to more than approximate.

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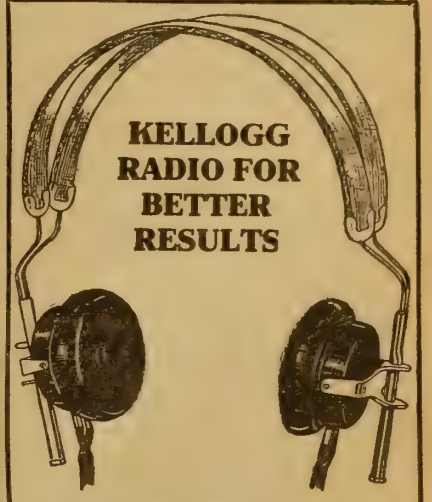

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Radio Illustrated

A "gobboon," as will be recognized by Rumphans as popular B. R. (Before Radio), a bunch of keys, bed springs and the human body serve as antennae for the set operated by O. C. Smith of Jacksonville, Ill. Everett Mann is the part of the aerial standing in the center of the picture. When this photo was taken KSD, St. Louis, was coming in like "a ton of bricks"

One of the heaviest sleet storms to hit Atlanta in years proved too much for WGM's antenna and counterpoise. The havoc done by the ice is shown in the above picture. Attempts were made by the operator, A. W. Shropshire, to effect temporary repairs but despite his work "Old Reliable" was forced to suspend operations for two days. The normal radiation of this station is 10½ amperes, but this was cut to 7½ amperes for several days following the storm

"Wheat down six points," comes over the Radio. "F'evven's sake!" exclaims John Marvin Jr. and takes another hitch in his —— (belt). "Mr." Marvin Jr., a prominent citizen of St. Paul, Minn., is an ardent Radiophan and spends his leisure hours wearing a headset. In an interview granted a Digest reporter, Marvin said he was in favor of abolishing bedtime stories in order to give more time for broadcasting market reports and scientific lectures

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Reinartz Amplifier, Flewelling Set—This Issue

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF.

Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, MARCH 10, 1923 | No. 9

R. C. A. IN NEW GRAB?

WASHINGTON'S BIRTH CELEBRATION ON AIR

WASHINGTON, D. C.—For the first time in the history of the celebration of Washington's Birthday, the ceremony which takes place at the base of the Washington Monument was broadcast over the entire country by Radio. The broadcasting set was erected in the doorway of the Monument and connected by cable with the Arlington Radio station, NAA.

to the hundreds of thousands who could hear me over the Radio. It really made me feel smaller than I am, being just one of so many folks who heard me talk that day. But when I began to talk I felt like a great big giant speaking to so many people at one time.

At the left is "Jackie" Coogan, famous child movie star, who recently gave a talk to his many admirers from Station WOR

FAN NEARLY LEAVES HOME AS OPERA ENDS

Broadcast So Perfect He "Thought He Was in Theater"

SAN ANTONIO, TEXAS.—Many splendid reports on the broadcasting of the opera "Rigoletto" recently by WOAI, the broadcasting station of the Southern Equipment Company and the San Antonio Evening News-Express, as it was presented at the Grand Theater by the San Carlo Grand Opera Company, have been received from Radiophans in all parts of the country.

Dr. W. L. Kitchens of Stamps, Ark., who heard the concert at his home, reported the reception was perfect, so perfect, in fact, that he imagined he was in the Grand Theater in San Antonio listening to the opera, instead of in his own home. Dr. Kitchens expressed his appreciation in the following telegram:

"Your program Monday night was so perfect that at the conclusion I started to leave my home, thinking I was in the opera house at San Antonio. My compliments to the San Carlo Grand Opera Company."

ARMSTRONG LICENCEES AIM OF SUIT

May Hurt 17 Companies

Scathing Rebukes Greet R. C. A. and Westinghouse — Monopoly Efforts Rapped by Independents

(By Special Correspondence)

NEW YORK.—Not hesitating once in its reported efforts to monopolize the "air" and all Radio apparatus, the Radio Corporation of America has shot its latest agitating bolt at independent Radio manufacturers. The move which is rumored to be another spite action directed toward complete and imperialistic monopoly of the Radio industry, took the form of a suit instituted February 26 in the District Court of New Jersey by the Westinghouse Electric and Manufacturing Company against the

(Continued on page 2)

Above is Mme. Maeterlinck, who, as critics say, "is not a singer striving for voice effect, but a dramatic artist using music." She was on one of the recent Bamberger Store's programs and many fans have praised her part highly. At the left is Mariona Rakauska, dramatic soprano, who delighted listeners of KYW with her Polish folk songs

'IT'S THE BERRIES,' —'JACKIE' COOGAN

CHILD STAR WRITES EXCLUSIVELY FOR DIGEST

WOR Broadcasts First Talk of Movie Youngster — Voice Is Pallophotophoned

By "JACKIE" COOGAN

I have had a Radio receiving set for some time, both in my home, in Los Angeles, and at the studio where I make my pictures, and I get lots of fun out of listening in at different times, just like all the other readers of the Radio Digest. But it was not until I came to New York on my last trip that I had the chance to speak on the Radio myself.

It was while I was visiting Newark, N. J., where I met the boys and girls of the city at Bamberger's store there. WOR is the Bamburger station; and after lunch I spoke in their microphone.

I told the boys and girls, who were listening, how interesting and thrilling it was to speak to them all. Up to now it has been just a case of their seeing my pictures on the screen and me seeing them in small groups in different places, for after all, even twenty-five thousand people (this is the number that met me at Newark) is a small group compared

I spoke over the Radio again for Gimbel Brothers' store, at New York. But just before this I had my voice photographed on the pallophotophone, invented by Mr. Hoxie. I think this was one of my most interesting experiences. In a couple of weeks this talk will be broadcast and I will hear myself talk over my set in Los Angeles, three thousand miles away, and you can just bet I am going to tune in. That will be some stunt. What do you think?

It is really wonderful to think of all

(Continued on page 2)

Symphony Heard from WNAC

BOSTON, MASS.—Members of the Boston Symphony Orchestra, in a smaller organization known as the Boston Symphony Ensemble, recently gave a concert by Radio, the music being broadcast by WNAC of the Shepard stores. The Symphony members played at Jordan Hall, and the music was relayed to WNAC by telephone. These Boston Symphony Ensemble concerts are made possible by special arrangement with Aaron Richmond, manager of the Ensemble.

R. C. A. IN NEW GRAB?

(Continued from page 1)

Radiocraft Company, Inc., and the DeForest Radio Telephone and Telegraph Company, for infringement of the Armstrong patent.

The Westinghouse company, one of the five organizations in the Radio Corporation, claims that the Armstrong license, one of which is held by the Radiocraft Company, a subsidiary of DeForest, does not permit the sale of Armstrong circuit sets through the regular trade channels of jobbers and dealers, but only direct to the amateur. The suit evidently seeks to prevent the seventeen independent manufacturers licensed under the Armstrong patent from doing business except as mail order houses, that is, direct to the fan.

Suit Flimsy Cloak for Real Purpose?

Although the suit just filed was directed against the Radiocraft and DeForest companies, it is said that the action is merely a filmsy cloak for the real purpose of the monopolists. The real significance of the suit is that it may be construed as a test case against the sixteen other independent manufacturers who paid good money to E. H. Armstrong for their licenses. These manufacturers, it is said, are now being attacked by a group of five organizations called the Radio Corporation of America which is reported to have entirely too much capital behind it for no other purpose than wrecking the Radio industry for the purposes of everyone except themselves, by court suits, injunctions, and other methods.

"Buncombe by Woolworth Building Gang"

Another angle to the demoralization of the Radio industry and hundreds of independent manufacturers by the Radio Corporation of America is found in the belief that the Westinghouse-R. C. A. clique is seeking publicity for the Armstrong regenerative sets to counteract the growing popularity with Radiophans of Reflex circuit sets, a patent for one of the best of which is owned by the DeForest Radio Telephone and Telegraph Company.

Radio manufacturers throughout the country are indignant at the latest "grab," as one of these has termed it. Another stated that the Westinghouse suit was the "choicest piece of buncombe yet shot out by the Woolworth Building gang." A third person suggested that the R. C. A. wouldn't stop at taking pennies from a blind man's cup.

The counsel for DeForest in the suit is Darby and Darby, New York City. The date of the hearing has been set for March 19.

No Strings on Armstrong Licenses

Investigation of one of the Armstrong licenses held by an independent manufacturer shows that the license granted him the right to sell to everybody except for commercial purposes. It is hardly believable that this right could fairly and rationally be construed to mean specifically the channels of distribution through which the goods were to be sold. Armstrong, reported to have been paid $500,000 by Westinghouse, it is said, will be called on to testify as to what he meant then, and if the meaning has changed any.

Another point of interest turned up in the discovery that Dr. Edward Preston, president of the Weston Instrument Company, manufacturers of high grade electrical measuring instruments, is a shareholder in the Radiocraft Company, now being attacked. The interesting part of the discovery, not obvious to outsiders, is that Dr. Preston, a multimillionaire, in protecting his rights regarding electrical measuring instruments, has defeated several of the largest electrical manufacturers in the country in court battles when the latter attempted to steal certain of his patented ideas. It is reported that the Westinghouse Company was involved in these so-called steals.

Whether the Westinghouse company would like to "get back" at Dr. Preston is not known, but as was said, the connection presents some interesting sidelights.

Supreme Court Gives R. C. A. a Shock

A very telling shock was given to the Radio Corporation in its group of numerous court actions and entanglements when a decision in a patent suit was handed down recently by the Supreme Court of the United States.

In a nutshell, this case was number 240 between the Crown Die and Tool Company, petitioner, and the Nye Tool and Machine Works, respondent. The latter had bought the "right to sue" the former for infringements from the owner of an important patent. The District Court of Illinois maintained that the right to litigate could not be bought from an inventor. The case was appealed to the Circuit Court of Appeals for the Seventh Circuit, which court for the first time in the history of the United States, reversed the decision and said that the right to litigate could be purchased as a license from an inventor.

Supreme Upholds District Court

The case was then appealed to the Supreme Court of the United States, by the Crown Die and Tool Company. The final judiciary gave its decision February 19. This was a reversal of the Circuit Court's reversal.

In other words, the Supreme Court sustained the first, the District Court, and maintained that the legal right of an invention could not be licensed by a patentee, and that all infringement actions must be maintained by the patentee alone.

Miss Florence King, famous Chicago patent attorney, won this case.

Sixteen Suits of R. C. A. Weakened

Now for the interesting part. The counsel for the Radio Corporation of America attempted to be heard in this case before the Supreme Court. Their motion to be heard was denied, however. In the R. C. A. brief, the counsel for the R. C. A. put down in black and white that the Radio Corporation of America was relying on the decision of the Circuit Court of Appeals for the Seventh District in sixteen suits for injunctions and accountings which they had pending because of infringements of patents, "each of which is based upon one or more assignments." The suit, R. C. A. vs. Jacob Hohenstein et al., was mentioned as one of these cases.

The conclusion, therefore, is that the R. C. A. lost an important toe hold when it based many of its legal efforts on a decision which has since been reversed by the Supreme Court of the United States.

Representative White Asks for Federal Investigation

AUGUSTA, ME.—Congress Representative White of this state is out after a Federal investigation of the entire Radio Situation of the country, particularly with reference to possible violations of the anti-trust laws. In a resolution he introduced, as member of the House Merchant Marine Committee, he asks that the Federal Trade Commission investigate the entire Radio industry. The resolution required that a report to the next House be given on the manufacture of Radio apparatus, ownership of patents, agreements tending to restrict trade or fix prices and contracts or leases for exclusive rights or special privileges in the reception or transmission of messages. Rep. White is joint author of the White-Kellogg Federal Radio Control bill.

DEALERS ORGANIZE FOR AID TO WHAM

Rochester Plant to Get High-Grade Artists as Result of Meetings

ROCHESTER, N. Y.—As a result of several meetings held recently by the electrical dealers of this city who handle Radio supplies, a new organization has been formed, known as the Radio Broadcasting Musical Association. The new association will give a series of musical programs which will be broadcast from Station WHAM.

This move, it is said, is due to the intense interest in Radio in this section and the excellent quality of the transmitting apparatus in use at the Broadcasting station in the Eastman School of Music, which is equal to that of any station in the country.

The high-grade artists appearing on these programs are only available on one or two nights a week, and as the majority of Radiophans in this city have sets with a rather limited range, it was thought advisable to broadcast additional material, and with this view the new association was formed.

The association has announced that popular programs will be broadcast each evening except Sunday and Monday, from 7:30 to 8:30 o'clock, in addition to the regular schedule.

"JACKIE" COOGAN

(Continued from page 1)

the fun we can get out of Radio and all the interesting things we can learn. I will never forget my first talk into the microphone and I hope every one of the Radio Digest readers will have the same chance I did. It was wonderful.

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Looking Ahead

Flewelling Contest Prize Winners will be announced in the next issue of the Digest. Who do you suppose won the $100 in prizes? See the next issue for the details. It is planned to describe the prize winning sets in issues of the near future.

Reinartz Sets will be discussed again next week by H. J. Marx. He has something neat in store for Reinartz fans.

G. C. Arnoux of WBAP, "Uncle Billy" of WGI and Harry Sadenwalter of WGY will be a few of the mystery men unfolded to listeners in who read page 5 of the Digest next week. The station announcers and staff members whose voices are often heard, are but rarely seen, and less known. But their pictures in the Digest will eliminate all this uncertainty and will help the invisible audience to visualize the invisible personnel of the great broadcasters.

Part II of the Radiophonist's Telephone Book will be given on page 8 of the March 17 issue. You can't get along without it, can you?

A-B-C Lessons for Beginners, Chapter Eleven next week will discuss the action of the vacuum tube as an amplifier. A. G. Mohaupt will make this article just as interesting as all of its predecessors. See his Chapter Ten on page 11.

E. T. Flewelling Will Tell More About His Circuit in the March 17 issue. The Digest certainly scored a hit when it "found" Flewelling. Read what he says this week on page 7.

Newsstands Don't Always Have One Left

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ETHER ONLY PILOT IN SIX HOUR FLIGHT

NEW FRENCH APPARATUS PROVES SUCCESSFUL

Aveline Control Weighs But 90 Pounds —Developed By State Research Laboratories

PARIS. — A pilotless French military airplane today made a flight of six and one-half hours in an aerodrome. This is an epoch making performance. The plane could have reached Berlin, Vienna, Rome or equivalent distances without the touch of a human hand.

Radio Control

A pilot was sent up with the plane, but he did not touch the controls during the flight. Two miles below he could barely see the group of aeronautical engineers on Only field make the plane ascend, descend, loop and bank itself at just the right angle in making turns. It responded instantly to Radio control. The only action of the pilot was to land the airplane after the flight. The control apparatus does everything but land the plane.

Of Military Value

The apparatus, which weighs ninety pounds, is called Aveline control. It has been developed by state research laboratories. It has two pistons working as arms, which are driven by compressed air. Mercury tubes, making or breaking contacts with the tilting of the ship, constitute the heart of the control apparatus. The apparatus will have not only military value, but for commercial aviation it will serve as a safety device.

Leper and Wife United to Outside World by Ether

Receiving Set Installed in Leper Colony By Army Officer

MISSOULA, MONT.—Through the magic of Radio the world has been restored to two persons who for six years have lived apart from their fellow men in forced confinement—one a leper, the other his wife.

Six years ago O. G. Willett, former state senator, was found to have leprosy, contracted, it is believed, during his service as a soldier in the Philippines. When he was banished from society, his wife followed him into exile, and since that time they have lived in a small bungalow near the little town of Alberton, Mont. Alberton is in Mineral county, whose people Senator Willett once represented in the state assembly.

The Radio set was recently installed by Lieutenant Alexander, a Radio expert of Fort Missoula, Mont. With another soldier and Mayor W. H. Beacon of Missoula, he visited the leper camp after obtaining permission from the state board of health to enter the enclosure.

The antennae was strung from the bungalow at the top of a lofty pine, about 150 feet distant. Before he left Missoula, Lieutenant Alexander had tested the set and found that he was able to "pick up" Los Angeles, San Francisco, and Nome, Alaska.

Springfield Exchange Club Listens in to Louisville

SPRINGFIELD, OHIO.—Members of the Springfield Exchange club spent an enjoyable night this week when they assembled at the Foos Gas Engine company plant and listened to a Radio program broadcast by the Exchange club of Louisville, Kentucky. The Radio program was composed of musical numbers and several four-minute talks, all having a part in the program being members of the Louisville club. After the program had been started, a telegram was sent to the Louisville club stating that the program was being heard distinctly and was being thoroughly enjoyed. Twenty minutes later, the Louisville announcer stated that the telegram had been received and a special number was played for the Springfield organization.

Station WEAO Broadcasts Ohio Senator's Messages

COLUMBUS, O. — Legislators of Ohio, members of the general assembly in session at the present time, were given the opportunity to broadcast messages to their constituents from Station WEAO of the Ohio State University on Thursday, February 22, as a part of the program of the university in showing the public officials the state university plant and a cross section of its activities on University Day, annually observed on Washington's birthday. Governor A. V. Donahey, cabinet members, supreme court judges, legislators and others in public life in Ohio were in the party that visited the state university and were guests of the Ohio State Alumni association and other campus organizations.

WOR TEST PROVES HIGHLY SUCCESSFUL

MISS BENNETT IS HEARD BY EUROPEAN FANS

American Soprano Sings for Largest Audience Ever Reached By Human Voice

By F. N. Hollingsworth

NEWARK, N. J.—The trans-oceanic recital test recently made by the Bamberger station, WQR, more than fulfilled the fondest dreams of the Radio engineers in charge. This test, the first of its kind to be made, proved to be perfect. WOR was distinctly heard by amateurs in England, France, Italy and possibly nearly all of the European countries. At the date of writing cablegrams and letters continue to flood the Bamberger store offering congratulations in appreciation of the program offered, from DX listeners living in all parts of Europe.

Largest Audience Ever Reached

Experts here state that Miss Edith Bennett, of Concord, N. H., the young American soprano selected to test out the experiment of singing by Radio to an overseas audience, sang to the largest audience ever reached by human voice. Miss Bennett, who was chosen from a long list of American and European concert stars, by a special jury of Radio-musical experts, is proclaimed to be the world's finest singer for Radio broadcasting. Only this one vocalist was used for the program so that one voice could be considered in adjusting the powerful transmitting apparatus.

Heard by Assembled Audiences

Several of the big Continental newspapers, including the Paris-New York Herald, the Antwerp Neptune, the Geneva Currier and the Stockholm Svenska Dagbladt, made arrangements to receive Station WOR's program for assembled audiences. And, of course, almost every individual Radiophan abroad made a serious attempt to tune in the Bamberger station. According to the many communications received a large majority of them were successful.

European Fans Doubtful

In spite of the fact that WOR has been heard clearly in France, Italy, Belgium, England, Scotland and Sweden on a dozen or more former occasions, there were some of the European Radioists who were a bit dubious regarding the complete success of the recent experiment. The American Radio engineers, who made a complete check of all data leading to the test, were more than positive that Miss Bennett's voice would be heard in the European countries, however, it can be safely said that they did not expect the test to be such a complete success as it proved.

Besides the many acknowledgements from across the Atlantic, Station WOR received a heavy mail from American Radiophans who heard the recital. These letters came from almost every section of the states.

New England May Soon Have New 'Silent Hours'

Inspector Kolster Plans Change of Evening Broadcasting Hours

BOSTON, MASS.—Radio Inspector C. C. Kolster of the New England division is about to recommend to the Radio Bureau of the U. S. Department of Commerce a slight variation in the "silent hours," for code sending, which he believes will straighten out many of the difficulties now being experienced throughout New England. First he will ask the Federal Bureau to sanction the Monday "silent night" broadcasting scheme for this district. With most of the local broadcasting stations now silent on Monday night, it gives the fans a chance to tune in on long distance broadcasts, and also gives the "spark" a chance to pound the brass to his heart's content.

It is also planned by Inspector Kolster to change the evening broadcasting hours from 7:30 to a half hour later, with the programs running from eight to 11, and thus giving the DX amateur two hours every night for sending, after which he is to remain silent for the rest of the evening, during the broadcasts.

HILL GIVES CANADA HEALTH OVER ETHER

BUFFALO, N. Y.—Canada will get its health by Radio. Dr. H. W. Hill, director of the London Institute of Public Health, London, Ont., Canada, will do the broadcasting through the London Free Press station. Dr. Hill was formerly director of the public health work of the state of Minnesota. The Free Press station carries through all the western part of Ontario.

NORWEGIAN COMPANY TO MAKE AIRPHONES

WASHINGTON.—A company recently has been formed in Christiania, Norway, to manufacture Radiophones and other equipment, according to a report from Assistant Trade Commissioner Sorensen, at Copenhagen. The company will make a specialty of making the phones for the Norwegian fishing fleet which comprises over 14,000 ships.

THE "HIRED HAND" OF WBAP

"The Hired Hand" at the Fort Worth Star Telegram microphone, known the country over for his humorous announcements. He is president of the "Radio Truth Society" of WBAP, with a membership of 10,000, whose purpose is to see that the truth is not abused and overworked. His activities are centered around the boiler room when not announcing. WBAP has still another famous feature in the cow bells which open and close all programs, symbolical of the cattle empire of the Southwest, of which Fort Worth is the capital

Shepard Stores Program Has Many New Features

BOSTON, MASS.—Some notable features were added to recent broadcasts of the Shephard Stores WNAC station. These included an evening's program by members of Mme. Emilia Ippolito's Vocal School offering selections from the Opera Cavalliera Rusticana, and the sextette from Lucia. Also a concert on the same evening by the Peerless Quintet of Boston, relayed by telephone and microphone from the New England Hardware Dealers' banquet at the Copley-Plaza. On another evening the "Liberty Chorus" of the R. H. White Company Store Members divided the program with the King's Chapel Choir, which gave a fine Lenten concert of sacred choral music.

NEW BROADCASTING PLANT FOR CHICAGO

THE "CRYSTAL STUDIO" TO BE "SHOW PLACE"

Station WJAZ Promises to Be on Air in Three Weeks with Program

CHICAGO, ILL.—Chicago is soon to have a new broadcasting station. Contracts were recently signed and license arranged for. This new station will have some novel features that will give the public an insight in the mysteries of broadcasting.

WJAZ will be the call of the new station to be located on the Edgewater Beach Hotel here. It will be known as the "Zeneth Edgewater Beach Hotel Station" and it is already being spoken of in Radio circles as "the crystal studio." This comes from the unique design of the operating room and artist's studio.

The "Show Place of Chicago"

The station proper will be located in the main floor of the hotel and its walls will be built of three thicknesses of plate glass. This will offer a full view of the entire station to spectators who care to watch the work. The studio will be entirely draped in red velour with indirect lighting, furnished in period style. In an interview, Mr. E. F. McDonald, Jr., of the Chicago Radio Laboratories, who will operate the station, said, "We intend to make this station the show place of Radio broadcasting stations in Chicago."

Paul Beese to Furnish Music

The regular concert programs will be broadcast from the crystal room and at other intervals Paul Beese's Orchestra will furnish dance music from the Marine dining room of the hotel. Every Sunday a concert will be given from the lounge room and in the Summer time the orchestra will broadcast from an open air platform.

Station WJAZ will be under the direct supervision of the engineers of the Chicago Radio Laboratories, with Mr. L. M. E. Clausing, operator, Mr. R. H. T. Mathew, assistant engineer, and Mr. M. B. West, formerly of the Navy Radio department directly in charge. The antenna of the station will be of the fan type. The set will have an output of 10 K. W. Generators that are now being built are in relation and capable of 4,000 volts. The new station will probably be heard for the first time in the next three weeks.

FLORIDA COCOANUTS FOR 1,000 LISTENERS

WQAM Makes Unique Offer to Those Hearing Program

MIAMI, FLA.—On Sunday, March 11, Station WQAM will broadcast a transcontinental program beginning at 11:00 P. M., (Eastern time), and lasting about two hours. Music for this program will be furnished by Harold Stern's Orchestra and the Castle House Orchestra, both are of New York City but now playing at the Miami Beach Casino here. There will also be selections by some of America's leading artists who are wintering in Florida.

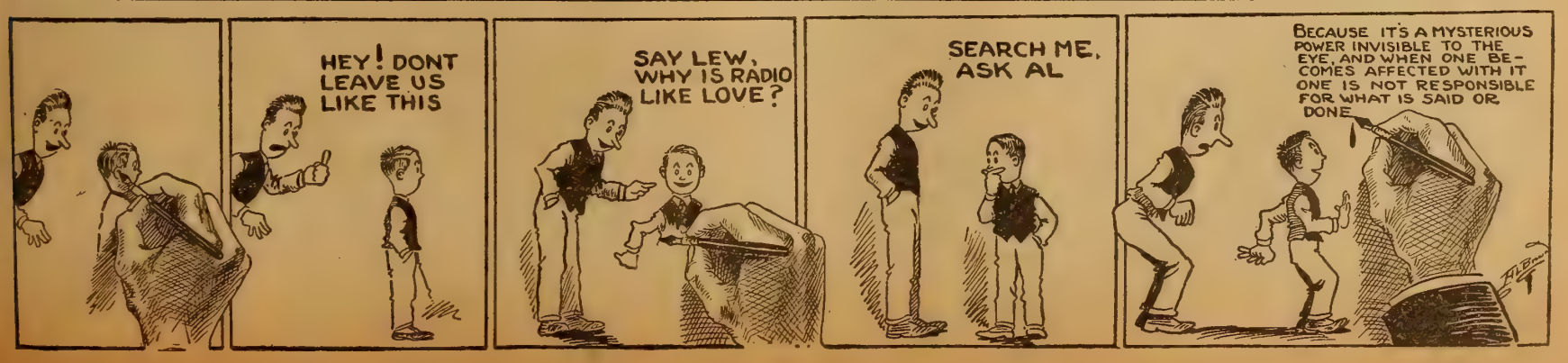
To each of the first thousand listeners who acknowledge reception of this program a real Florida grown cocoanut will be forwarded, post paid, free of charge. This offer is made by the Curtis Bright Company of Miami.

WQAM, (formerly WFAW), broadcasts the programs prepared by the Miami Daily Metropolis. This station is operated and maintained by the Electrical Equipment Company, and has the distinction of having been heard in thirty states as well as Canada, Porto Rico and Cuba.

Convention at Columbus

COLUMBUS, OHIO.—Hotel Columbus will be the scene of the first annual statewide Radio convention to be held March 16 to 18, according to officials of the Columbus Radio Club. There will also be exhibits by Radio appliances companies and a small broadcasting station in operation at the hotel.

THE ANTENNA BROTHERS — Spir L. and Lew P. — First Signs of Spring



WGM "OLD RELIABLE" SCOOPS ALL RIVALS

SECURES FIRST AIR TALK OF "BIG BOSS"

"Ether Talk is Enough to Make Anyone Feel a Little Queer," Says D. B. Carson

By G. C. Congdon, Jr.

ATLANTA, GA.—Picture if you can Henry Ford riding for the first time in an automobile in 1923. Picture Thomas A. Edison listening for the first time to his phonograph. Picture the late Alexander Graham Bell in 1922 using a telephone for the first time.

If you can do all this, then you can conjure up in your mind the picture that was presented a short time ago in the studio of Station WGM, the "Old Reliable" of the south. Not later than two weeks ago, D. B. Carson, commissioner of navigation of the department of commerce, the "big boss" of Radio, spoke for the first time from a Radiophone broadcasting station.

Introduced from "Old Reliable"

Mr. Carson is a native of Atlanta and during a recent tour of port inspections in the South visited in Atlanta. He visited the Atlanta constitution's station as one of the first points of interest to him. It was after five o'clock in the afternoon. Station WGM presents its first evening program at six o'clock. At six o'clock Mr. Carson was introduced and gave his first address by Radio.

Odd, isn't it?

When Mr. Carson stepped back from the microphone, he wore a rather foolish look on his face.

"Well," he said, "I don't blame people for feeling a little queer when they are delivering a talk by Radio."

YANK PLANES GET PERMITS AS STATIONS

Ether Phones Become Safety Measure for Air Travelers

By Carl H. Buttman.

WASHINGTON.—Radio as a safety measure for the protection of pilots and passengers has come into its own in air travel as well as on the sea, where its value was first realized. Seven airplanes and flying boats now are equipped with Radio and answer to regular calls.

The first American commercial aircraft to be licensed as a limited commercial station was one belonging to the Airline Transportation Co., of California. The Aeromarine company followed with the "Buckeye" in December and licensed five more planes recently. Radio equipment, officials believe, will make for greater safety in oversea travel and insure aid when air boats are forced down on the water.

The following aircraft have been licensed to date as limited commercial stations on 525 meters wave length:

KFBI, Airline Arrow, No. 1, Airline Transportation Co., Los Angeles, Calif.; KFBY, Balboa, Aeromarine Airways Inc., New York City; KFBA, Buckeye, Aeromarine Airways Inc., New York City; KFBF, Gov. Cordeaux, Aeromarine Airways Inc., New York City; KFBJ, Nina, Aeromarine Airways Inc., New York City; KFBM, Ponce de Leon, Aeromarine Airways Inc., New York City; KFBZ, Santa Maria, Aeromarine Airways Inc., New York City.

KELLOGG RADIO FOR BETTER RESULTS

KELLOGG SWITCHBOARD & SUPPLY COMPANY

Chicago

OPERA BROADCAST DRAWS BIG CROWD

German Opera Draws Heavily on Fans—Reminiscent of Hammerstein Days

NEW YORK.—Without warning save for such explanation as followed the Manhattan's first "broadcasting" of an opera here two nights previously, the former Hammerstein Theater in Thirty-fourth Street was besieged by operagoers all day yesterday and its lobbies were the scene of a wild but friendly "riot" last night when the Wagnerian Opera Festival began its second week with a packed house for "Die Meistersinger." At first the management was at a loss to account for the crowd, some hundreds of whom had to be turned away for lack of either seats or standing room.

May Change Policy

Then it was suggested that the wide public interest had resulted from Saturday's experiment, when a performance of "The Flying Dutchman" had been sent by Radio over a city and suburban population of millions from the Westinghouse plant at Newark, N. J., the music having been conveyed to that place on a single wire installed in the Manhattan stage by the Postal Telegraph Company. Influential members of the Metropolitan directorate had likewise heard it and there were those who said the result might change the policy of the older Broadway house, which hitherto has barred the broadcasting of opera by Radio.

Again the Ether Is Called Into Use to Find Missing

SCHENECTADY, N. Y.—The Radio has given another evidence of its value recently, when the whereabouts of Louis Gordon, former sergeant of Company B., 301st Artillery, military police corps, was found. He was wanted to substantiate the claim of an ex-service man who was dying in a Buffalo hospital, and letters to Gordon's last known address had been returned. Finally Station WGY was appealed to. This plant complied by sending out a Radio inquiry, by H. M. Laughlin, county claim agent of the Chatauqua county committee, American Legion. Within twelve hours after the broadcast inquiry Gordon saw a lawyer, drew up the necessary papers and mailed them to the claim agent. Later others by the name of Gordon wrote in, giving their full names, addresses and outfits with which they served an doffered any assistance they could.

May Change Wave Lengths

WASHINGTON, D. C.—It is possible, it is understood, that the Secretary of Commerce might make an effort to change Radio wave lengths in spite of the fact that the Radio law is not being changed by Congress. He might make an effort to do something without the law.

Freshman Has New Home

NEW YORK.—The Chas. Freshman Company, Inc., has recently moved their quarters from 97 Beekman street to a much larger and more pretentious store at 106 Seventh avenue, on the corner of 17 street. This company is one well familiar to all Radiophans.

CKCK HELPS CAPTURE "DOC" PURVIS—BANDIT

New Use Found for Broadcasters By Regina Police Force

WINNIPEG, CAN.—Prompt use of the Regina, Sask., Leader's Radio broadcasting plant CKCK was responsible for the arrest of "Doc" Purvis, train bandit.

As a transcontinental train was nearing Regina the masked bandit entered the express coach, held up and bound the messenger and took all the mail from stations between Edmonton and Regina. He jumped off the moving car as the train slowed down for the station and made away in the darkness. It was thought he had been completely lost.

The trainmen who discovered the bound messenger dashed to the nearest telephone and informed the Regina police. Immediate and up-to-date action was taken by the "coppers" and the Regina Leader's Station flashed a complete description of the bandit as furnished by the expressman.

Within ten minutes a net was spread around the city and surrounding country that proved impossible to escape. The bandit was detected four days later as he attempted to board an out going train. He said he had intended to leave the city sooner but heard of the action taken with the Radio and consequently feared arrest.

New Wrinkle for Fans

PAWTUCKET, R. I.—James Hanley, Radiophan of this city has found that he increased his signal strength by cupping out the center of the diaphragm of one of its phones so that the center almost touched the magnets. Before he did this he could generally hear Station KDKA, Pittsburgh, 25 feet from the phones, but after trying the new wrinkle he could hear at least 25 feet further away. By loosening or tightening the receiver cap, he can vary the sound to any degree of scund amplification.

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Ether Cops Keep Watch for High Wave Length

Canadian Government Give Canadian Amateurs More Leeway

OTTAWA, ONT.—"Ether Cops" are maintaining a constant vigil over the upper strata in Canada. Such is the term applied to those inspectors who have been appointed by the Canadian government department of marine and fisheries. They are mostly ex-service men and pass the night checking up on the wave lengths being used by amateurs in cities with a population greater than 15,000.

Canadian government officials contend the Canadian amateur is given more leeway than the operators of any other country in which Radio has become popular.

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Baby Lawson Crystal Set, Complete, $20.00; now 9.99
Dictograph Loudspeaker, $20.00; now 12.49
K.-C. Crystal Set, Complete, $16.50; now .. 7.99
Dictograph Headset, $12.00; now 4.49
K.-C. 23 Plate Variable Condenser, $3.30; now 1.64
Magic Crystal Detector, $1.50; now ..... .39
Radio for Everybody, by Lescarboura. $1.50; now ..... .79
(Published by Scientific American.)
Vacuum Tube Hookups, includes Armstrong Super-regenerative, by Brigham, 50c; now .29
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A finely finished large walnut cabinet, enclosing a Cast Aluminum horn with Loud Speaker Unit of exceptional tone quality and volume. A handsome ornament for the finest home.

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DID ARMSTRONG INVENT SUPER?

Courts Will Soon Decide If Title Belongs to Logwood

Meisner First to Register

Logwood Eager to Give Improved Circuit to Radio World With Few Restrictions

By Albert H. Munday

What promises to be one of the most interesting and important steps in the development of Radio, the Armstrong vs. Logwood case at present pending in the United States patent office, is gradually being consummated, and judging from present indications Charles V. Logwood will win the case. If this is the outcome it will mean that Major Edward H. Armstrong will be required to withdraw his patent rights, which have been sold to the Radio Corporation of America for $500,000, and the new circuit, known as the Logwood super-regenerative circuit, will predominate in the Radio world.

Claim Herr Meisner Inventor

It is safe to say that practically every Radiophan in the world today is familiar with the Armstrong circuit, but it might be mentioned, however, that Mr. Armstrong was believed to be the first man to conceive the principle of what is known as the super-regenerative circuit for Radio receiving sets. It will be remembered that this circuit was hailed by Radio experts all over the world as the greatest contribution to the improvement of the science; chiefly because it was an improvement in the sensitizility of the audion, and consequently the audibility of telephone and telegraph signals was increased by 1,000 times.

The new circuit was a development of the regenerative circuit patented by Herr Meisner, of Germany. This regenerative circuit was also known and developed by Charles V. Logwood and De Forest (simultaneously), E. Armstrong, Mr. Round, of England and Mr. Franklin, of England. In this case Herr Meisner was the first to register the circuit, and therefore he was given the credit for being the inventor.

First Case Decided

In the case of the super-regenerative circuit it has been understood for some time that Mr. Armstrong was the first to register the circuit, and accordingly he was granted the legal patents. But since, however, it has been discovered that Mr. Logwood really registered his application before that of Mr. Armstrong's. The first step in the case was decided in November last when the United States patent office declared an interference, as to whom was the first inventor.

In the first interview ever given to the world, and given exclusively to the Radio Digest, Mr. Logwood pointed out that his application was filed at Washington, D. C., in March, 1921, whereas that of Mr. Armstrong's was filed on June 27, 1921. The first written description of the circuit was made by Mr. Logwood on December 16, 1920, and that of Mr. Armstrong in March, 1921.

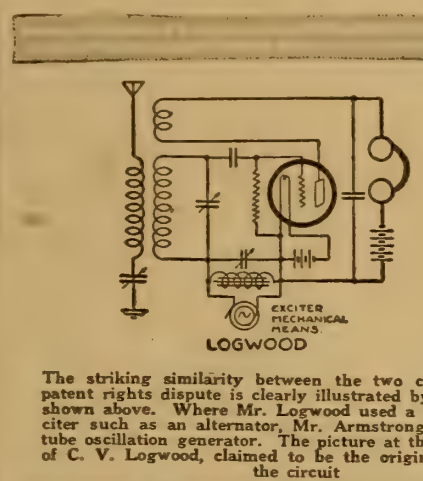
Logwood Explains Difference

Without going into technical details Mr. Logwood explained, in a few words, the difference between the Logwood and the Armstrong circuits. The Logwood circuit is equipped with a mechanical exciter and gives a broader field because both the mechanical and the electrical exciters can be used. The Armstrong circuit has a tube exciter by an electrical means. If the case is won by Mr. Logwood it will mean that the Logwood circuit will be available to the whole world (of course subject to Mr. Logwood's restrictions and patent exceptions), and will give a very broad field. This will also mean that Mr. Armstrong will be restricted. It is understood that the Logwood circuit is so sensitive for continuous wave reception that it is necessary to screen the tube circuit away from the influence of the antena re-action.

There are five steps in the great case now being held, which is expected to be settled within the next eight months. The first was recently declared by the United States patent office; the second is the motion to take the testimony of E. Armstrong; the third is the motion to take the testimony of Charles Logwood; the fourth will be the summing up, and the fifth and last step will be the decision.

Views Expressed by Logwood

Asked by the Radio Digest to express his view of the case, Mr. Logwood said: "I have the greatest admiration of Mr. Armstrong. He is a remarkable man and has accomplished excellent work for the development of the science, but in this case it is a question of rights and I feel that when the full testimony is in and summed up, the decision given by the United States patent office will be considered justice to everyone. It is a peculiar psychological fact that when a new invention is declared there are many inventors who were thinking along the same lines, and in the case of the super-regenerative circuit there was no exception. It is because inventors think along the same lines of development and many hit upon the new improvement at the same time.



The striking similarity between the two circuits now in patent rights dispute is clearly illustrated by the diagrams shown above. Where Mr. Logwood used a mechanical exciter such as an alternator, Mr. Armstrong used a triode tube oscillation generator. The picture at the right is that of C. V. Logwood, claimed to be the original inventor of the circuit

According to the patent laws in the United States, and other countries for that matter, it is the person who registers the invention first that is given the credit, and then, in the case of an invention that has been stolen or obtained by illegal means, it is necessary for the inventor to prove his claim. But in this case it is a question of priority that, I consider, has been overlooked by the United States patent office."

Will Improve Circuit

Questioned regarding his next move in the betterment of Radio, Mr. Logwood said: "As soon as this case is settled I am going to improve on the Logwood circuit so that every one from the expert in charge of the largest station in the world to the fan who has his small crystal set will be able to benefit by my inventions, and especialy by the Logwood circuit. At the present time the circuit is especially suited for the large powerful stations, and it is necessary for a well-informed man to be in charge in order to get the best results, but I am eager to give the Radio world the value of my experience; so that the new science may develop as quickly and as efficiently as possible."

Test Proves Audibility

One of the outstanding features of this new invention of Mr. Logwood's is the fact that telegraph signal reception does not depend on the "beat" principle as in the Fessenden heterodyne circuit. In tests made in reception for telegraph signal from continuous wave stations is 10,000 to one in audibility ratio against the heterodyne circuit. Daylight reception with one tube in the circuit the first of December, 1920, in San Francisco, actually received daily signals from Marion Ross, so loud one could not keep the phones on the ears at maximum intensity while with the best reception the audibility was but twenty.

Etherized Sermons Bring in Collection

Liberal Donations Are the Result of Joke Made by Dr. Massee

BOSTON, MASS.—Rev. Dr. J. C. Massee and Rev. Dr. A. C. Conrad, pastors of Tremont Temple and the Park Street Church respectively, whose Sunday evening sermons are broadcast every week by Radiophone, find that spreading religion by Radio is an enterprise profitable to the church as well as to listeners. Liberal contributions have come in to both churches by mail from Radio listeners who were invited to assist in the regular offerings. Since they could not be reached when the plate was passed among the congregations they sent in their offerings by mail. Dr. Massee has received contributions varying from twenty-five cents to $10 and during Christmas week a special contribution of $50. One man sends in regularly, the church's weekly offering envelope, with his contribution within.

Dr. Massee said that his first suggestion for a mail offering from Radiophans was at first made half jokingly, and the congregation took it as a joke. Next day a Radiophan came in to Dr. Massee's office and gave him a dollar, saying he had heard the joking remark and had heard the congregation laugh. "Now let's see if the people at the service do as well," he said, as he walked out. At the next service, Dr. Massee got $76 in bills, after telling his congregation of the Radiophan's challenge.

A Dorchester woman who has a set wrote that she would invite some women friends to lunch and have them listen in to the service. Another woman who heard the Radio service of Dr. Massee wrote that if she were not a Presbyterian she certainly would be a Baptist, and enclosed a dollar.

As a result of the stories told about the crippled boy who sent in a contribution to help some other cripple to a chance for listenining in, this boy has been given a set, placed in his own home, and other sets have been promised by various donors to help other worthy sufferers, and a special fund is slowly growing also toward this end by contributions sent in.

Meridian Opens New Station

MERIDIAN, MISS.—A new broadcasting station has been opened at Meridian under the auspices of the newly organized Meridian Radio Club. The station will send reports of aid to farmers, such as weather forecasts picked up and relayed and news items of interest to the rural community.

CFCN Operates on 2,000-Watt Output

Calgary Plant Offers "CFCN Night" and Plays to Listening Room Only

By Jeffrey J. Dingman

CALGARY, ALTA.—"CFCN Night" was observed all over the Middle West and Pacifie Coast States and in western Canada on the night of February 19, when W. W. Grant, owner of CFCN, The W. W. Grant broadcasting station at Calgary, broadcast a special program from 6XB, Telegraph Hill, San Francisco.

W. W. Grant, former chief of the Radio station of the Canadian government at High River, Alberta, and now operating at Calgary one of the most powerful stations on the continent, was asked to broadcast from the Mercantile Trust Company's station at San Francisco as a special feature for 6XB, (test call for KFDB).

Output of 2,000 Watts

Mr. Grant, who has devised a special and most effective system for broadcasting, was heard clearly in Calgary and in many other cities of western Canada. CFCN at Calgary discontinued the regular broadcast that night to afford fans here the opportunity of hearing Mr. Grant in San Francisco. While in the States Mr. Grant "rode the goat" at The Night Owls Club of Portland, Oregon.

Last week Mr. Grant commenced operation on his new set at Calgary and CFCN now has a modulating output power of 2,000 watts, being equipped with four new 500-watt tubes which were especially manufactured at Montreal. It is believed that with the new set, which has four times the output of the old, CFCN will be able to establish new records and accomplish feats which will startle Radiophans. Communication with Australia and Continental Europe is within the bounds of possibility.

Miss Florence Parsons Wins DX Prize Awarded by WNAC

BOSTON, MASS.—Miss Florence Parsons of Sydney, B. C., has been awarded a prize of a Sonochorde Loud Speaker by WNAC station of the Shepard Stores, as the person hearing this station the greatest distance from Boston. The distance is 3250 miles, an exceptionally long one for a 100-watt station to be heard, which proves that WNAC is ideally located for broadcasting. One requirement of the contest was that claimants should submit a portion of the program heard for verification before being considered eligible.

INDIANS DANCE TO WHAZ—TROY TECH

POLYTECHNIC INSTITUTE WINS NEW NAME

New Midnight Program Proves Popular Among Brave Ex-Warriors of Famous Custer Battle

TROY, N. Y.—Sioux Indians to the number of 160—many of them ex-warroirs of the Custer Battle of June 25, 1876, and a number of former Carlisle, Pa., students—gather at Lone Eagle's ranch at Winnett, Montana, to dance to music of the Rensselaer Polytechnic Institute Students Orchestra broadcast from radiophone station WHAZ at Troy, N. Y., approxmately 2,500 miles distant. And at the request of Lone Eagle—who discovered when he first "listened in" a month ago that "Big Chief WHAZ with the Mighty Voice" could be heard clearly three-fourths of the way across the continent—the Students Orchestra will play "In the Land of the Sky Blue Waters" and other modern Indian airs for the entertainment of the descendants of the first Americans.

It came about thus that the oldest angineering college, which has developed the art of broadcasting to the furthermost reaches of the continent from Alaska to Panama in a few months, provided Radio music for the first time for an Indian dance last month.

The Troy Polytechnic inaugurated this winter an international Radio program Monday night of each month. Immediate response came from remote points in all the Western states, Canada, Alaska, Mexfrom midnight to 1:30 A. M. on the second ico, Cuba and Panama.

RELAY OF BROADCAST BY WBAP—FT. WORTH

Liner Berengaria Picks Up WBAP in English Channel

FT. WORTH, TEXAS.—The Ft. Worth Star Telegram believes it is privileged to claim a new record for station WBAP due to the successful relay by this plant of a program broadcast by KHJ, Los Angeles, Calif. The program was heard almost all over the entire Southwest.

This plant has been doing very successful distance work and on one event was heard aboard the steamer Berengaria in the English Channel. Mr. L. S. Rothael, managing director of the Capitol Theatre, New York, listened to the complete program of WBAP over a receiving set installed in his cabin of the Cunard Line vessel. He said the reception was unusally clear and free from interference.

All ships sailing from American harbors and carrying fifty or more persons are required by law to maintain and operate a Radio transmitting and receiving set capable of covering at least 100 miles.

WHITE ASKS TRUST TRUTHS IN REPORT

MAINE SENATOR PUTS O. K. ON QUIZ RESOLUTION

Deems Investigation of Reputed Trust Activities Necessary for Intelligent Radio Legislation

By L. M. Lamm

WASHINGTON, D. C.—Representative White of Maine, who introduced the resolution providing for an investigation by the Federal Trade Commission of the alleged monopoly in the manufacture of Radio instruments and parts, reported this resolution to the House from the Committee on Merchant Marine and Fisheries. At the time of writing, Congress had not yet adjourned. The committee in its report on this resolution says:

"The Committee on the Merchant Marine and Fisheries, having considered House Resolution No. 548, reports the same to the House without amendment, with the recommendation that the resolution be passed. The members of the committee are unanimous in their approval of the resolution.

Request Prompt Action

"The House recently passed House bill 13773. In the preparation of that bill the members of your committee felt constrained to limit its scope because of a lack of accurate information on certain important phases of the general subject of Radio. That bill, therefore, dealt only with those matters concerning which we were advised and upon which we deemed it vital that there should be prompt action by the Congress.

"It is a matter of common assertion that the development of the art, its use and enjoyment, is being hampered and restricted through the acquisition by a few closely affiliated interests of basic Radio patents, and that the intent and effect of the practices of these interests is to establish a monopoly in Radio instruments and parts thereof. It is charged that agreements have been entered into between manufacturers and dealers in Radio apparatus the purpose and effect of which is to eliminate competition, to restrict the sale, and to unwarrantably maintain the price of instruments and their parts. There is evidence of record of contracts or agreements made, which purport to give exclusive rights in the transmission, reception, and exchange of Radio messages, with the result that no competition in service is possible in the localities covered by such contracts.

Ask for Truth

"Your committee feels that an investigation should be made to ascertain the facts in connection with the matters specifically suggested and more generally covered by the reported resolution. We desire to know the truth. We must have this information in order to satisfy ourselves whether unlawful agreements have been entered into, whether unlawful practices have been and are being engaged in, and to guide us in framing legislation for the consideration of the House. The Members of this House must have the facts if they are to legislate advisedly in the public interest on this subject."

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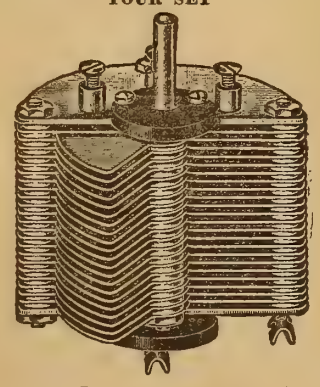

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Book Reviews

How to Make Radio Receiving Sets. This booklet describes ten different receiving sets and amplifiers which have been constructed in the research department of the Federal Telephone and Telegraph Company of Buffalo, N. Y. The booklet is fully illustrated. It is free to all who ask for it by writing the firm mentioned.

Revolutionary Theories in Wireless. By Frank E. Summers. A treatise in the how and why of Radio and science. A practical result of years of careful study and research by the author. Non-techincal, written so you can understand it. Price, $2.50.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

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KRUMM ACCLAIMED AS FATHER OF 360 WAVE

Sees Advisability in New Code of Regulations

COLUMBUS, O.—In an interesting talk given before the Columbus Radio Club, L. R. Krumm, of the Erner & Hopkins company, it developed that Mr. Krumm, more than any other man, was responsible for the fixing of 360 meters as the standard wave-length of popular broadcasting. This fact was learned while the speaker was giving a short history of the Radiophone as a prelude to his explanation of the White Radio bill.

While with the Westinghouse company, Mr. Krumm obtained the first broadcasting license for that concern. It was an entirely new subject to government officials. As a standard for this service, Mr. Krumm suggested the 360-meter wave length and it was adopted. He admits that at the time he could not foresee the tremendous increase in broadcasters, but now sees the advisability of a new code of regulations, such as embodied in the White bill.

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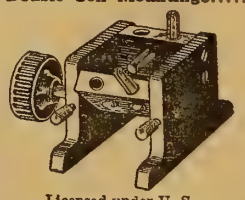

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COLUMBUS, OHIO. — "Although Radio has taken rapid strides in the short time that people have known about it, it is destined to advance further in the next three years," declared R. C. Bohannan of the Erner & Hopkins company in his talk on "The Development of Radio" at the convention of the Ohio Engineer society at the Southern hotel this week. "It is impossible to predict what future development will be, but it is practically certain that within the next three years we shall see some remakable and revolutionary changes in Radio."

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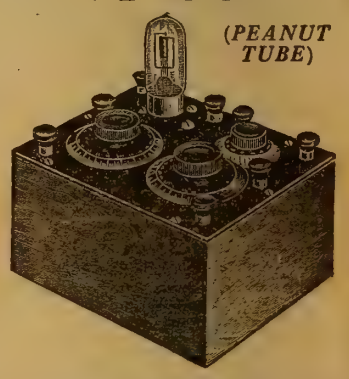
WD-11 OUTFIT

(PEANUT TUBE)



This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire, screws and picture diagram for wiring, all at above price.

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The "How" of the Simplified Super Circuit

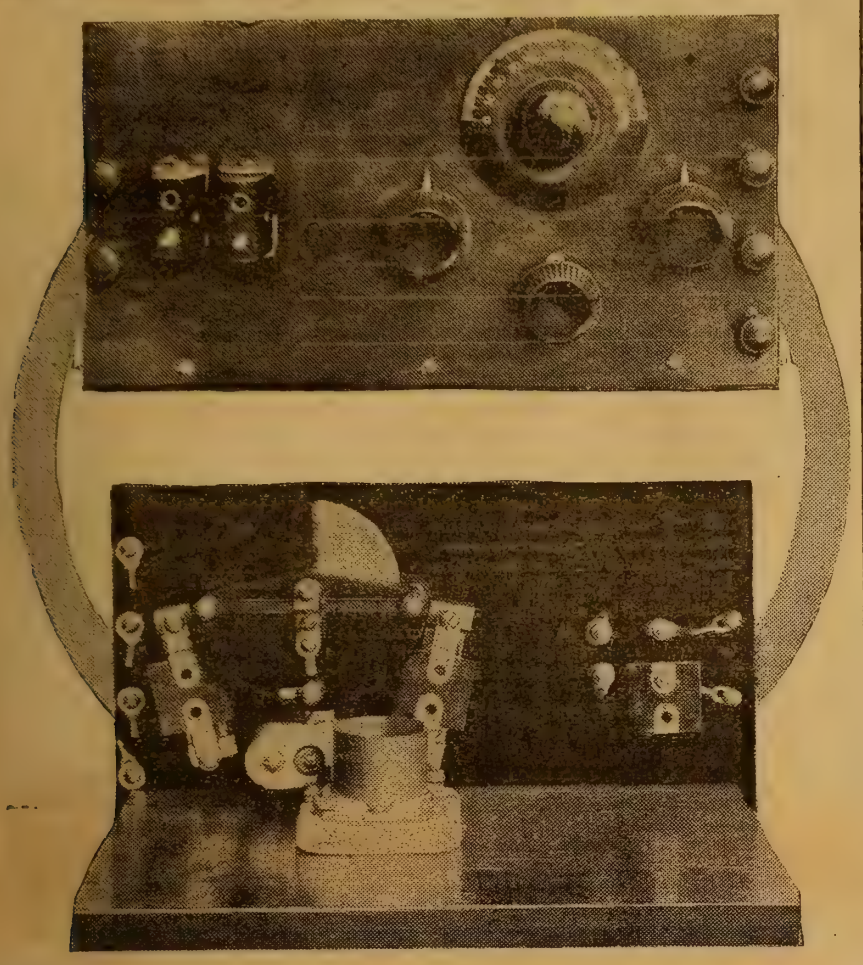
Part VI—Putting the "Flivver" on the Panel

By E. T. Flewelling

IT IS presumed that all those who have followed this series now have all the data necessary to build a Flewelling super set properly. Mounting of the various parts is, of course, optional with the one who builds his set to meet individual requirements. No doubt there is plenty of room for improvement in the Flivver circuit and more or less opportunity for those who may wish to experiment. This is one of the reasons for the prize contest that has just been closed by Radio Digest.

The Flewelling super has a peculiar characteristic, for at times distance will make no difference whatever. It is a consistent receiver as compared with other sets. To get a comparable audibility with other sets, I have been forced to equalize things by putting the Flivver on a 2-foot loop, or even robbing it of any energy collector whatsoever. These tests were, of course, in comparison with other single-tube sets. The Flivver is simply a step farther in the right direction, for reducing first and upkeep cost. The Flivver always ranks high in comparative tests, especially where cost is considered.

For the fan desiring a suggestion for mounting his set the method shown in the accompanying halftone is given. These pictures show the front and back view of a panel mounting which is laid out with a view to maximum results and ease of operation. The views were taken before the set was wired in order to show the simplicity of the outfit and to avoid any possibility of hiding any mounting feature with the wiring.



The 2-coil mounts are placed on the left of the panel for the following reasons:

The 50-turn coil is placed in the extreme left mount and is only moved when it is necessary to secure out of the ordinary conditions of coupling between the coils. The antenna post is placed near to this coil. Both the antenna post and the coil are connected to the grid of the tube. There is considerable body capacity effect centered around these points and for this reason they are placed as far out of the way as is possible. This applies, of course, only to the right handed operator.

Important to Have Grid Leads Short

The 75 or 90-turn tickler coil is placed in the mount on the right. This coil is then moved to vary the coupling. It swings to the right and for this reason the condenser and other controls are placed as far to the right as is possible in order to avoid interference with the coil when it swings.

The view of the rear shows the socket for the tube placed very close to the adjustable grid leak and its condenser C2. This construction makes it possible to have a lead to the grid of the tube of minimum length, **which is important.**

One of the condensers of the condenser bank C3C4C5 is placed directly on the coil mounting stud, another is placed on the mounting of the grid leak R2, and the third may be placed in the most convenient position to suit individual needs.

Both binding posts on the left are directly connected to the 50-turn coil mount. Only one is used as a rule, the one that is connected to the grid side of the coil, but the second one may be used for loop work.

Of the four posts on the right of the panel the two upper ones are for the phones and the two lower ones for the filament or A battery connections. The B battery leads would ordinarily be taken from the rear of the set but the A leads are mounted on the panel so that the filament current may be easily carried to an amplifier if one is used.

The control knobs of the variable condenser, rheostat and variable grid leaks, are all placed close together so that practically all of the control of the circuit is at one's finger tips and will enable one to secure maximum ease in tuning.

Mount in Cabinet to Exclude Dust

If the panel is fastened to a baseboard, as shown, the board will serve as a support for the panel, tube socket, etc., and will not interfere with mounting the set in a cabinet. It is much easier to work on a set that is mounted in this manner than it is on one that has no support for the panel. It is strongly recommended that the set be enclosed in a cabinet in order to exclude dust which will often seriously affect the grid leaks. No peep holes are cut in the panel to observe the tube for the same reason.

Radiophans are using almost any tube they have in stock on the Flivver circuit. For this reason it is not necessary to make any expenditure for building a set if you have a tube. If a tube is too soft, that is, gas filled or low vacuum, it will not operate correctly. One reason for this is because it is not possible to control the blocking action. The charge on the grid will leak off through the tube itself instead of through the leaks where the circuit is controlled.

Discussion of Tubes for Circuit

Among the list of tubes that will operate in the Flivver are the WD-11, Myers, UV or Cunningham amplifiers, and the 202 5-watt power tube. Audibility will depend to a great extent upon the kind of tube used. Some tubes deliver a greater volume of sound than others. This part can only be made known by trial. The WD-11 tube is as good as can be asked so far as its ability to bring in long distance work is concerned, but it does not deliver the volume characteristic of other tubes.

When one is desirous of securing maximum volume from his set he must take into consideration other factors along with the tube. Any given tube will deliver its maximum in a given circuit only when, other things being right, the filament and plate voltages are exactly right. This means that no two tubes, even of the same type, will yield their best work on the same setting of the A and B voltages.

(Continued on page 15)

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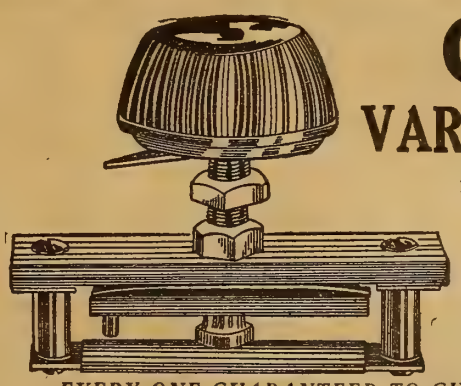

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AG1, Presidio of San Francisco, Calif. 50 mi. Signal Corps, U. S. A. Sun, Thurs, 8-9 pm, instruction, music. Pacific.
AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.
AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.
AV7, St. Paul, Minn. Signal Corps, U. S. A.
BE1, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 9-10 pm, music, announcements, lectures. Pacific.
CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd., (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45-9:45 pm, concert. Eastern.
CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Van Couver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.
CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.
CFCN, Calgary, Alta., Can. 275, 440 only. 1500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.
CFCX, London, Ont., Can. The London Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Can. Marconi Co.
CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Montreal, Que., Can. B. L. Silver.
CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.
CHYC, Montreal, Que., Can. Northern Elec. Co.
CHXC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.
CJBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.
CJCA, Edmonton, Alta., Can. 450 only. 1000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Pacific.
CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.
CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.
CJCF, Kitchener, Ont. Can. 420 only. 50 mi. The News Record, Ltd. Thurs, 9-11 pm. Eastern.
CJCG, Winnipeg, Man., Can. 410 only. 1,000 mi. Manitoba Free Press. Daily ex Sun, 10-10:30 am, news; 12-1 pm, reports. Mon, Thurs, 8-10 pm, concert. Tues, 7-8 pm, music. Fri, 5:30-6:45 pm, music. Every other Thurs commencing Feb. 15, 11 pm-1:30 am, dance music. Alternate Sun, 8 pm. Central.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm. Fri, 8-10 pm. Alternate Sun, 8:30-10 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram.
CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 2 pm, weather; 4:30-4:35, reports; 4:15-5:15, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.
CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Atlantic.
CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.
CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.
CKOC, Hamilton Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.
DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.
DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.
DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDBZ, Bakersfield, Calif. 100 mi. Frank Siefert. Daily ex Sun, 7:30-3:15 pm, reports, music. Sun, sacred program, irregular. Pacific.
KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 3, sports; 7-9:55 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.
KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.
KDYL, Salt Lake City, Utah. 485 also. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.
KDYM, San Diego, Calif. Savoy Theater.
KDYQ, Portland, Ore. Oregon Inst. of Technology.
KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m weather, time. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.
KDYV, Salt Lake City, Utah. Cope & Cornwell Co.
KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.
KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks, Tues, Fri, 3:45-4:30 pm. Sun, 11 am-12:15 pm, 5-6, Church services. 120th Meridian.
KDZA, Tucson, Ariz. Arizona Daily Star.
KDZB, Bakersfield, Calif. Frank E. Siefert.
KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.
KDZER, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZF, Los Angeles, Calif. Automobile Club of Southern California.
KDZG, San Francisco, Calif. Cyrus Pierce & Co.
KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-5 pm, news, reports. Daily ex Tues, Fri, 8-9 pm, reports, music. Tues, Fri, 6:30-7:30 pm. Sun, 8-9 am, church service. Pacific.
KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.
KDZK, Reno, Nev. 50 mi. Nevada Mch. & Elec. Co. (Nevada State Journal.) Daily ex Sun, 4-4:30 pm, news. Wed, 6:30-7:30 pm, music. Fri, 8-9 pm, special. Pacific.
KDZL, Ogden, Utah. 100 mi. Rocky Mountain Radio Corp. Mon, 12-1 pm, 7-9 pm. Mountain.
KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.
KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.
KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZT, Seattle, Wash. Seattle Radio Assn.
KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.
KFCL, Los Angeles, Calif. Los Angeles Union Stock Yards.
KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.
KFCP, Ogden, Utah. Ralph W. Flygare.
KFCQ, Casper, Wyo. Motor Service Stn.
KFCV, Houston, Tex. 300 and 600 also. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.
KFCY, Le Mars, Ia. Western Union College.
KFCZ, Omaha, Neb. Omaha Central H. S.
KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories.
KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.
KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.
KFDF, Casper, Wyo. Wyo. Radio Corp.
KFDH, Tucson, Ariz. Univ. of Ariz.
KFDJ, Corvallis, Ore. Oregon Agri. College.
KFDL, Denver, Colo. Knight-Campbell Music Co.
KFDO, Bozeman, Mont. H. Everett Cutting.
KFDP, Des Moines, Iowa. 300 mi. Hawkeye Radio & Supply Co. Daily 12 m. Mon, Wed, 7:30-9 pm. Sat, 9-10:15 pm. Central.
KFDR, York, Neb. Bullock's.
KFDS, San Francisco, Calif. John D. McKee.
KFDU, Lincoln, Neb. Neb. Radio Elec. Co.
KFEB, Taft, Calif. City of Taft.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.
KFAD, Phoenix, Ariz. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.
KFAE, Pullman, Wash. 200 mi. State College of Wash. Program irregular.
KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Thurs and Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Ida. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services.
KFAP, Butte, Mont. Standard Pub. Co.
KFAQ, San Jose, Calif. City of San Jose.
KFAR, Hollywood, Calif. Studio Lighting Service Co.
KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.
KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 9-10 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.
KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Daily ex Sun, 9:30-10 am, 3-3:20 pm, markets, news; 8:30 pm, weather. Mon, Fri, 8:30-9 pm, concert. Wed, 8-9 pm. Mountain.
KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.
KFAW Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.
KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Wed, 9-10:30 pm. Special programs other days. Pacific.
KFAZ, Reedley, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.
KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buttrey Co. Daily ex Sun, 9:30 am, agriograms, weather. Tues, Fri, 8-9:30 pm, music. Mountain.
KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.
KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.
KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.
KFBG, Tacoma, Wash. First Presbyterian Church.
KFBH, Marshfield, Ore. Thomas Musical Co.
KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.
KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.
KFBL, Everett, Wash. Leese Bros.
KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. Bishop N. S. Thomas.
KFEV, Colorado Springs, Colo. Clarence O. Ford.
KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.
KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Tues, Thurs, Sat, Sun, 7:30-8:30 pm. Sat, Sun, 9:30-10:30 pm, music. Pacific.
KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.
KFCF, Walla Walla, Wash. Frank A. Moore.
KFEC, Portland, Ore. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music; 6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.
KFEJ, Tacoma, Wash. Guy Greason.
KFEP, Denver, Colo. Radio Equipment Co.
KFEQ, Oak, Neb. J. L. Scroggin.
KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.
KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.
KFGB, Pueblo, Colo. Lowenthal Bros.
KFGF, Mt. Vernon, Wash. Buchanan, Stevens & Co.
KFGG, Astoria, Ore. Astoria Budget.
KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule
KFHJ, Santa Barbara, Calif. Fallon Company.
KFI, Los Angeles, Calif. 400 only. 1,500 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Tues, Fri, 1:30-2:30 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-10. Pacific.
KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.
KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.
KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.
KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.
KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. No regular schedule.
KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 400 and 485 also. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 3:30-4 pm, women's program. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.
KGY, Lacey, Wash. 250 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.
KHD, Colorado Springs, Colo. 485 also. 50 mi. C. F. Aldrich Marble & Granite Co. Daily ex Sun, 8:15 am, weather. Mon, Wed, Fri, 7-7:30 pm, music, lectures. Mountain.
KHJ, Los Angeles, Calif. 400 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.
KHQ, Seattle, Wash. Louis Wasmer.
KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.
KJQ, Stockton, Calif. 100 mi. Gould, the Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.
KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun, 8-9 pm, miscellaneous. Pacific.
KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.
KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri. 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.
KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.
KLS, San Francisco, Calif. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.
KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 3:30-4:30 pm, 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.
KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm, news, markets, bedtime story, concert. Thurs, 8-9 pm, concert. Sun, 8-9 pm, church services. Mountain.
KMJ, Fresno, Calif. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.
KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7, 9:15-10, concert, news, lecture. Pacific.
KNI, Eureka, Calif. T. W. Smith.
KNJ, Roswell, New Mex. 485 also. 750 mi. Ross-
KNJ, Roswell, New Mex. Temporarily discontinued.
KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.
KNT, Aberdeen, Wash. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 5-6 pm, 7-8, news, concert. Pacific.
KNV, Los Angeles, Calif. Radio Supply Co.
KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.
KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5 pm, code, 8:20-9 pm, music. Pacific.
KON, San Diego, Calif. 200 mi. Holzwasser Inc. Daily ex Sun, 4-5 pm and 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm and 8:15-9, church service. Pacific.
KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.
KPO, San Francisco, Calif. 400 only. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 12:30-1:30 pm. Tues, Sat, 8-10 pm. Sun, 11-12:30 pm, church services. Pacific.
KQI, Berkeley, Calif. Univ. of Calif.
KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, 7:15-8 pm. Sun, 9-10 pm, entertainment. Pacific.
KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.
KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.
KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.
KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Wed, 9-10 pm. Sun, 5:30-7:30 pm, concert. Pacific.
KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Thurs, 11:30 pm, concerts. Central.
KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.
KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.
KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.
KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 5:15-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather reports. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, 2-4 pm, 5-6, concert, news. Pacific.
KUS, Los Angeles, Calif. 300 mi. City Dye Wks. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.
KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.
KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.
KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.
KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.
KXS, Los Angeles, Calif. Braun Corp.
KYI, Bakersfield, Calif. Bakersfield Californian.
KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.
KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:25 am, 10, 1:20 pm, 2:15, 2:30, markets; 3 (3:30 ex Mon, Wed, Fri), 4, 4:15, 4:30, 5, news, sports (6:30 Mon only, news, reports, sports), 6:50, bedtime stories; 8-9, music; 9, news, sports; 9:05, special. Sun, 11 am, 3:30 pm, 7, church services. Central.
KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.
KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.
KZV, Wenatchee, Wash. Wenatchee Battery & Motor Co.
NAA, Arlington, W. Va. 710 only. 2,000 mi. Official government broadcasting station. U. S. Navy Dept. Mon, Tues, Thurs, 7:15-7:30 pm, lecture. Mon, Thurs, 6:45-7 pm, lecture. Tues, Thurs, 7:45-8 pm, health lecture. Wed, Fri, 8:30-9:45 pm, band concert. Eastern.
PWX, Havana, Cuba. Cuban Telephone Co.
WAI, Dayton, O. McCook Field, U. S. Army.
WAAB, New Orleans, La. Valdemar Jensen.
WAAC, New Orleans, La. Tulane Univ.
WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. Fri. 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.
WAAF, Chicago, Ill. 485 also. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program at 3 and 4:30 pm. Central.
WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.
WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Tues, 10-11 pm. Thurs, 8:30-9:30 pm, Sat, 7-8 pm, music. Eastern.
WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun. 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.
WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 7:30-8 pm, code instruction; 8-9, special program. Eastern.
WAAN, Columbia, Mo. Univ. of Mo.
WAAP, Wichita, Kan. 485 also. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.
WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.
WAAS, Decatur, Ga. Georgia Radio Co.
WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45, 10:45, 11:45, 12:45, 1:20, 8 pm, market reports. 8:15-9 pm, music. Central.
WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

(NOTE—The second part of the station schedule list will appear next week.

RECEIVING RECORDS CONTEST

By the Contest Editor

EDGING in at the last minute, 29 new record holders passed the qualifications needed to have their names listed in the complete, revised list of records appearing below. The "horse race" seems never-ending, and more than once the Contest Editor has had to paste additonal "map" to the one he is now using so that the Alaskans, Cubans, and Nova Scotians could be checked in the distances they submitted.

The complete list of record holders is as follows:

Station—Miles Away—Who Heard It

CFAC—1650, R. A. Deger, Dayton, O.
CFCA—1850, C. C. Beery, Spokane, Wash.
CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CFCN—2000, C. M. Bussey, Hudson, N. Y.
CHBC—2450, S. S. Florence B. Phillips.
CHCA—1625, T. S. Wildman, Nicholas, Iowa.
CHCC—1525, Samuel Woodson, Jr., Liberty, Mo.
CHCQ—2100, G. F. Aiken, Providence, R. I.
CHXC—1500, M. B. Gilbert, Douglas, Wyo.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
CJCG—1425, G. E. Wharton, Houston, Tex.
CJCE—2100, F. C. Woodford, Canton, O.
CKAC—2700, A. C. Carter, Juneau, Alaska.
CKCK—1625, L. Genack, Springfield, Mass.
CKCR—1225, Samuel Woodson, Jr., Liberty, Mo.
CJCB—1300, V. Dennis, Oskaloosa, Kans.
DD5—1225, C. D. Mason, Cleveland, O.
DN4—2100, W. E. Davison, Berwick, N. S., Can.
KDJ—2450, C. Edge, Jr., Melbourne, Fla.
KDKA—2150, Geo. Walker, Fresno, Cal.
KDN—2175, F. C. Woodford, E. J. Poyser, Canton, O.
KDPT—1800, C. Hackney, Fairmont, Ind.
KDYL—2450, R. Doull, Halifax, N. S.
KDYM—2025, F. B. Steer, Cleveland, O.
KDYQ—2550, C. M. Rice, Jr., Worcester, Mass.
KDYR—2300, F. H. Peran, Oswego, N. Y.
KDYS—1700, M. C. Ridenour, Kingwood, W. Va.
KDYU—1525, T. S. Wildman, Nichols, Ia.
KDYW—1125, C. Bennett, Aurora, S. D.
KDYX—4150, W. E. Long, Sterling, Ill.
KDYY—1325, J. Wallace, Bridgeville, Pa.
KDZA—2025, Breisch Motor Co., Ringtown, Pa.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KDZQ—1325, H. S. Rahiser, Pittsburgh, Pa.
KFAB—2225, Breisch Motor Co., Ringtown, Pa.
KFAD—1600, D. L. Kalter, Dayton, Ohio.
KFAF—1775, F. W. Foss, Boston, Mass.
KFAE—1650, G. E. Wharton, Houston, Tex.
KFAM—1775, J. W. Hawes, Boston, Mass.
KFAN—1250, Chas. N. Schwab, Grinnell, Iowa.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFAS—1900, F. Brumon, Urbana, O.
KFAY—2200, L. A. Graf, Dunkirk, N. Y.
KFBB—1050, R. Henry, Butler, Mo.
KFBC—2125, J. D. Crosby, Stauffer, Pa.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFBH—1450, R. B. Reed, Eureka, Kans.
KFBJ—1775, Richard Reeder, Alliance, O.
KFBK—1950, H. S. Juday, Eldorado, O.
KFBM—2450, T. W. Zeigler, Charleston, S. C.
KFBQ—1025, B. H. Seydel, Tacoma, Wash.
KFC—1875, G. E. Wharton, Houston, Tex.
KFCB—1425, O. P. Klein, Leduc, Alta., Can.
KFCF—1775, B. A. Deger, Dayton, Ohio.
KFCX—1075, G. E. Wharton, Houston, Tex.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFEB—1125, R. L. Hartman, Hoisington, Kans.
KFEL—1050, H. R. Wunder, Cheviot, O.
KFI—2425, J. H. Michell, Elmhurst, L. I., N. Y.
KFV—1200, C. C. Sawyer, Liberal, Kan.
KFZ—1750, E. Stonton, Vicksburg, Miss.
KGB—1250, C. Bennett, Aurora, S. D.
KGF—1350, S. M. Woodson, Jr., Liberty, Mo.
KGG—1550, T. S. Wildman, Nichols, Iowa.
KGN—1875, Fay Allarding, Lake Odessa, Mich.
KGU—4650, Eugene Evans, Tippecanoe City, Ohio.
KGV—3700, M. C. Bidwell, Grinnell, Ia.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KGY—1500, E. Coston, Edmond, Okla.
KHJ—2900, W. E. Davison, Berwick, N. S., Can.
KHQ—2500, C. M. Rice, Jr., Worcester, Mass.
KJJ—2175, M. P. Jacot, Copley, O.
KJR—1500, W. M. K. Young, Kansas City, Mo.
KLP—2180, W. G. Mann, London, Ont., Can.
KLX—2225, C. J. Lohman, McDonald, Pa.
KLZ—2100, W. E. Davison, Berwick, N. S., Can.
KMJ—1050, C. C. Sawyer, Liberal, Kans.
KMO—1200, A. Taylor, Winnipeg, Man., Can.
KNI—2150, John Kiener, Cleveland, O.
KNJ—1425, J. Wallace, Bridgeville, Pa.
KNT—2425, J. H. Wall, Rensselaer, N. Y.
KOB—1975, C. M. Rice, Jr., Worcester, Mass.
KOG—2125, A. H. Jessup, Erie, Pa.
KON—1900, F. Brinnon, Urbana, O.
KOP—2075, T. W. Smith, Watsonville, Calif.
KPO—2550, C. M. Bussey, Hudson, N. Y.
KQP—2100, G. A. Walter, McDonald, Pa.
KQV—1325, M. B. Gilbert, Douglas, Wyo.
KQW—1900, C. Conrad, Logansport, Ind.
KSD—1725, Wm. Schauer, Daly City, Calif.
KTW—1250, C. Bennett, Aurora, S. D.
KUO—2675, C. M. Rice, Jr., Worcester, Mass.
KUY—2100, Roland Smith, Hilo, Hawaii.
KVQ—1125, G. D. Robarts, Edmonton, Alta., Can.
KWG—2500, Mrs. A. S. Mawhinney, New York, N. Y.
KWH—2250, Hugh Meetze, Manassas, Va.
KWJ—2125, C. J. Lohman, McDonald, Pa.
KXD—2075, Richard Reeder, Alliance, O.
KYF—1100, R. L. Hartman, Hoisington, Kans.
KYG—2175, J. F. Means, Oil City, Pa.
KYJ—2025, V. V. Tompkins, Cleveland, Ohio.
KYT—2325, Breisch Motor Co., Ringtown, Pa.
KYW—1850, J. J. Beales, Jr., San Anselmo, Cal.
KYY—2500, J. B. Purcell, Port Jervis, N. Y.
KZDQ—1250, F. C. Woodford, Canton, O.
KZM—2700, Sarkis Kachajian, Worcester, Mass.
KZN—1650, E. K. Kitts, Bluefield, W. Va.
KZY—1950, A. Galloway, Jr., Grand Rapids, Mich.
KZV—1175, C. Bennett, Aurora, S. D.
NAA—1150, H. S. Johnson, Chandler, Okla.
NOF—1100, C. B. Martin, Springfield, S. D.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAAB—1150, H. K. Cooper, Owego, N. Y.
WAAC—1775, W. F. Macleod, Prince Albert, Sask., Can.
WAAD—1100, R. Doull, Halifax, N. S.
WAAG—1600, C. C. Beery, Spokane, Wash.
WAAJ—1725, M. B. Gilbert, Douglas, Wyo.
WAAL—1550, Richard B. Martindale, Los Angeles, Calif.
WAAM—1575, M. B. Gilbert, Douglas, Wyo.
WAAN—1400, H. Baird, River de Chute, N. B., Can.
WAAP—1325, W. B. Clark, Bridgeport, Conn.
WAAQ—1325, W. Douglass, Guthrie, Okla.
WAAZ—1700, W. E. Davidson, Berwick, N. S., Can.
WAEF—1125, F. P. Cerniglia, Tallulah, La.
WAH—1275, A. G. Hilton, Bicknell, Calif.
WAP—1450, C. C. Beery, Spokane, Wash.
WBAA—1575, C. C. Beery, Spokane, Wash.
WBAB—1425, G. E. Wharton, Houston, Tex.
WBAD—1125, N. Theobald, Attleboro, Mass.
WBAF—1250, M. Neuman, Guthrie, Okla.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAJ—1075, G. E. Wharton, Houston, Tex.
WBAH—1050, F. T. Wycoff, Springfield, Mass.
WBAM—1125, Dr. W. C. Welverton, Linton, N. D.
WBAP—2550, C. Blanch, Amherst, N. S., Can.
WBAX—1350, G. E. Wharton, Houston, Tex.
WBAY—2175, C. C. Beery, Spokane, Wash.
WBF—2575, A. B. Butters, Los Angeles, Calif.
WBL—1825, W. E. Davidson, Berwick, N. S., Can.
WBT—1250, W. C. Wolverton, M. D., Linton, N. D.
WBZ—1725, W. F. Macleod, Prince Albert, Sask., Can.
WCAE—2150, Perkins Benneyan, Fresno, Calif.
WCAG—1325, K. McNeil, Ottawa, Ont., Can.
WCAH—1075, D. J. Morris, Weir, Tex.
WCAK—1025, F. J. McKenny, New Prague, Minn.
WCAL—1150, G. D. Robarts, Edmonton, Alta., Can.
WCAQ—1025, G. E. Wharton, Houston, Tex.
WCAP—1225, W. F. Macleod, Pr. Albert, Sask., Can.
WCAR—1750, Sarkis Kachajian, Worcester, Mass.
WCAS—1125, G. D. Robarts, Edmonton, Alta., Can.
WCAT—1500, H. Dammann, Bronx, N. Y.
WCAX—1325, Doyle Getter, Arkansas City, Kan.
WCAY—1050, D. J. Morris, Weir, Tex.
WCJ—1150, M. L. Johnson, Atchison, Kan.
WCK—1225, W. F. Macleod, Prince Albert, Sask., Can.
WCM—1650, C. M. Rice, Jr., Worcester, Mass.
WCN—1200, W. M. K. Young, Kansas City, Mo.
WCX—2050, A. G. Hilton, Bicknell, Calif.
WCY—1150, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WDAE—1225, J. Shamburg, Tekamah, Nebr.
WDAF—1675, W. E. Davison, Berwick, N. S., Can.
WDAH—1625, W. M. Brown, Pittsburgh, Pa.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAK—1200, R. Hastings, Atchison, Kan.
WDAL—2450, J. Beckman, Seattle, Wash.
WDAN—1375, W. H. Spencer, Montreal, Que., Can.
WDAO—1500, M. J. Columbe, Plattsburg, N. Y.
WDAP—1875, M. J. Bevelockway, Lomita Park, Calif.
WDAQ—2375, M. C. Bidwell, Grinnell, Ia.
WDAR—1175, C. B. Martin, Springfield, S. D.
WDAS—1250, C. M. Bennett, Aurora, S. D.
WDAU—2250, A. L. Lewis, Stanberry, Mo.
WDAV—1275, J. H. Wall, Rensselaer, N. Y.
WDAY—1200, G. E. Wharton, Houston, Tex.
WDT—1400, G. E. Wharton, Houston, Tex.
WDY—2225, Nestor Barrett, Republic, Wash.
WEAD—1000, John Kienor, Cleveland, O.
WEAF—2450, N. E. Parr, Albany, Ore.
WEAH—1375, E. A. Howard, Watch Hill, R. I.
WEAJ—1300, Richard Siegel, Lawrence, Mass.
WEAK—1100, J. H. Wall, Rensselaer, N. Y.
WEAO—2100, Dobson & Tucke, Oakland, Calif.
WEAP—1250, M. J. Columbe, Pittsburgh, N. Y.
WEAT—1525, R. Doull, Halifax, N. S.
WEAV—1200, H. S. Rahiser, Pittsburgh, Pa.
WEAY—1950, H. Gow, Seattle, Wash.
WEV—1400, H. Dammann, Bronx, N. Y.
WFAA—1925, W. E. Davison, Berwick, N. S., Can.
WFAC—1200, G. E. Wharton, Houston, Tex.
WFAF—1425, G. E. Wharton, Houston, Tex.
WFAG—1375, R. L. Hartman, Hoisington, Kans.
WFAJ—1125, P. A. Meunier, Cleveland, O.
WFAS—1875, B. H. Seydel, Tacoma, Wash.
WFAT—1275, P. Benneyan, Fresno, Calif.
WFAV—1175, E. E. Case, Beverly, N. J.
WFAW—1550, C. Bennett, Aurora, S. D.
WFAZ—1150, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WFI—1250, W. Douglass, Guthrie, Okla.
WFO—1000, D. J. Morris, Weir, Tex.
WGAB—1700, W. F. Macleod, Pr. Albert, Sask., Can.
WGAD—2575, L. Jang, Hanley Falls, Minn.
WGAK—1050, D. D. Coutts, Madison, S. D.
WGAM—1275, H. B. Porter, Lynn, Mass.
WGAN—1625, H. Gardner, Halifax, N. S., Can.
WGAR—1150, H. Dammann, Bronx, N. Y.
WGAS—1250, W. E. Davison, Berwick, N. S., Can.
WGAT—1675, R. Doull, Halifax, N. S.
WGAY—1000, D. J. Morris, Weir, Tex.
WGF—1400, Perkins Benneyan, Fresno, Calif.
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WGM—2175, Allan Harvey, Snohomish, Wash.
WGR—2175, N. E. Parr, Albany, Ore.
WGY—2575, J. J. Beales, Jr., San Anselmo, Calif.
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WHAB—1350, G. W. Perkins, Thomson, N. Y.
WHAE—1050, H. Rawls, Phoenix, Ariz.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WHAM—1125, W. C. Wolverton, M. D., Linton, N. D.
WHAN—1250, K. McNeil, Ottawa, Ont., Can.
WHAS—1700, O. P. Klein, Leduc, Alta., Can.
WHAW—1325, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WHAZ—2550, H. Wilbert, San Francisco, Calif.
WHB—1675, W. E. Davison, Berwick, N. S., Can.
WHK—1550, L. W. Gushwa, Firth, Ida.
WHX—1025, Mrs. A. S. Mawhinney, New York, N. Y.
WIAC—1200, H. Meetze, Manassas, Va.
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WIAZ—1200, F. T. Wycoff, Springfield, Mass.
WIK—1150, G. E. Wharton, Houston, Tex.
WIP—1150, D. D. Coutts, Madison, S. D.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAE—1700, A. Moffet, Ottawa, Can.
WJAJ—1000, D. J. Morris, Weir, Tex.
WJAX—200, Allan Harvey, Snohomish, Wash.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAS—1900, Louis Raymond, Pullman, Wash.
WJAZ—1200, C. B. Martin, Springfield, S. D.
WJX—1400, H. Simons, Ft. Worth, Tex.
WJZ—2575, J. J. Beales, Jr., San Anselmo, Cal.
WKAC—1175, H. Dammann, Bronx, N. Y.
WKAF—1500, C. M. Bennett, Aurora, S. D.
WKAL—1175, Mrs. Nancy L. Wolverton, Linton, N. D.
WKAN—1100, C. M. North, Malden, Mass.
WKAQ—2600, Edwin Perkins, Jr., Sioux Falls, S. D.
WKC—1200, J. E. Latt, Fairfield, Tex.
WKY—2400, R. Bartholomew, Garrochales, Porto Rico.
WLAB—1100, C. H. Vale, Providence, R. I.
WLAC—1175, D. J. Morris, Weir, Tex.
WLAD—1275, M. J. Columbe, Plattsburg, N. Y.
WLAG—1525, D. O. Wolfe, San Jose, Calif.
WLAH—1500, D. J. Morris, Weir, Tex.
WLAJ—1450, J. H. Wall, Rensselaer, N. Y.
WLAK—1200, C. Larsen, Sioux City, Ia.
WLAL—1300, Perkins Benneyan, Fresno, Calif.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WLAY—2000, C. A. Gallagher, Berkeley, Calif.
WLAW—1450, C. C. Sawyer, Liberal, Kans.
WLAY—4200, M. P. Jacot, Copley, O.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—1900, Perkins Benneyan, Fresno, Calif.
WMAB—1250, W. F. Macleod, Prince Albert, Sask., Can.
WMAC—1300, B. T. Andrea, Cobalt, Ont., Can.
WMAD—1150, H. J. Latshaw, Clearfield, Pa.
WMAF—1250, R. Henry, Butler, Mo.
WMAK—1175, Wm. J. Wolverton, Linton, N. D.
WMAM—1350, H. Dammann, Bronx, N. Y.
WMAQ—1850, B. Rowe, Santa Clara, Calif.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WMB—1300, R. Hastings, Atchison, Kan.
WMC—1625, Perkins Benneyan, Fresno, Calif.
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WNAD—1500, C. T. Mower, Malden, Mass.
WNAF—1525, W. Rankin, Woodfords, Me.
WNAK—1200, J. H. Wall, Rensselaer, N. Y.
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WPAB—1250, J. Skinner, Corsicana, Tex.
WPAC—1225, R. T. Andrea, Cobalt, Ont., Can.
WPAT—1375, L. C. Kemp, Seattle, Wash.
WQAM—1150, R. Clark, Bridgeport, Conn.
WRL—1100, W. M. K. Young, Kansas City, Mo.
WRP—1300, A. Taylor, Winnipeg, Can.
WRR—1425, B. S. Watkins, Bridgeport, Conn.
WRW—1225, K. E. Gabbert, Clay Center, Kan.
WSAS—1225, F. T. Wycoff, Springfield, Mass.
WSAV—1125, Billy Withington, Jackson, Mich.
WSB—2275, L. K. Poyntz, Victoria, B. C., Can.
WSL—1175, L. Hull, Eureka, Kan.
WSY—1050, T. W. Smith, Watsonville, Calif.
WVP—1150, C. M. Bennett, Aurora, S. D.
WWJ—2200, F. W. Hill, Cristobal, C. Z.
WWL—1275, G. W. Perkins, Thompson, N. Y.

Production of Radio Waves

To produce Radio waves it is necessary to have an electrical circuit carrying a vibrating or alternating current, which sets the waves in motion. The condenser two or more sheets of metal separated by an insulating material called the dielectric, serves as the basis of Radio transmission. One of the metallic plates acquires a positive charge of electricity and the other a negative charge. They are connected through a conducting wire and a discharge takes place, giving rise to Radio frequency current or waves.

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Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set.
Complete $11.45

Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loud speaker or phonograph can be used in place of head-set. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel.
Complete $12.45

Moulded Variometers	$3.45	Brandes Superior Headset	$5.75
180° Moulded Varicouplers	$3.45	Phone Connectors (take 4 sets of phones)	35c
Mahogany Variometers	$1.95	Antenella Aerial Plug	$1.15
180° Bakelite Varicouplers	$1.75	3 Coil Honeycomb Mounting	$3.45
Freshman Variable Grid Leak and Condenser	75c	2 Coil Honeycomb Mounting	$2.60
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35	WD-11 Bakelite Sockets	50c
Master Baldwin Type C Units with Cord	$3.95	4 (Four) Way Plug	$1.35
Master Baldwin Type C Head Sets	$6.95	Barchass Coils	$1.95
		Firth Cord Tip Plugs	60c
		Thordarson Amplifying Transformers	$2.45

Complete Knockdown Receiving Set

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial $17.95

Complete Parts for Flewelling Circuit

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak,, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set.
Complete $12.45

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$4.30 Value, 43 PLATE, now	$1.75	$3.10 Value, 5 PLATE, now	$1.25
$3.70 Value, 23 PLATE, now	$1.45	$2.70 Value, 3 PLATE, now	$1.15
		$3.30 Value, 11 PLATE, now	$1.35

U. S. A. Signal Corps Aviation Type 194-W Western Electric Phones, $7.95

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Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special $4.65

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FEDERAL JACKS—Filament Control Single Circuit 35c
Filament Control Double Circuit 50c

MAGNAVOX LOUD SPEAKER, Type R3 ..... $34.95

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1,250 Turns	1.50	Sponge Rubber Ear Caps, Pair	50c	2-Slide Tuning Coils, at	$1.95
1,000 Turns	1.25	Dials, 2, 3 and 3½ inch	25c	Phone Caps, for mostly all phones	25c
750 Turns	1.00	Grewol Detectors	$1.65	Signal Cps, Hot Wire Ammeters, at	$5.45
250 Turns	75c	Signal Corps Super Sensitive Microphone Transmitters	$2.45	Anti-Capacity Switches	$1.50
150 Turns	60c	Solid Copper Aerial Wire, 100 ft	35c	Lightning Switches	$2.65
100 Turns	50c	Spaghetti Tubing, yard	10c	Hydrometers, now at	45c
75 Turns	40c				
50 Turns	40c				
35 and 25 Turns	40c				

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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, March 10, 1923 No. 9

Influence of the Amateur

Epoch-Making Invention Work of Experimenter

THE American amateur, under the law of 1912, was given limitations as to power, wave length and decrement, which were considered by the framers of the law as placing the amateur under such a handicap that he would never be able to reach out far enough to make any trouble with commercial and military communication. The handicaps were considered sufficient to prevent his signals from reaching beyond the distance of a mile or two.

Ten years of extensive study, patient research and epoch-making invention, he has today produced short wave Radio transmitting and receiving apparatus which enables him to reach into the thousands of miles to cover a continent where it was thought he would only cover a city square. Before the World War the American amateur had actually developed a Radio relay system which extended across the American continent from coast to coast. At the time the war called him from his work he had organized his fellows and covered the entire country with a network of amateur lines. Messages were handled at the rate of several hundreds a night, and they reached into every state in the Union.

The contributions to the art made by the Radio amateurs have not been fully told without reference to their far-reaching effect in other countries. European amateurs have not enjoyed liberal laws in the past. The exhibition made by American amateurs in the war, and the achievements made since the war, have awakened other countries to the value of the Radio amateur. The result has been that the laws of Canada, England and France have been modified and regular international amateur communication is a thing of the immediate future.

Composers Want Money

Broadcasting Stations Face Invoices from Authors

RADIO broadcasting has been running very smoothly, with the possible exception of the general commotion resulting from the lack of proper legislation to handle the phenomenal increase in the number of stations desiring to transmit.

Out of the clear sky now comes a new obstacle to its progress. Authors of books and writers of popular songs are beginning to ask for royalties whenever their favorite successes are sung over the Radio, or passages from a literary success are read to the invisible audience.

They propose to levy a fee, through their organization, on those stations which broadcast their music, literature and songs. It should be remembered that the various broadcasting stations throughout the country, for the most part, are maintained at considerable expense. The only return for the money invested is a certain amount of advertising. This same advertising is also received by all artists who perform at these stations and to all whose material is used.

Common business sense ought to be applied to this situation. We are trying to recover from the effects of the war; business for none of us is what we would like it to be, and for one concern, set of men or association to deliberately carry out a plan that not only will wreck another industry, but at the same time seriously injure their own, is quite inconceivable.

If the law is on the side of the artist, author or song writer to give them the right and power to drive, and if they elect to drive broadcasting out of business then all that can be done is to submit, take the loss in broadcasting investment, and pass it up. It can be done quickly.

There is surely another way out of this trouble. It is suggested that broadcasting stations announce the name of the publisher, song writer or composer before and after the broadcasting of each number. While at present there is no compensation to broadcasting stations other than the advertising, every person should lend a hand and take advertising for pay in a like manner. There will be no loss from the artist, composer or song writer, for their work will become better known. There is no question of doubt but what this is good publicity for there are too many examples to prove the point. Recently a New York theatre, that had been running at a loss, broadcast a performance of their show and the next night the entire house was sold out.

Condensed

By DIELECTRIC

The Cleveland Radio Association has urged all listeners in to report any flagrant violation of the silent hour rule which was established to enable listeners in to hear broadcasting with the minimum of interference. This idea is worthy of experiment by other communities and should be much appreciated where practiced. In speaking of silent hours maintained by broadcasters themselves, it is of course fair to remember that crystal sets are still in use and that the majority of owners are new at the game. They should not be deprived of entertainment for the sake of DX fans. Yes, but look at the records made by some of these galenas! Precisely, but do they constitute the majority? I have been hammering away for "silent periods" and shall continue to do so in the hope that we may all benefit, even the crystal owner, for he may be encouraged to get a tube set, which is the ultimate in Radio reception.

Such are some of the utilitarian possibilities of broadcasting for the farmer. But one may well doubt if the service should be placed ahead of what broadcasting can do to make the farm a happier place in which to live. The cultural and spiritual possibilities of broadcasting are a gold mine that has been scarcely touched.

None of us can expect to get away with a policy of limiting broadcasting to those features which happen to make a greater appeal than others. My favorite numbers on a program may be decidedly unattractive to the rest of you and vice versa. But for those who do not like grand opera music for instance, there are a great number who do and they are entitled to their enjoyment as well as the first group. So my reiterated plea for the spread of opera broadcasting is simply for the sake of adding something to the usual program, and not to eliminate other popular features. The number of letters received by WNAC upon transmitting the Chicago Opera performances, and at WIP in regard to the German operas, is a fair indication of the degree of interest in this particular music. Both the Boston and Philadelphia stations deserve to be commended for their recognition of Radio opera audiences.

If the White-Kellog Radio bill has to lie over for possibly another year before becoming a law of the land, it will be a very unfortunate thing, for the benefits likely to accrue from such a measure as this are very much needed right now. We surely need regulation in the matter of broadcasting in order to lessen interference between stations transmitting on the same wave length, and we certainly need the Jones amendment to safeguard ourselves (the Radio Public) from a too voracious appetite which is rapidly developing in some quarters of the industry. Thousands of sets are tuned in just waiting for the announcer to say that the White bill has become a law.

You can hear 'em all with a receiving set nowadays, from the world's most famous boy movie actor to—to a United States Senator! Jackie Coogan complained of the heat in the studio of Station WOR, when he spoke there recently, though he was not addressing his Radio audience. It was an "aside" remark that the microphone picked up. Just prior to that he told a Radio joke. He said he had a Radio receiving set and upon opening the window got chilly. Now that would be some record, and I'm inclined to think it would be a rather cold day when the average bug could get Chile. This little chap is more accustomed to warm receptions than to chilly ones, so naturally such an incident as he related would be novel. I would be willing to wager that the thrilling experience of listening to Jackie's voice by boys and girls—and grownups—would outweigh in enthusiasm the reception given to some men of broadcasting fame. It is just such unique features as I have alluded to which make Radio take on fresh interest.

While the broadcasting stations in this country are being improved and more powerful ones being built, other parts of the globe are aiming to attract attention to themselves. According to latest reports South Africa is to have the largest Radio station in the world. Engineers report that the vicinity of Cape Town is ideal both for reception and transmission. When the station is completed it will add another and quite important one to the ever increasing number of Radio stations in the British Empire. The French are responsible for the plan to open the Orient to occidental influences through establishing a series of Radio stations, one of which is located at Beirut, Palestine. And so it goes; and so it will come eventually to cover the earth.

When you wish to let your family or friends back home hear your voice, and any others who may care to listen, all you need do is hire a broadcasting studio for a few minutes. If the publicity of the thing is not objectionable to you, you may unburden yourself of some choice observations which it would be unhealthy to deliver were you face to face with the head of the house at home. No such thought as this prompted Alma Gluck to speak mto the microphone at WPAL, during a visit in Columbus, Ohio; nor to Harriet Williams, who was heard on the program of PWX, Havana. The one was speaking that her children in New York might hear her voice; the other selecting the numbers her mother in Toledo, Ohio, was fond of. I merely suggest the possibilities provided through the use of a transmitter.

What a difference in the manner of teaching code lessons exists among the various broadcasting stations. WGI, at Medford Hillside, Mass., seems to be going at the thing in a way to benefit the largest number of novices devoting some of their time to this interesting subject and it is a pleasure to be instructed by them.

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Willie Wonders Will He Win?

"Willie," said Mrs. Fan, to their young offspring. "Daddy and I have arranged that he shall give you a dime every time he is caught swearing."

"Gee, that's great!" cried the youngster. Then he added hopefully: "When are you going to tune the Radio set, Daddy?"

But the Waves Are Undamped

The Director of Radio, or whatever his title may be, will have his hands full controlling the waves, it is pointed out by one fiend on history, who recalls that old King Canute got into difficulties some years ago and wet his feet terribly trying to do the same thing.

You Can Listen in But Not Cash in

"Have they arranged to send money by Radio yet?"

"Probably not. Too many people would 'pick it up.'"

The Current Raised and the Station Called

A news item announces that a quartet had the place of honor in a Radio program. We suppose some one's sense of humor selected that place for four of a kind.

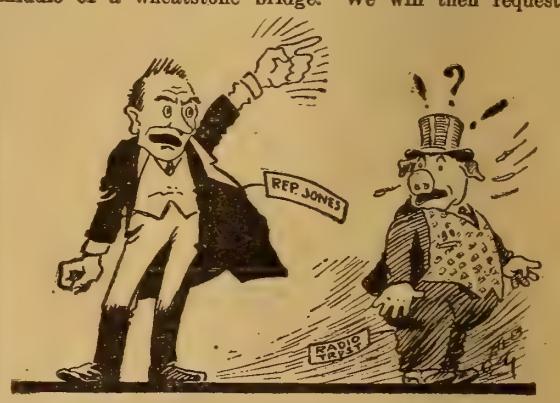
We Keep Tuned in for the Tiernans

The Radio gossiper should always bear in mind that there are a million and a half receivers now in American homes, and little receivers often have big ears.

Hey! Trust, Listen in on This

Dear Indi—

If the Radio Trust keeps on growing at the present rate we are going to take down our KU Klux Klantenna, capture this d'hog in the manger, make a twenty-five turn honeycomb coil around his neck and string him up to the middle of a wheatstone bridge. We will then request



Mr. Hoover to install a variable grid leak across his pituitary gland (or however you spell it) to stop his growth. We will then watch him oscillate and howl at audio frequency. When all oscillations cease and we are sure his B battery is completely exhausted we will take him down and send him to the Radio museum at Arlington.—Go Gettem.

Right on the Dot He Dashed Off

A young woman arriving in New York from abroad received a Radio code proposal of marriage. Her answer was "Yes." We hope the sender got the code signals straight. If he pounded out on da-di-da-da dit di-di-dit and it should have been da-dit di-dit da-di-di-da it might have caused an embarrassing situation.

A. B. C. Lessons for Radio Beginners

Chapter X—The Vacuum Tube as a Detector

By Arthur G. Mohaupt

THE first important function performed by the three-electrode vacuum tube is to detect Radio frequency oscillations. This action as a detector depends upon the fact that variations in the potential impressed upon the grid cause corresponding fluctuations in the current flowing in the plate circuit of the tube.

Furthermore, there is a certain filament temperature and plate pressure at which the detector action of the tube is most pronounced. At this "critical point" the variations in grid potential will cause maximum changes in plate current. A slight increase in the change on the grid may mean an increase of from five to ten times in the strength of the direct current flowing "via the electrons" from the plate to the grid. Thus the vacuum tube acts not only as a detector or rectifier of alternating current oscillations, but also as an amplifier or relay. It is for this reason that the tube is often termed an "electron relay" for the electrons emitted from the filament cause the electrical oscillations to be "relayed" from the grid to the plate circuit. And during this relay process the oscillations are both rectified and amplified.

Fundamental Detector Circuit

Although numerous vacuum tube detector circuits have been devised and are now in use, they are really all only modifications of the fundamental detector circuit as is illustrated in Figure 39. The operation of this circuit is briefly as follows:

The Radio ether waves in moving through space are interecepted by the antenna and induce in it electrical oscillations of the same nature and frequency as were originally set up in the transmitting antenna from which the waves were sent out broadcast. In order that these induced oscillations may be of maximum intensity, the receiving antenna circuit must be adjusted or tuned so that its natural wave length will be the same, or nearly the same, as that of the impinging ether waves. This tuning is accomplished by adjusting the switch lever S until the correct number of turns are cut in of the primary L-1 of either a loose or vario-coupler.

By electromagnetic induction similar oscillations are then set up in the secondary L-2. In order that maximum results will again be obtained from these oscillations, a variable condenser C-1 is shunted across L-2; and by varying the capacity of this condenser, resonance is established in the closed circuit L-2C-1. This causes maximum voltage variations to be set up across the condenser terminals, and these pulsations are then impressed upon the grid and filament of the detector tube.

The circuit between the grid and filament is called the input circuit, or better, the control circuit of the tube, for it is the actions going on within this circuit that control the entire operation of the tube. It corresponds to the valve on a steam engine—the distance the valve moves determines the amount of steam that is let into the cylinder and hence controls the functioning of the entire engine.

Action Within the Tube

The filament of the tube is supplied with electric current from the A battery. As long as the rheostat R is in the off position, the filament is cold and no electrons are being emitted. The space between the plate and filament is thus an insulator, and no current can flow in the plate or output circuit of the tube.

As soon as current is sent through the filament, it becomes heated and negative electrons are emitted. Due to the presence of the B battery connected as is shown in the figure, the plate is charged positively; and as a result the electrons are immediately attracted to it. This closes the plate circuit and allows the B battery to send a current through the telephone receivers PH. However, as long as this current is steady in value, no sounds are produced in the phone. A variable or pulsating current only, con produce sound in the telephone receivers.

At this point the control action of the grid becomes effective. The electrons in passing from the filament to the plate must first pass through or encounter the grid, and their action can be retarded or accelerated according to the electrical condition of the grid. The electrical condition of the grid, in turn, is influenced by the presence of the small condenser C-2 connected in series with the grid circuit, and by the high resistance grid leak GR shunted across the grid condenser.

The high frequency potential oscillations set up across the condenser C-1 and impressed across the filament and grid, occur or come in groups, the groups themselves, however, occurring at an audio frequency. As one of these groups or trains of waves moves toward the grid, it encounters the small grid condenser C-2. Through the action of this condenser, each individual wave of the group causes a negative charge to form on the grid. This charge accumulates during the occurrence of one wave train; but as soon as the wave train ceases, there is nothing to hold this negative charge, and hence it leaks off again through the high-resistance grid leak. The action of the grid condenser is thus to allow a negative charge to accumulate on the grid, while the grid leak allows the charges to escape between the successive

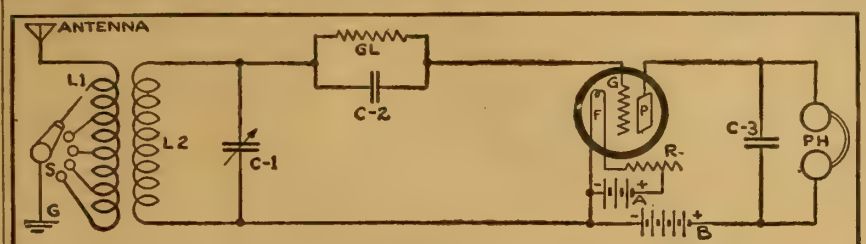


Figure 39

wave trains. The leak thus always maintains the grid at zero potential as long as new wave trains are being received.

Rectifying Action of the Tube

As long as the negative charge exists on the grid, the electron movement is hindered and reduced, and consequently the flow of current in the plate circuit is also decreased. Between wave trains, this retarding action of the negatively charged grid disappears, and the plate circuit current increases to its normal value.

Now when the filament temperature and plate pressure are of just the right value, that is, are at the critical point, a given negative charge on the grid will cause a greater decrease in plate current than an equally intense positive charge will cause an increase in plate current. Consequently, the current in the plate circuit becomes a pulsating direct current with the decreases or hollows greater than the increase. Also, the "envelope"of the hollow in the plate current corresponds in every respect to the envelope of the trains of waves that originally existed in the grid circuit.

Since audio frequency pulsations are thus created in the plate circuit of the tube, the telephone receivers will be duly affected and produce sounds corresponding to the nature of the electrical pulsations supplied to it. Since these electrical oscillations are identical with those sent out from the transmitting station initially, the sounds heard in the telephone receivers will also be identical with those that entered the microphone of the transmitting circuit.

The detector action of the vacuum tube is thus in many respects similar to the action of a crystal detector. The advantage of the tube, however, is that it is more sensitive, and that it not only detects the weak signals but also amplifies or strengthens them to a very great extent. Another desirable feature of the tube, is that if it is at the proper filament temperature and plate pressure, it does not require the location of a sensitive spot before the detector action can take place.

Constructing a Vacuum Detector

The circuit illustrated is a very satisfactory and efficient one for using a vacuum tube as a detector. L-1 and L-2 are the primary and secondary of a standard vario-coupler, while C-1 is a 23-plate variable condenser. The grid condenser C-2 is a smaller condenser having a capacity of .000025 mfds. The grid leak is a very high resistance, from one-half to two megohms. A megohm is equal to one million ohms.

The battery for supplying current to the filament of the tube is a 6-volt storage battery, preferably of the lead-acid type, while the B battery is a 22½-volt standard battery used for supplying the positive potential to the plate of the tube. The rheostat for controlling the filament current should have a resistance of about 6 ohms and a current carrying capacity of one and one-half amperes. The telephone condenser is similar to the grid condenser, and should have a capacity of about .000025 mfds.

The quality and loudness of the signals received will depend to a great extent upon the sensitiveness of the telephone receivers. Therefore, it is not advisable to economize by purchasing a cheap set. Money spent for a good head set is a safe investment, for they do not deteriorate and will give a much cleaner and purer tone.

Operating a Vacuum Tube Detector

The successful operation of a vacuum tube detector depends to a great extent upon the patience and skill of the person in charge. Skillful and rapid tuning can be acquired only with practice and experience. Every receiving set has its own individual characteristics, and it is up to the operator to become acquainted with these peculiarities before he can rapidly and successfully operate his set and obtain best results.

However, if at first no results can be obtained, do not immediately condemn the set as being no good or defective, for the fault may not lie in the receiving apparatus at all. It may be that the antenna has a serious ground contact at some point through which the electrical energy leaks away. It may also be that the lead-in wire makes poor contact with the antenna wire, or that it may have a serious ground leak at some point. The lead-in wire should be securely soldered to the antenna, and both should be well insulated from the ground. Good electrical contact should also be made to the lightning switch, both from the lead-in wire and to the wire leading to the set within the room. Only after examining all these and making sure that they are in good condition should investigation be begun on the receiving set itself.

The first step in setting a vacuum tube detector into operation is to throw the lightning switch into the upper position, and then connect the lead-in wire and ground wire to the receiving set. Be sure that the ground connection makes good contact, for this is very essential to the proper working of the apparatus.

After the rheostat has been turned completely to the left so that all resistance is cut in, the A battery and B battery are connected to their respective terminals. The apparatus is now ready for tuning.

Place the telephone receivers to the ears and turn the rheostat to the right until the tube burns nearly but not quite at

(Continued on page 12)

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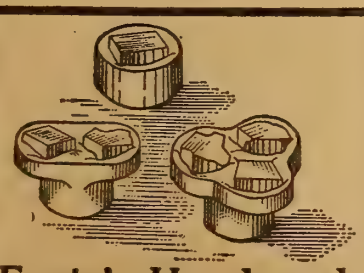

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How to Prevent Howling in a Set

Condenser in the Grid and Filament Circuit

All that is needed to make the tryout is a .001 fixed condenser—a phone condenser of the right size will do. Attach leads to each end of the condenser and connect one wire to the post marked "grid" on the amplifying transformer of the second step, the other to the negative of the tube socket of the first tube. A mica condenser is best for this purpose. Make sure the condenser has been tested and is not shorted. If more than two tubes are used, follow the same method. The diagram shows the connections.—Joe McCormack, Godsden, Alabama.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
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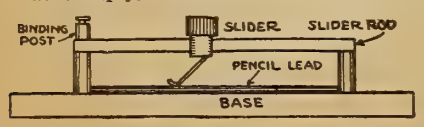
Non-Inductive Potentiometer

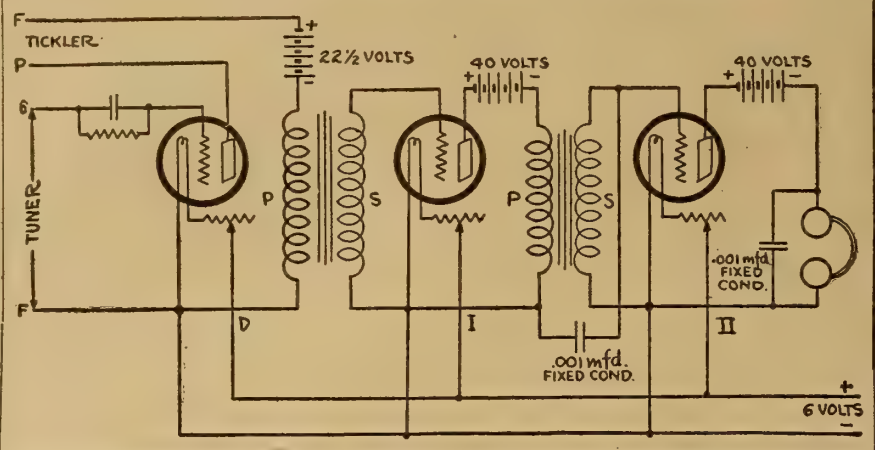
The illustration shows a non-inductive potentiometer or rheostat which can be made cheaply. The materials needed are



one slider, one rod, four Fahnestock clips and the lead out of an ordinary lead pencil.

The Fahnestock clips serve as binding posts and holders for the lead by fastening two of them at each end of the lead and passing a wood screw through the holes in their ends and into the base. When both pairs are fastened on in this manner the lead is passed through the two under the rod and connections are made to the other two. When used as a potentiometer leads are taken off at both ends of the lead and at the slider rod. Connections are made at the slider rod and at one end of the lead when used as a rheostat.—Earl Litt, Cherryvale, Kansas.

HOOK-UP THAT REDUCES NOISE

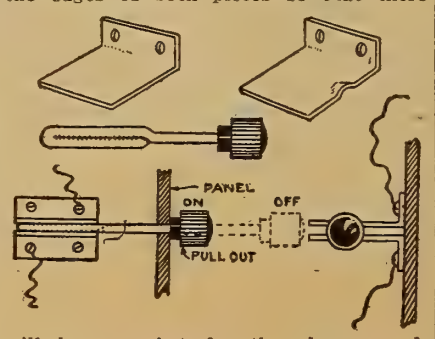


Aerial Construction

One pound of No. 14 copper wire generally provides the correct span for the receiving antenna which picks up the broadcasting stations operating on 360 and 400 meter wave lengths. In comparison with this the aerial of the powerful navy Radio station at Annapolis, Md., consists of 10 miles of wire, weighing approximately seven tons. The great mass of wire is held aloft by six 600-foot steel towers. The natural period—that is the wave length of the aerial alone—is 4700 meters. The station operates on a wave length of 17,145 meters. Heavy accumulations of ice on the wires would cause great strain and break many of the wires, but this is guarded against by an electric heating circuit which melts the ice as fast as it collects. Signals from Annapolis have been heard in Australia.

Homemade Battery Switch

Procure two small strips of light copper sheeting and bend the ends of each as shown and drill the holes marked. Bend the edges of both pieces so that there



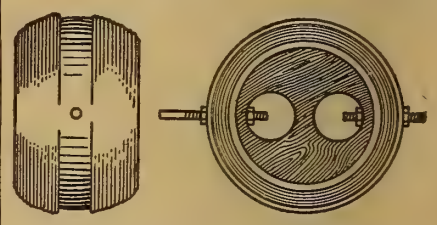
will be a pocket for the plunger end. Procure a piece of copper wire, number 6 or 7, and thread one end to fit the nut or knob of a binding post. Bend the opposite end over to make it double and round off the end. This makes the plunger. When the plunger is pushed in the connection is made.—Daniel H. Mowat, Joliet, Ill.

Simple Construction of Variocouplers Rotors

One of the simplest and easiest ways to make a variocoupler or variometer rotor is to use an old croquet ball as a base. Place the ball in the top of a standard Mason fruit jar and mark a ring on the ball. Saw it off, and then mark another ring on the opposite side of the ball, parallel with the first ring. Cut this portion off also and the rotor section will be the right size.

In boring the shaft hole, wrap a slip of paper around the circumference of the rotor and mark the length on the paper. Divide the paper in half up to the mark and place the half on the ball. Make a mark at the ends and these will be the through the bearings, or a hollow shaft Bore two holes, ¾ or 1 inch through the parallel faces to intersect the shaft hole. These are used for leading out the connections. The ends of the winding can be soldered to the shafts and so taken out through the bearings, or a holllow shaft can be used, and the wires run through it.

When starting the winding either tack



a circular piece of cardboard on each parallel face so as to project about ⅛ inch all around, or put small brads around the edges of the rotor. These will hold the windings in place temporarily. When the winding is finished, paint it with water glass—sodium silicate. The water glass dries with a hard, glassy surface, which will hold the windings in place permanently. The brads or cardboard can then be removed. An oatmeal box or a salt box can be shellacked and used as the tube with this rotor.—G. F. Lamkin, Cincinnati, Ohio.

A bulb that gives a weird, blue glow when in use indicates that an over-supply of current is coming from the B battery.

A. B. C. LESSONS

(Continued from page 11)

maximum brilliancy. First adjust the switch S until the antenna circuit is tuned to the desired wave length. Next turn the rotor of the coupler until the desired degree of coupling is obtained between the antenna circuit and the closed oscillation circuit. Finally the set is thrown into resonance by adjusting the variable condenser C-1.

The filament rheostat is another important factor to consider in tuning the set, for as stated before, the filament temperature as well as the plate potential must be of the correct value to secure most effective operation of the tube. Consequently, if the signals cannot be brought in very clear or loud by manipulation of the coupler and condenser, try adjusting the filament rheostat, and generally this will be found to do the trick. In fact, at times the rheostat adjustment is so critical that a vernier attachment is necessary in order to bring the tube into the proper operating condition. By a vernier attachment is meant merely an auxiliary resistance adjustment capable of making very fine changes in the current flow or filament temperature.

Sometimes improved results can also be obtained by altering the plate potential a few volts. If it seems as though the tube were not functioning at its best, change the B battery contact from the 22½-volt tap to the 21 or 19½-volt tap, or even as low as the 18-volt tap. This will often bring about surprising results.

Important Points to Remember

In order that a receiving set can operate at maximum efficiency, the resistance of the interior circuits should be as low as possible. Therefore all interior wiring should be done with copper wire at least No. 18 in size, although No. 14 or 16 is better. All contacts should be well soldered so as to insure perfect electrical contact. It is a good idea to cover all wire with insulation tubing so as to prevent any possibility of a crossed or short circuit occurring.

The various pieces of apparatus should be arranged so that all the necessary connecting wires will be as short as possible. Furthermore, to present a neat appearance, all wires should be run in straight lines and turn at right angles. Try to avoid running two or more wires parallel to each other for otherwise inductive interference between the several wires is likely to cause serious trouble. For the same reason all wires should be arranged to cross each other at right angles.

Often a change in the value of the grid leak resistance will add greatly to the better operation of the set, for if the resistance of the leak is too low the negative charges will not accumulate sufficiently on the grid but leak off too quickly. This, of course, will not allow the plate circuit current to be affected with maximum intensity. On the other hand, if the grid resistance is too high, the negative charges will experience too great difficulty in escaping between wave trains. The result is that an excess negative charge will accumulate on the grid and choke the tube, thereby greatly interfering with the best functioning of the tube.

Hence, since each tube has its own individual peculiarities as to the best filament temperature, plate potential and grid leak resistance, the operator will get best results by experimenting with these various factors until maximum intensity of signals will be received. After he has once determined these values, he can quickly set the adjustments to these values each time the set is set into operation.

The essence of a vacuum tube is the filament, and the life of the filament depends upon the temperature at which it is operated. Consequently an important rule to observe in operating a set is never to burn the filament at a greater brilliancy than is necessary to secure best results. If the filament can be burnt at a lower temperature, the life of the tube will be greatly prolonged; but if the filament is burned at too high a temperature, the tube life will be greatly decreased.

Another important point to observe is never to connect the B battery across the tube filament or A battery terminals, for the high pressure of the B battery will cause such an excess current to flow that the filament will be burned out immediately. The same may happen if the interior wires are not insulated and should accidentally come in contact.

If all the above suggestions and warnings are carefully observed and followed, successful operation of the outfit is bound to be secured. However, a little slip here or there may so seriously interfere with the functioning of the various parts, that many an evening's pleasure can quickly be spoiled.

Chapter Eleven

In the next chapter we will consider the second important function of the vacuum tube, namely its action as an amplifier. We will discuss the general subject of amplification, and show how additional vacuum tubes can be used to intensify the signals detected by the detector tube. It will be a most interesting and important article.

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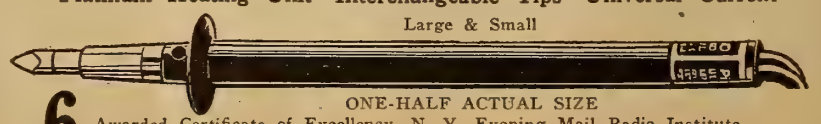

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Part V—Two Step Amplifier Construction

By H. J. Marx

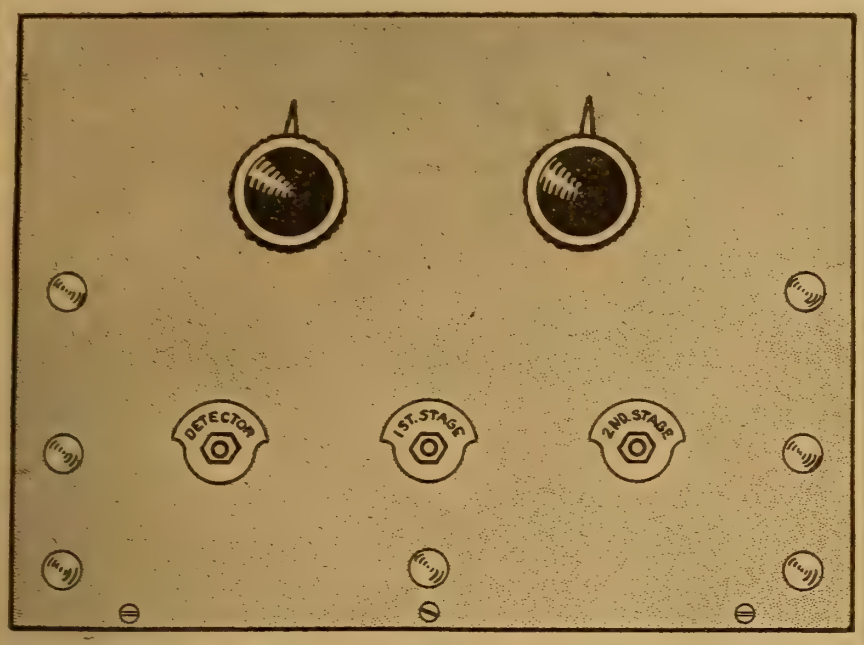


Figure 1

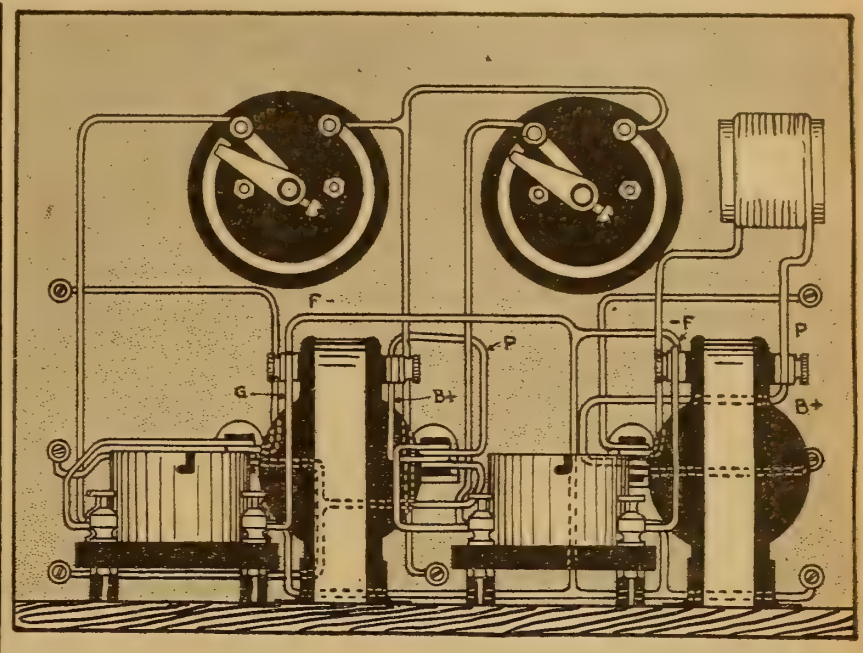


Figure 2

AFTER the panel has been drilled and the parts are all on hand, it is a simple matter to assemble them on the panel. The two tube sockets and the two frequency transformers are fastened to the baseboard.

In determining where to set them on the board, the constructor should bear in mind that it is advisable to keep both the grid and the plate leads as short as possible. In figure 2 the tube sockets and transformers are shown. It will be noticed that the grid and plate leads are kept to very short lengths. In addition care should be taken to avoid running any other leads very close and parallel to these. Outside of this last point, it is not of very great importance to try to limit the lengths of the A and B battery circuit leads.

Keep Leads Away from Panel

Another feature that the writer found of considerable importance was not to have any leads flat against the panel. They should be kept at least ⅛ to ¼ inch clear of the panel. After the set accumulates a certain amount of dust and dirt it provides a series of leaks between any wires that are flat against the panel and in this way gradually decreases the efficiency of the set. Letters are often received, stating that some set used to work wonderfully well but of late it has not been giving satisfactory service. It is usually very puzzling to analyze difficulties of this nature but they can always be traced back to some seemingly little point of construction item as just mentioned.

It might be mentioned here that it is not advisable to lay out the panel with a pencil as this will also provide leaks between terminals.

Jack Mounting and Soldering

Before mounting the jacks, test them to make sure that the springs are making good contact and the separate circuits are insulated from one another. Then insert the plug and examine to see whether the outside springs are making proper contact with the tip and sleeve of the plug.

In mounting the jacks on the panel make sure that they are fastened rigidly and securely. A loose jack will mean weak electrical connections and ultimate short circuits.

Soldering leads to jack terminals is a delicate operation and has been the cause of many vitrolic exclamations. Unless tinned wire is used, it will be found best to tin the lead wire before fastening it to the jack terminals.

For soldering jack leads a light soldering iron, preferably electric, with a long tapered, ¼-inch wide chisel edge tip, should be used. A tip of this type allows insertion between the various jack leaves, without touching the adjacent ones and thus reheating a completed connection. If the leads come very close together at the jack terminals, it is best to cover them with spaghetti to safeguard against short circuits. Don't get the impression, however, that spaghetti is an insulator against induction from one lead to another. It is used merely to prevent actual short circuits between the leads.

Details of Wiring and Assembly

The choke coil can be supported by the two leads that run to it, or if preferred, it can be fastened to the panel by means of a fiber strip through the core, with machine screw holes at each end.

Except at the terminals where the connections are made, care should be taken so wire leads don't come in contact with metallic parts of the framework of the various pieces of apparatus, such as tube sockets, transformers, jacks or rheostats. Where two wires cross each other very close, it is advisable to put a semi-circular loop or "jump over" in one so that there is at least a ¼-inch clearance.

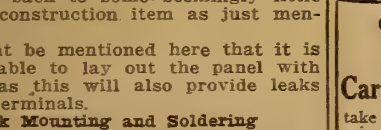
It will be noticed that although both transformers are facing the same way, the cores are parallel but not in line. No detrimental effects were noticed in the compactness of this assembly, and shielding was never taken into consideration.

The Cabinet

The cabinet used for these amplifying stages is exactly the same as that described for the detector stage in Part III of this series. When the two are used together the two binding posts on the upper right side of the detector panel (phones or output) and the two on the upper left side of the amplifier (input) are connected together. Separate batteries are not required for the amplifier.

The Idle Battery

Storage batteries which are to stand idle for a month or two should be fully charged before being put away. If the battery is permitted to stand for any length of time in a discharged condition, the plates will become white, an indication that sulphate is forming, which is very harmful to the cells.



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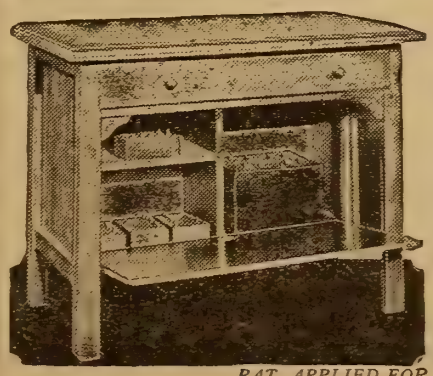

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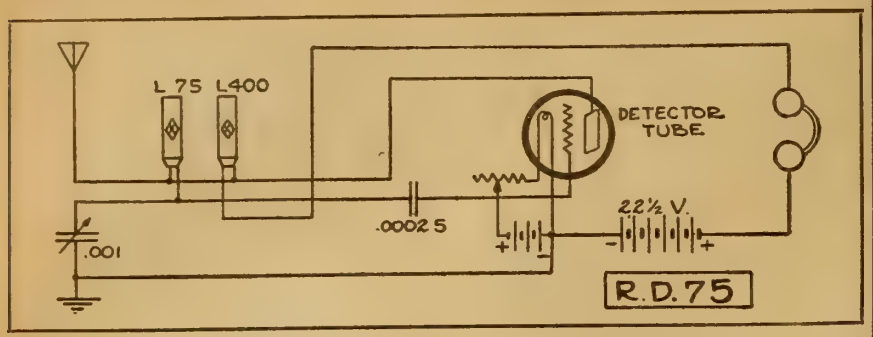

THE demand for simple forms of hook-ups has brought to light many unusual circuits. These simple diagrams are very often found to possess unusually good reception qualities, although difficulty is occasionally experienced in selectivity because of the set's simplicity.

This circuit is very similar to the R.D. 74 of last week, with the exception that two honeycomb coils are used instead of one. An unusual feature, however, is the fact that the plate coil has 400 turns. For this reason, a rather loose coupling is required.

A WD-11 tube will operate successfully in this circuit, by merely substituting a dry cell instead of the 6-volt storage battery. A .001 mfd. variable condenser is indicated in the ground circuit. This can be reduced to .0005 mfd. if a long aerial is used, but vernier control is suggested for either condenser. A grid of .00025 mfd. is used with or without a grid leak. The vacuum tube is a soft or detector tube and only 22½ volts are required in the plate circuit.

The Reader's View

Regarding the WHAM Situation

The Times-Union and The Democrat & Chronicle bought the best broadcasting set obtainable and gave it to the Eastman School of Music. We are paying for the operation of this station. Erecting the station at the Eastman School makes it possible to broadcast the wonderful concerts that are given in the School of Music and the music of the orchestra which is rapidly developing into one of the best orchestras in the country.

After we have spent thousands of dollars and, thus, given Radiophans of this vicinity the best that can be obtained, it is rather irritating, to say the least, to get such a letter in regard to this station. Not until we attempted to do something in Radio has it been my experience to receive criticism for public benefaction. I can't understand the attitude of the owner of a Radio receiving set when he thinks he is privileged to condemn and criticize those who are giving him something for nothing. And yet, that is the spirit of the letter which you are publishing in the Radio Digest and also the spirit of your own letter to Mr. Eastman.

There is no reason in the world why we should be expected to go out and employ artists or an orchestra at the expense of thousands of dollars a year and give it to Radiophans. And, I feel that you are not justified in expecting us to do so. As a matter of fact it costs about a quarter of a million a year to maintain the orchestra at the Eastman School and as a result of our expense in operating the station, music of this orchestra is broadcast every night. We are sorry that we haven't a different program every night, but it isn't necessary for a person to listen to this program unless he wants to. We have received thousands of letters thanking us for this service. Evidently it is not possible to please everyone.

Some of the greatest artists in the world give concerts at the Eastman Theater. In every case Mr. Eastman has personally insisted that they permit the broadcasting of at least a part of their concerts. As a result of his personal interest and influence it has been possible for Radiophans to hear from Station WHAM artists whose work is not broadcast from any other station. Among these artists are the following: Mrs. Louise Stires, John Charles Thomas, Percy Hamus, Paderewski, etc.

In the meantime dealers of this city who benefit most from the development of Radio have raised a fund of several thousand dollars with which they intend to provide a program five nights in the week to supplement the music from the Eastman Theater. We have offered to broadcast their programs for them without any charge what-so-ever and in the very near future this additonal service will be established. This will meet the unjust criticism which you raised and give the Radiophans in reach of Station WHAM a program that will not be surpassed anywhere.

Inasmuch as publicity was given to the letter criticizing the management of Station WHAM I think in all fairness this reply should be published. — Frank E. Gannett, Editor of Rochester Times-Union, Rochester, N. Y.

The time is approaching when every aircraft will be required by law to carry Radio equipment. At the first public session of the International Commission for Aerial Navigation it was agreed that all aircraft engaged in public transportation (carrying 10 or more persons) must carry a set.

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1½ Volt Special	4.50
W. T. 501 Peanut	2.00

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$5.00 Acme Transformer, Radio and Audio	3.45
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Reinartz Complete Parts

Consisting of 7x18 panel, 23 plate condenser, 11 plate condenser Barrchas inductance coil used in Reinartz circuit, 2 dials, one bakelite socket, 3 switch levers, contact points, Freshman variable grid leak, vernier rheostat, 8 binding posts, 25 feet wire, base board and diagram for construction, for only..... $10.95

Flewelling Complete Parts

Consisting of 6x14 panel, one 23 plate condenser, one composition dial, three .006 Micon condensers, 2 honeycomb coils, one double adjustable coil mount, one Freshman variable grid leak, one condenser, one vernier rheostat, one bakelite socket, 8 binding posts, 25 feet wire and construction diagram, for only..... $11.95

Moco Wonder Circuit Complete Parts

(Something new, wonderful and efficient.) 1,000 mile range and over. Consisting of 6x10 panel, 23 plate condenser, W.D.-11 socket, one honeycomb inductance coil, panel and coil mountings, one rheostat, .00025 fixed condenser with panel grid leak, 8 binding posts, 25 feet wire, and complete construction working diagram, for only..... $7.95

Two Stage Amplifying Unit Complete Parts

Can be attached to any of the above circuits, giving a longer range and 100% more efficiency in volume of tone. Consists of two transformers, 6x10 panel, 2 bakelite sockets, 3 jacks, 2 rheostats, 7 binding posts, wire and construction diagram complete for.... $10.85

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$4.50 Value 43 plate	$1.70	$3.50 Value 11 plate	$1.25
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$5.50 Value 23 plate with vernier	$4.00		

Note: Vernier condensers with dials 50 cents extra. All list prices quoted here are genuine, not inflated. Condensers of all other capacities on hand.

This Week's Special—3,000 Ohm Headsets

These phones are unusual bargains, excellent standard make, with patented universal joint, adjustment on receiver, and comfortable band for head. Regular list, $7.50.. $3.95

Vernier dial controls 75c value	42c	75 Turn coils	34c
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Questions and Answers

Set Advice

(1905) WFB, Dickinson, N. D.

Can you advise me regarding a receiving set? I desire to get a good receiving set capable of receiving over as long a distance as possible. I read in your publication of amateurs picking up foreign stations. I want to procure a set for use with a loud speaker for home use that is not too difficult to operate. What set or sets would you recommend? I am not trying to commit you to any one manufacturer's product. But it has occurred to me that there is probably some receiving set or sets that occupy the same relative position in the Radio field as do the Packard and Pierce Arrow cars in the automobile field; that you would know and perhaps you would advise me.

I have a friend who has a RC Westinghouse receiver and another has a "Zenith" made by Chicago Radio Laboratory from which they get fair results. The Radio Craft D-6, put out by a branch company of the De Forest Radio Tel. Co., has been recommended to me for long distance work; also the Mu-Rad MA-13, and the Kennedy sets have been recommended to me as the best. I will appreciate any advice you may give me. Are there new changes so likely as to make advisable now the purchase of only a small, inexpensive set?

A. Any one of the sets you have enumerated stand pre-eminently among the best. Personally the writer favors a circuit having the regenerative principle and employment of two or three stages of audio frequency amplification as given the best results without a high degree of knowledge and skill in operation.

While the claim is made that Radio outfits are well standardized, the fact of the matter is that it can never become standardized in any way whatsoever and the more we know about it the less apt shall we be to standardize it. What is new tomorrow will be scrapped two years hence. This is not said with any view to discouragement of buying complete outfits, nothing is further from our mind. The novice should, by all means, buy a simple outfit, which is the best possible thing he can do to familiarize himself with the art. Once the outfit has fulfilled its mission he can go in for parts to his heart's content, but to the man not electrically and mechanically inclined, we would say buy the outfit by all means, because he would probably make a mess of it and become discouraged.

There are many things to be learned by experimenting with Radio and too much of it cannot be done. The more who do experiment, the better for all concerned. It is like no other thing of which we can speak. It has no precedents. So in this light we are loath to advise specifically any method of procedure. It is the rapid developments of the art that makes it so fascinating.

Reinartz Circuit

(2027) EHR, Chicago, Ill.

Please state in order of value to the average "fan," Reinartz, Flewelling or hook-up employing variocoupler and two variometers. Which is best and why?

Is the WD-11 tube satisfactory?

Does it give as great range as large tubes?

May it be used successfully for amplification?

How many would be required for a large horn?

What changes are necessary in R. D. 70 Circuit to get two stages of amplification?

Are honeycomb coils interchangeable?

Is it necessary to keep on hand a number of variously turned coils for use in reception of different wave lengths?

What is the range of Circuit R. D. 70, Meters?

A.—It is best for a novice to begin with a simple tube set employing the regenerative principle until he has familiarized himself with the action. For selectivity, simplicity of tuning and operation generally it is best to use a variocoupler, and a two variometer circuit for a starter. The Flewelling and Reinartz are both good circuits of the regenerative type and either is simple of construction and operation.

The WD-11 tube are proving very satisfactory as detector tubes and afford a range equal to the ordinary six volt tube. However, it does not afford the volume of an ordinary tube when used as an amplifier.

Two or three stages of amplification are required for satisfactory employment of a horn.

No changes are necessary in Diagram R. D. 70 for use of amplification.

Honeycomb coils are not interchangeable nor is it necessary to keep on hand variously turned coil for different wave lengths. This is accomplished by tuning.

The range of circuit R. D. 70 should be one thousand miles or over.

RD-66

(2051) IWH, Toledo, Ohio.

Will you please inform me as to the range and distance of your hook-up, No. R.D. 66, page 14, of the December 23, 1922, issue, also, is it capable of cutting out stations and receiving another with a minimum of interference?

A.—Answering your inquiry with reference to R. D. diagram No. 66, appearing in December 23rd issue, would advise that properly executed this is an effective and selective circuit and with proper tuning should afford a minimum of interference. It is difficult of course to tune out signals of mutual wave lengths on simultaneous broadcasting. The range of circuit above mentioned should be about one thousand miles.

Five Tube Set

(2081) P. N., Gary, Ind.

Will you kindly answer a few brief questions in regard to Mr. Marx's tube set as described in Nov. 18th issue?

Could I use Dayton Fan link wound to 2,600 meters as a vario coupler and R. C. Radio frequency transformers which work to 5,000 meters?

Will this change the capacity of the condenser across the secondary of coupler?

Is this set regenerative?

Will the detector and 2-step audio without R. F. work the loud talker?

A.—Referring to the set described in November 18th issue will state that the inductance cited wil serve effectively as suggested. No change in condenser necessary. The circuit in question is non-regenerative. Two stages of amplification are usually adequate for employment of a loud speaker.

Ford Spark Coil Condenser

(2113) JRDP, Leominster, Mass.

I desire to ask you a question about the construction of the condenser bank used in the Flewelling Super. I am using a piece of tinfoil and paraffined paper taken from a Ford spark Coil and would like to know what the surface of each would be required to build a condenser of .006 capacity. Everybody is trying the Super but if you can make the condensers there will be about $3.00 saved which is enough to buy the coil mounting.

A.—Answering your inquiry relating to construction of condenser of .006 mfd. capacity would advise that about twenty-four square inches would approximate it nearly enough. This, of course, means twelve square inches on each side.

"HOW" OF SUPER CIRCUIT

(Continued from page 7)

The difference may be exceedingly small but it will always be there because no two things can be made identically alike in every respect. On the other hand this difference usually is quite large, and when a particular plate voltage is specified, that voltage should be taken only as a fair average. Then try out different voltages to procure final results. Remember that it is not the correct setting of the plate voltage or the filament or grid that gives tne best results, but that they are only secured when these three factors are all working with each other. This point, of course, applies to any and all Radio tubes.

Likes Power Tube

The writer is rather partial to the UV-202 tube, which although an expensive tube comparatively, is one of the best tubes for receiving that we have, volume and other factors considered.

The greater the plate voltage that we can control with our tube, the greater will be the volume and amplification secured. A hard tube will generally handle greater voltages on the plate than a soft tube. This is another argument for the use of hard tubes in the Flivver circuit.

If a soft tube is used in the Flivver circuit, and the grid leak is omitted, it will be seen that the blocking action can still be present because the charged grid will still be able to free itself through the gas molecules present in the tube. This means that we cannot control the timing. However, if the characteristics of the tube happen to be right, very good results may be obtained, although they are not comparable with a set in which the timing is under exact control.

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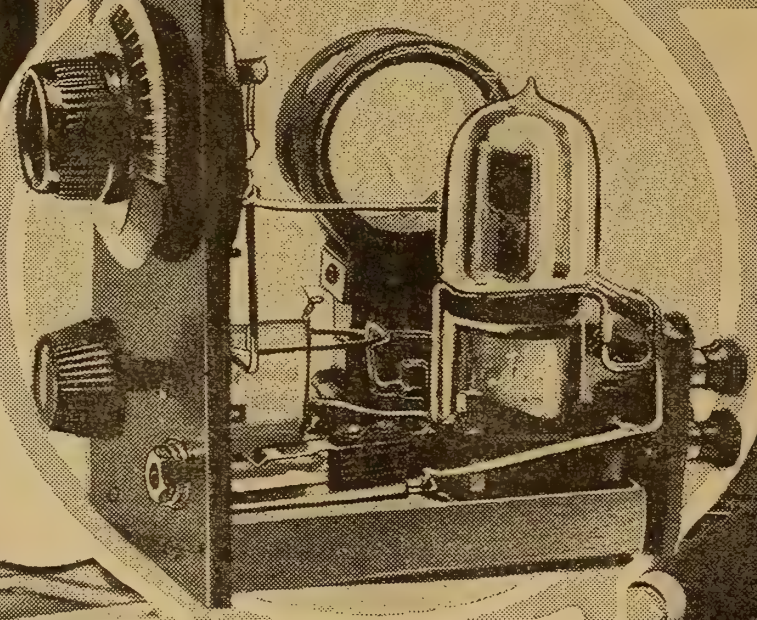
Radio Illustrated

Radio is serving to lengthen the lives of many youthful bridegrooms. This picture shows a bride copying a recipe being given by Mrs. Anna J. Peterson of the Peoples' Gas Company, Chicago, from the Westinghouse station, KYW

Mothers have found a new way to keep the kiddies quiet while the housework is being done. The happy youngster above may not understand all the many strange things he hears over the ether, but he is highly interested © Keystone



This photo shows an exceedingly simple Radio receiving set perfected by W. E. Foster, of 2308 Bryant avenue, Minneapolis, at a cost of about $8. With this little instrument programs have been heard from Louisville, Atlanta, Los Angeles and Fort Worth. It consists of a vernier rheostat, one 50-turn honeycomb coil, a grid condenser, 23-plate variable condenser and tube © Int.

The "Sheik" is seen above listening in on KHJ, The Los Angeles Times station. Rudolph is a true Radiophan and has a set installed in his dressing room at the studio as well as at his home © U. & U.

MAR 22 1923

Reinartz Coil Winding; The Single Tube Reflex

Radio Digest

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WINS FLEWELLING PRIZE

CRYSTAL FAN WILL BE FUTURE EXPERT

LOGWOOD SAYS HE WILL STAND BY AMATEURS

Radical Action Against Trusts Urged—Unless Science Is to Be Thrown in Discard

By A. H. Munday

TORONTO, ONT.—"The harm being done to the advancement of Radio by the big trusts, and the small trusts for that matter, can almost be put down as irretrievable, and unless some radical action is fostered by enthusiasts all over the world the science will soon be on the way to the discard," declared Mr. Charles V. Logwood, in giving his opinion on the big trusts, and their handling of the circuits.

"The healthy development of any new movement is of course subject to certain restrictions and regulations, but the everyday fan with his crystal set is an important person to consider, and his requirements should be considered equally as much as the most powerful stations all over the world. It is from these young

(Continued on page 2)

TEST CASE ON AIR LAW TO BE MADE

Secretary of Commerce Will File Appeal in Case Against Interstate Company

WASHINGTON.—The Secretary of Commerce will file an appeal in the Supreme Court of the United States in his case against the Intercity Radio Company of New York City. The District of Columbia Court of Appeals recently handed down a decision in which it upheld the Supreme Court of the District of Columbia requiring the Secretary of Commerce to issue a Radio license to the Intercity company. The case will go to the United States Supreme Court as the first test case under the Radio law.

WEAF Has Mexican Night

NEW YORK.—Mexican Night was a special feature of Station WEAF's program March 5. A distinguished group of musicians and speakers under the auspices of the Consul General of Mexico in New York City furnished the Radio audience an entertaining and instructive evening. F. P. deHoyos, General Agent of the National Railways of Mexico, delivered a talk on the culture of Mexico.

New Club for Davenport

DAVENPORT, IA.—A new club was recently organized here known as the Davenport Radio Club. At the first meeting officers were elected as follows: W. R. Yancy, president; H. A. Wright, vice president; Clarence E. Alford, secretary and treasurer.

PLANTS ENTITLED TO ACKNOWLEDGE WIRES

F. R. Stark, Western Union Attorney, Tells How

CHICAGO.—The regulation of the department of commerce which apparently prevents broadcasting stations from acknowledging telegrams and telephone calls does not prevent Radio operators from announcing the fact that messages have been received, but it does prevent broadcasters from talking directly to the sender of the telegram. This is the view taken by Francis R. Stark, general attorney for the Western Union Telegraph Company.

"It seems to me quite evident that a station may broadcast the information that a telegram has been received and received at a certain time, without any personal communication to the individual, which would violate the regulations," said Mr. Stark. "It is not the broadcasting of the information that a telegram has been received, but only "the transmission of acknowledgments to individuals relating to the receipt of such a telegram."

Wittenberg Heard in England

SPRINGFIELD, OHIO.—According to word received here, messages and concerts sent out recently by the Wittenberg college Radio station here, have been picked up in England. The college station was established only a short time ago and sent out its first program less than two months ago.

BOSTON, MASS.—A recent Radio club is one formed in Holyoke, Massachusetts. A drive is now being made for increased membership.

FLIVVER SET RACE TAKEN BY STUDENT

To Describe Prize Sets

F. P. Hall and A. J. Barclay Second and Third Winners—Seventeen Win Mention

CHICAGO.—Lawrence M. Blakey, student at the Georgia Institute of Technology, Atlanta, Ga., has been awarded first prize of $40.00 by the judges of the $100.00 Flewelling Prize Contest, conducted by Radio Digest. F. P. Hall, Owego, N. Y., won second award of $25.00, and A. J. Barclay, Tampa, Fla., won the $10.00 given as third prize.

Fourth to eighth prizes, respectively, of

(Continued on page 2)

'La Femme Charmante' above is Nedelka Simeonova, violinist virtuoso, a pupil of Leopold Auer. She is one of the most popular artists who broadcast at WOR, the Bamberger Store station, Newark, N. J.

Miss Lucile Wiseman (left), soprano, and Miss Mildred Wiseman, violinist, artists on the entertaining staff of WOAI, at San Antonio, Texas, are favorites with Radiophans

Mme. Freda St. Jerna, the Swedish Nightingale, has the distinction of being the first singer heard over WOAI, the Radiophone station of the Southern Equipment-Evening News-Express, at San Antonio, Texas

ENGLAND HEARS WCX BROADCAST MARKETS

DETROIT,—The Detroit Free Press Radio Station, WCX, has received information from New Castle, England, that broadcasts of its market reports had been picked up in that place. The reports are said to have come in strong and clear. This is the first time WCX has received information that its broadcasting has been heard in England, although they have been reported heard far.

CHICAGO NOW ADMITS OUTSIDERS MONDAYS

CHICAGO.—Three Chicago broadcasting stations now remain silent every Monday night from 7 o'clock until midnight, to give Radiophans a chance to hear out-of-town stations. This agreement was made recently by representatives before the Radio subcommittee of the council committee on gas, oil and electric light. The new Zenith Edgewater Beach station will also adhere to this plan.

FLEWELLING AWARDS

(Continued from page 1.)

$5.00 each were awarded to A. R. Miller, Jr., Spring Valley, Minn; Charles Priesmeyer, Chicago, Ill.; E. C. Hebert, Detroit, Mich.; J. A. Harris, W. Lynn, Mass., and Thomas Dunply, Kansas City, Mo.

Marked Ingenuity Shown

Marked ingenuity and careful workmanship were found in practically every entry. Distance reception was one of the deciding factors which cost several excellent entries their places in the prize.

High lights on the prize winners are interesting. Mr. Blakey, first prize winner, fulfilled every rule of the contest and submitted a very neat and complete manuscript. His care in treating the subject and building the prize set were considered important factors by the judges in making the award.

Mr. Hall, second prize winner, showed some unique ideas in construction, and even extended his paper to include the making of a two-step Radio frequency amplifier.

Mr. Barclay, winner of third prize, took great care in preparing his description of his set, submitting excellent diagrams and photographs.

Third Prize Set Next Week

The third prize set, Mr. Miller's, will be described in the next issue of Radio Digest, that of March 24. The following week (April 7) the second prize set will be described, and in the April 14 issue, the complete description of the first prize set will appear.

The descriptions will be very detailed so as to aid Flewelling fans in their experimental work.

From the many excellent papers submitted in the contest, the judges selected seventeen for honorable mention. The contestants whose papers were worthy of honorable mention follows:

E. C. Galbreath, Denver, Colo.; W. J. Pusey, Haskell, N. J.; H. C. Borgfeldt, Wilmette, Ill.; L. C. Fairfield, Winnipeg, Manitoba, Can.; E. E. Holmes, Los Angeles, Calif.; Harry Shiples, Salt Lake City, Utah; H. J. Perkins, Lake Worth, Fla.; E. E. Cook, Chicago, Ill.; Dr. B. F. Morrow, New York, N. Y.; E. Schmidling, Milwaukee, Wis.; M. L. Healy, Boston, Mass.; J. B. Rathbun, Chicago, Ill.; H. E. Dudrey, Ashland, Ky.; Henry Burr, Kansas City, Mo.; Theodore Madige, New York, N. Y.; J. F. Callahan, Brooklyn, N. Y.; Geo. A. Remling, North Tarrytown, N. Y.

LOGWOOD SPEAKS

(Continued from page 1.)

Radiophans that we will have to gather our future experts, and unless we gain their confidence, and help them to help themselves, the science will suffer in the next generation," emphasized Mr. Logwood.

Raps Certain Firms

He pointed out that as soon as any Radiophan has worked out a new circuit that showed promise of an improvement on the one in popular use, he was immediately requested to submit the plans to certain firms throughout the United States, with the promise of large returns if his circuit proved meritorious. As soon as one of the companies had secured the sole rights they immediately place it out of reach of all except the largest stations, and then at a great expense to the companies licensed to use it.

Mr. Logwood, who is at present figured in an action against Major Armstrong regarding the priority of patenting the Armstrong circuit, is at the present time working on several new circuits with the interests of the small Radiophan at heart solely.

Thinks Logwood Will Win

"In my opinion it will not be very long before some action will be taken; perhaps it will be by the small fans themselves," declared Professor J. M. Buckley, of Manchester, England, who is on a tour of Canada and the United States to secure first-hand information on Radio and its application in North America. "I have studied the Armstrong circuit and am also fully acquainted with the claim of Mr. Logwood. In my opinion, Mr. Logwood will win his case, because the United States patent office has already allowed his claim of priority of application, as I understand it. I think that it will be one of the finest moves ever made for the science if Mr. Logwood succeeds, because he is a man, and associated with men, who are far from being purely mercenary. They have the true interests of the Radiophans at heart and with their guidance, that is of Mr. Logwood and his associates, the Radio world will make great advancement."

Health Board Uses Broadcast

March 15 to March 22 was Diphtheria Week in Philadelphia. Then Philadelphians heard all the Board of Health knows about diphtheria "vaccination" cure and treatment. They had the news broadcast to them over the Radio as well as delivered to them by regular pre-Radio day channels.

Reports show that there are about six hundred incorporated manufacturers of Radio apparatus in the United States.

NAA, Old Time Naval Plant, Responsible for Naming Town in Virginia "Radio"

When NAA First Began Operation All Transmission Was Conducted from Hut Near By—Now Is Operated By Remote Control On Seven Separate Circuits

By Carl H. Butman

WASHINGTON—There is a town named Radio. It is in Virginia just across the Potomac from Washington. It is there that the gigantic towers of the Naval Radio station, from which the name came, is situated.

Usually it is known as Arlington, being near the great National Cemetery, but the call letters of the station, NAA, are known almost around the world. In the Postal Guide, the tiny village at the foot of the three great towers, one of which is 600 feet high, is listed as Radio.

This Naval Radio station was put in operation in 1912 and was the first of the Navy's chain of high-powered Radio stations to be established. It has only become well-known to American fans since the government broadcasting was transferred there in January, but today many thousands of Radio owners listen in on 710 meters when NAA speaks.

Seven Sets Now in Use

When the station was first put in operation only code signals were sent and received. Ten years ago, all operations were conducted on a single set from a little hut nearby under the direction of a superintendent of communications. Today it is different; seven separate transmitting circuits are operated by remote control from the naval and munitions buildings in Washington, from which wire lines link up with the Radio circuits for both army and naval use.

All receiving is done in Washington by special antennae and loops. Simultaneous operation is permitted with six sending sets without interference, thanks to "duplex operation."

Back in the early days, Chief J. W. Scanlin was listening in one night, on December 29, 1912, to be exact. He heard a curious series of numerals and letters forming words unintelligible to him. He had heard similar characters in code for several nights, but on the night mentioned he copied the message and told his superior officers in Washington that he had heard and copied "FL." He was laughed at. FL was the call of the Eiffel Tower in Paris, and no one believed he could pick up a message from that distant station. He insisted, however, and a report containing the copied message was transmitted to Paris through the Department of State. The reply proved that he was correct. He had copied Eiffel Tower, and correctly except for a few characters. For the first time, an American naval station had caught a European Radio station.

Soon thereafter experiments were undertaken between NAA and the Eiffel Tower and direct two-way communication was established in 1913.

Old Set Reaches Far

With the old 100 kilowatt Fessenden spark set, put in operation in 1913, some remarkably long distance results were achieved. Naval vessels in the Mediterranean have copied the time signals, which are still sent out from NAA on this set, after 19 years of service. An amateur in Brazil heard NAA as long ago as 1914, but this is not uncommon today.

Some of the first Radiophone experiments were conducted from Arlington in 1915 when the announcements were received in Pearl Harbor, Honolulu.

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Looking Ahead

Reflex, Reinartz, and Flewelling, featured every issue. Watch for the new developments in these circuits through the columns of Radio Digest.

Third Prize Flewelling Set, designed by A. J. Barclay of Tampa, Florida, will be described in full by the winner himself in the next issue of thte Radio Digest. The second and first prize sets will be described in the April 7 and 14 issues respectively.

A New Development in Reinartz Sets, will be the next subject discussed by H. J. Marx. It's good. Don't miss it!

A-B-C Lessons for Biginners, Chapter Twelve next week will take up a two-stage audio frequency amplifier, as well as a detector employing regenerative amplification. Read A. G. Mohaupt's Chapter Eleven on page 11, this issue and fall in line with the other beginners.

The Only Sure-Fire Radiophonists' Telephone Book, Part III with State, City-Station index. Watch for the new feature which will give daily schedules of the high power broadcasting plants.

Last But Not Least, E. T. Flewelling, will tell some more interesting details regarding the experimental work he is doing. Read this too in the March 17 Radio Digest.

Newsstands Don't Always Have One Left

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TORONTO COPS PLAN BROADCAST STATION

TO BE ONE OF THE MOST POWERFUL IN WORLD

Other Canadian Forces Intend to Follow In Footsteps of Chief Dickson

TORONTO, ONT.—One of the most powerful Radio broadcasting plants and long-distance receiving stations in the world is to be installed at the police headquarters in Toronto, Canada, within the next few months if present plans of the police commissioners materialize. In a special interview to a representative of the Digest, Chief Dickson said that before long the department will enter into negotiations, and it is expected that the plant will be in operation before the fall of the present year.

To Keep abreast of Times

"We must keep abreast of the times," declared Chief Dickson, "and I have had my ear to the ground regarding Radio for many months. I fully realize that Radio is the coming science that is going to revolutionize police methods, and the world generally, but it should be remembered that there will have to be the necessary government restrictions so that the work of the police and other departments for the protection of the public cannot in any way be interfered with. Yes, the possibilities of the new science are great, especially in the prevention of crime and the detection of criminals. Canada is especially suitable for high powered stations for police work, chiefly because it is a country of long distances and few large police centers. Then again there are many outlying districts that have not yet been equipped with telephones. These centers can now be equipped with high powered Radio stations at small expense, and in this way help in watching for the safety of the public.

Awaits Improvements

Chief Dickson is opposed to the immediate installation of a broadcasting station because he felt that there might be some radical improvements in apparatus very shortly, which might make necessary the scrapping of any equipment bought now. For this reason a "watchful waiting" policy will be adopted for a few weeks.

Chief Dickson pointed out that the head of the United States secret service, W. J. Burns, has his own broadcasting station, as have also the chiefs of police of New York, Detroit and other large centers throughout the United States. Almost every Radiophan is acquainted with the Detroit police's appropriate Radio call letters, "KOP."

Three Centers with Plants

Communication has been going on with Chief Dickson and the chiefs at Montreal and Ottawa with regard to the opening of a station by the chief in each of these three centers, and it is now reported that all three have definitely decided on the same policy as that of Chief Dickson's. So, when some definite decision is reached, all three centers will have high powered stations, but it is understood that the one to be installed at Toronto will be one of the most powerful in the world in order to be of the greatest service for points throughout Western Canada and also, at the same time, be in touch with all stations in Europe.

The chief stated that he had gone into the matter of cost and other details in connection with the installation and the operation. He has, we understand, full knowledge of the whole situation, and is in a position to take prompt action when it is considered opportune to act.

NOVEL FAMILY UNION FOLLOWS KYW SONG

Telegraph Operator Sings for Broadcast—Finds New Cousin

CHICAGO.—On January 8, Frank D. Greif, 2713 Florence avenue, who is a telegraph operator and sings as an avocation, sung over the Radio in the Westinghouse KYW program. Siting at his Radio set in Binghamton, N. Y., George F. Greif, an electrical engineer, heard the song, and the name of the singer.

George F. Greif, reversing the idea that "you may forget the singer but you can't forget the song," wondered if the singer were a relative, as the name is not a common one. He wrote the Chicago singer and a checkup of their relatives disclosed that they were first cousins, having the same grandfather, Frederick Joseph Greif, born in Germany.

Frank D. Greif, having lost his father when a child, did not know a great deal about his grandparents, but the mother of George, living in Lakeland, Fla., furnished the information that disclosed the young men their consanguinity.

'WORLD-WIDE' PHONE COMING—STEINMETZ

WIZARD OF SCHENECTADY MAKES PROPHECY

Static Elimination, Selectivity, Two Goals Sought—Believes Radio Will Not Supplant Wire Lines

By F. N. Hollingsworth

BOSTON, MASS.—Radiophone talks and concerts will be sent completely around the world from some central broadcasting station in the very near future, says Dr. Charles P. Steinmetz, the electrical wizard of Schenectady, in a recent interview here. "Engineers are working day and night on many things which will revolutionize Radio," he said. "They have been working for years on a scheme to entirely overcome static electricity, and they have nearly reached their goal. There has been a constant improvement in eliminating static, and in the near future I expect to see static interference completely wiped out.

"Selectivity, that is the ability to tune out stations and tune in others to make the use of the Radiophone more secret—is another improvement on which experts all over the world are working. These men have made remarkable strides in the past year, but in the coming few months I expect to see much more accomplished.

See Future of Utility

"I see no reason why, in the near future, Radio communication cannot be made almost as fool-proof as the land line telephone of today. It will be possible, I believe, to carry on a Radiophone conversation with a far distant station on a prearranged scale of wave lengths without the fear of others listening in.

"I do not believe that the Radio will ever supersede the land line telephone system, however. There is too much need for both for either to crowd out the other. They are both here and here they will stay. We cannot get along without the telephone for certain uses and we cannot now get along without the Radiophone. They both have separate missions in our business and social life."

Dedicate KOG as Sub-Station of KFI

Los Angeles Evening Herald Has No Transmitter but Works as Remote Control

LOS ANGELES, CALIF.—On Monday, January 29, at 5 o'clock, Radiophans who were listening-in heard, "This is the Evening Herald broadcasting through the central Radio station at Anthony's, Los Angeles." This was the re-dedication of KOG. This station is now only a remote control for KFI, the 500-watt plant of Anthony's, Los Angeles.

Since that time and henceforth Radio Station KOG, it stills retains its old call letters, goes on the air every afternoon and every alternate evening at the hours named above. The afternoon programs includes Radio news bulletins, and closing market reports.

The code lessons which became a part of the Herald's Radio program with the old station will be suspended until plans are worked out at a later date to continue the same, as there are many boys who desire to learn code receiving and many others with a knowledge of telegraphy get entertainment from listening in on Radio signals.

The opening concert which was Radiophoned from the new input station of The Evening Herald was heard and enjoyed by thousands of Radiophans throughout the Western States. The program was made up in equal proportions of both vocal and instrumental music.

Instrumental numbers for the program were furnished by the famous Fuhrer string quartet who have delighted music lovers with their interpretation of classical scores. The vocal numbers were presented by the well-known Carl Bronson Artists who have appeared from time to time on the Radio programs of KOG. The Bronson artists are known throughout Southern California and their appearance at KOG is always looked forward to with interest. Prof. Carl Bronson presided at the piano for the concert.

SONG LOCATES MAN'S BROTHER OVER ETHER

BERLIN, WIS.—While listening to a quartet giving a program recently from station WLAG of Minneapolis, Dr. B. E. Scott of this city heard the announcer say: 'I hope Dr. Scott of Berlin, Wis., is listening in." The doctor then realized that he was listening to a quartet one of whose members was his brother. He called the station by long distance telephone and five minutes later heard his brother's voice bidding him a "good-night."

NEW ZEALAND HEARS WHAZ—NEW RECORD

TROY, N. Y.—Words and music broadcast by Radio telephone from the Rensselaer Polytechnic Institute station here have been heard distinctly in New Zealand, according to a cablegram from Invercargill, N. Z., reaching the station today. This is regarded here as a new record for distance, the airline mileage to Invercargill being nearly 10,000 miles. New Zealand fans heard WHAZ on three separate days.

GANNA WALSKA SINGS FROM WJZ

Above is the first exclusive photo of Mrs. Harold McCormick, nee Ganna Walska, lyric soprano, singing over the Radiophone. The picture was taken on the occasion that Mme. Walska sang over Station WJZ direct from the Waldorf Astoria following her arrival in America. © K. & H.

WHA Broadcasts Religious Services by John R. Mott

MADISON, WIS.—Radio Station WHA, University of Wisconsin, recently broadcast the addresses given Sunday afternoon and evening, March 4, by Dr. John R. Mott, principal speaker at the religious conference held at the university, March 2 to 4. An additional feature of the program broadcast was songs by the Fiske University quartet of Nashville, Tenn.

Amateurs within 200 miles listened to Dr. Mott's speech Sunday afternoon, and it is estimated that the evening address was heard within a radius of 1,000 miles.

New Plant for Ann Arbor

DETROIT.—The Times-News of Ann Arbor is the newest broadcasting station in Michigan. It is known officially as WQAJ and operated on 360 meters. This station is broadcasting concerts in connection with the musical interests of the University of Michigan and Ann Arbor.

WHITE BILL DEAD AS CONGRESS ADJOURNS

NINE MONTHS BEFORE NEW BILL CAN BE MADE

Department of Commerce Must Continue under Ancient Law Enacted 10 Years Ago

BULLETIN

WASHINGTON.—During the closing hours of Congress the White resolution, providing for an investigation by the Federal Trade Commission of the alleged monopoly in the Radio industry, was passed by the House of Representatives. No time is set for the completion of the report and therefore the results will probably not be made public until the next session of Congress.

The White Radio bill which passed the House some weeks ago died a natural death in the Senate, owing to the continued opposition of some of the Democratic members to increasing the power of the secretary of commerce.

Secretary of Commerce Hoover announced that he will call a Radio conference to consider the temporary assignment of new wave lengths. Invitations for the conference have not gone out yet but the secretary stated it would probably be held March 20.

The secretary will reassemble the committee that acted during the last Radio conference which was held at the department of commerce, about a year ago. The conference will be held largely because of the failure of the White bill to pass Congress. Hoover stated that he could hardly believe that there was anything in the rumor, which has been current for some time, that the Radio Corporation of America succeeded in killing the White Radio bill in the Senate.

WASHINGTON.—The White Radio Bill died in committee along with a number of other important legislative documents when the 67th Congress adjourned on March 4. The House and Senate do not convene until December 4, when a new bill will probably be introduced—but that is nine months away.

Whether Secretary Hoover can manage to keep the ether from getting more jammed with broadcasts and other Radio communications without legislation, remains to be seen. Lack of a new law makes it necessary for the Department of Commerce to continue under legislation enacted ten years ago when broadcasting was unknown and there were few commercial and amateur stations.

Will Try to Use Old Law

It is probable that the Secretary will undertake the partial reallocation of wave lengths within the limits of the existing Radio law in an effort to reduce interference and make for peace in the ether.

Just what plans the department has for improving conditions in the present Radio pandemonium, are not known, but a plan for execution within a few months is being worked out, it is understood.

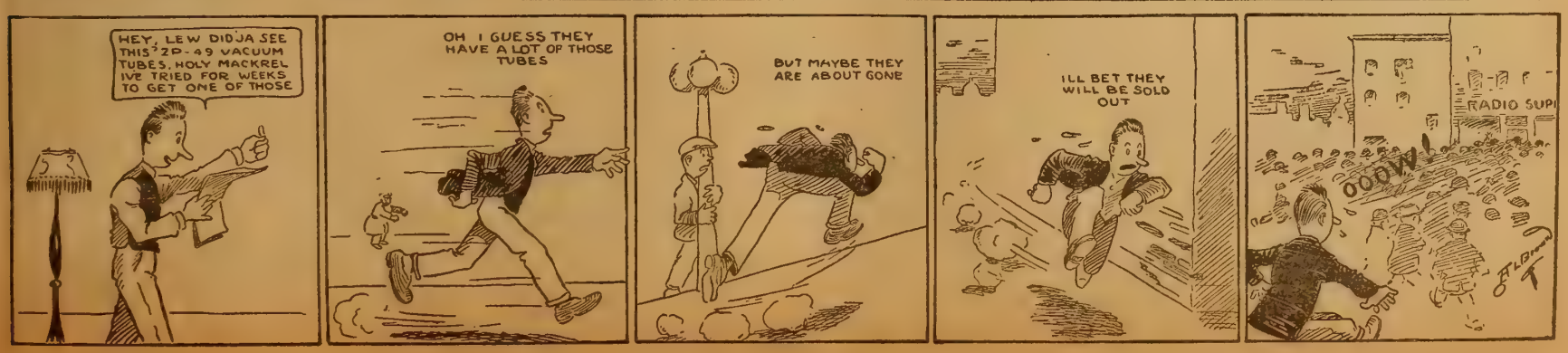
To Appeal Inter-City Case

The decision of the District Court of Appeals requiring the Secretary of Commerce to reissue a license to the Inter-City Radio Company of New York, although that station has been severely complained of due to interference, will be appealed, it was announced recently.

Secretary Hoover and his solicitor have taken the matter up with the attorney general's office requesting that the case be appealed to the Supreme Court of the United States. It was the action of the Court of Appeals that caused Secretary Hoover to state recently that: "This removes the last shred of the Department's authority over Radio."

Radio played an important part in the ceremonies conducted in connection with the two-hundredth anniversary of Benjamin Franklin's entrance into Printing House Square, New York.

THE ANTENNA BROTHERS — Spir L. and Lew P. — But Wait Till We Bust the Trust



THREE RAILROADS IN SOUTH HAVE PLANT

TRAVELERS LISTEN IN TO CONCERTS ON TRAIN

Ex-College Boys Organize Novelty Orchestra to Furnish Music for New York Limited

By Vera Brady Shipman

There are there railroads in the middle south, privately owned, which can boast of the only railroad ownership Radio broadcasting station in the world. These roads, the Atlanta and West Point, the Western Alabama, and the Georgia railroad, are all under the presidency of C. A. Wickersham with his son Frank Wickersham as signal engineer for the three, and director of Radio.

The College Park Radio station was originally put in to broadcast train dispatches with the experimental call letters 4XO. The idea of broadcasting programs was developed and the companies' own orchestra was gathered together and placed at College Park in 1921 when the programs were installed for reception on trains running on these roads between Montgomery and Atlanta, on the through New Orleans to New York lines. The receiving set is placed on the diner of the train and the whole train assembles after the evening meal to hear the programs of jazz orchestra tunes.

Try Various Stunts

Interesting combinations have been used by degrees of amplification. In one instance a violin solo was played on the train to the piano accompaniment in the College Park studio broadcasted to the train. Other combinations of orchestral instruments have been effected by train and studio, with exact rhythm and time.

The station is in charge of I. Miller and B. W. Benning, whom I met at the Constitution office in Atlanta preparatory to my trip to College Park. The announcer is Gene Curtis, a local College Park lad, son of a local physician. There are five musicians on the orchestra staff programs: Fred Graf, director, playing violin, saxophone and trombone; "Nick" Nickolas, an overseas veteran who combines piano, voice and a rare buzz on a comb; Frank Caldwell, voice and banjo; F. B. Myers, saxophone, and Frank Corts, a genuine Hawaiian steel guitar soloist.

Broadcast for Passengers

Their programs are broadcasted at 7:30 and 8:30 p. m., and 10:30 and 11:30 p. m., expressly for entertainment of passengers on board the New York limited while running from West Point, Georgia, to Atlanta.

WDAJ, as the College Park station calls, is a 500-watt station operating on 360 meters in Class A. They have been heard at Buenos Ayres, at sea and in every state and Canadian provinces, according to their map which they proudly display.

NAVAL BAND MUSIC WINS RECORD PACT

Concert Broadcast from Station KHJ Results in Compositions Being "Canned"

LOS ANGELES, CALIF.—Through the advancement made possible by Radio, the music of the naval band of the battleship U.S.S. Oklahoma has been preserved for posterity. A short time ago this band was received at Radio station KHJ, the Los Angeles Times, in their studio to be monitored in preparation for the naval-Radio concert which was presented a few evenings later by the officers and enlisted men of the U.S.S. Oklahoma from Radio station KHJ. The harmonious result of this monitor test was so satisfactory that the band was put "on the air."

Among those who were listening in to the concert was Theophilus Fitz, president of the Golden Record Company of this city, who immediately completed arrangements with the band to make two records prior to the special naval-Radio concert through KHJ.

The records have proven a distinct success and arrangements have been made through the reproducing company to place these records free of charge on every American vessel in naval service. Permission has also been given to place a reproduction in colors of the battleship Oklahoma on the records.

Efforts to afford relief to the deaf and dumb by means of Radio are producing encouraging results. One child of twelve had his hearing developed to a point where he pronounced the word "Dog" when a picture was shown—the first word he had ever spoken in his lifetime.

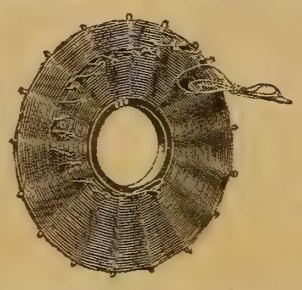
GERMANS HEAR WOR'S TRANS-OCEANIC TEST

Teutons Listen In on American Concert for First Time

NEWARK, N. J.—A cable from Lichterfelde, Germany, a suburb of Berlin, states that Miss Edith Bennett, the young American soprano who sung for an overseas Radio concert recently from Station WOR, was heard by the Seehof experimental station at six o'clock in the morning, which, allowing for the five hours' difference in time, would be midnight Eastern Standard time. This is the first time Germany has listened in on an American Radio concert, so far as has been reported. Eight high vacuum amplifiers were used in receiving, but only ordinary antenna, eight meters high.

REINARTZ

FIBRE CORE



COILS $3.00

E. & O. PRODUCTS

P. O. Box 1064, CHICAGO

Radio Tubes Repaired

UV 200—C 300.....$3.00
UV 201—C 301..... 3.50

The right filament and proper vacuum. All tubes guaranteed as good as new. Mark plainly. Pack carefully.

Radio Supply and Repair Co.
1045 NORTH WELLS ST., CHICAGO, ILL.
Repair returns 15 days after receipt.

KELLOGG RADIO FOR BETTER RESULTS

KELLOGG SWITCHBOARD & SUPPLY COMPANY
Chicago

ORIGINAL NATHANIEL
Baldwin
Type C
HEAD SET
Complete
SPECIAL PRICE
$11.75

Free with each pair of these world's best phones we give absolutely free a $5.00

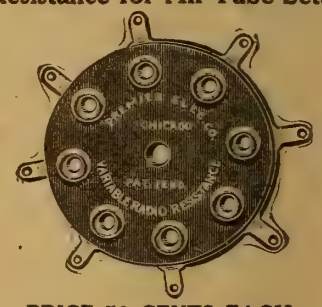
Sheltone Loud Speaker

This is a wonderful Loud Speaker. Both for less than the regular price of the phones.
Head set can be used in the regular way as well as on Loud Speaker.

Cash with Order or C. O. D.

WALTER SCOTT
10 St. Lukes Pl., MONTCLAIR, N. J.

DON'T GUESS
USE A
Premier "7-in-1" Variable Radio Resistance for All Tube Sets



PRICE 50 CENTS EACH

Has seven carefully calibrated values of resistance of approximately ½ megohm each between terminals. Protecting bakelite discs assure permanency of resistance. **Don't guess**—it is important to have resistances properly adjusted to function with your other apparatus to get the best results from all tube sets.

PREMIER UNIVERSAL RADIO PRODUCTS—ARE high grade and efficient. Request bulletin covering complete line.

DISTRIBUTORS: Some territory open for live, responsible concerns.

Premier Electric Company
Manufacturers—Est. 1905
(Dept. A) 3802-3810 Ravenswood Ave., Chicago, Ill.

The Only Set Backed by *Written Guarantee*

Winn SCR-11

WINN Sets were **perfected** long before the radio craze started—hundreds working successfully when radio was handled by technical men only. They are not experiments—not built of hastily assembled parts gathered haphazard.

WINN Sets are scientific—the result of years of study and actual experience. We design and build every one complete—so positive of their built-in quality, precision, performance, that we give a definite, all-covering **written guarantee** of service and satisfaction with every set.

The SCR-11, shown above, is a remarkably fine set that is **guaranteed** to operate a loud speaker at any distance up to 1000 miles, without distortion. It is practical, highly sensitive, easily handled, and comes in a beautiful mahogany or walnut cabinet, with engraved bakelite panels.

Exceptionally high efficiency—Vernier attachments—balanced condensers—copper shields—may also be used with loop aerial. All at reasonable cost—$155, f. o. b. Chicago.

Ask your dealer or write for full details.

DEALERS—Write for interesting proposition

WINN ELECTRIC CORPORATION
Radio Sets and Supplies
Transportation Bldg. **Chicago**

Crown Products For Radio Perfection

Licensed under De Forest Patents

List Price $5.00

CROWN Coil Mountings
especially adapted for
Flewelling Circuit

Used by manufacturers as standard equipment on sets.

For long and short wave reception.

A few of its many special features.

1. **Special Locking Device** to keep the coil in place, thus preventing it from being thrown out of adjustment.
2. **Special Adjustable Bearing** feature.
3. **Special constructed Calibrated Dial,** showing the stations tuned.
4. **Positive Connections** on rear of blocks.
5. Complete with **Flexible Leads.**

CROWN "WD 11"

The Transformer Designed Especially for Use with "WD 11" Tubes

The reputation gained by the Crown "W D 11" with jobbers, dealers and users is evidence that there is no other transformer giving such reliable service in amplifying without distortion. The Crown "WD 11" is mechanically perfect, ruggedly constructed and priced right. It is a transformer all jobbers and dealers can back to the limit.

Audio Frequency, $5.00
Radio Frequency, $4.00

At your dealer's—otherwise send purchase price and you will be supplied postpaid.

We also manufacture

23 PLATE VERNIER CONDENSER	$5.50
43 PLATE VERNIER CONDENSER	6.50
BAKELITE MOULDED VARIOMETER	8.00
BAKELITE MOULDED VARIOCOUPLER	9.00

Crown Radio Manufacturing Corporation
78 FIFTH AVENUE NEW YORK CITY

YOU'VE HEARD 'EM? HERE THEY ARE!

Of course you know who "Uncle Billy" is—if you have ever listened in on WGI, Medford, Massachusetts. Here is a picture of "the bedtime story man" (center above). We are sorry to say that Peter Rabbit and Johnnie Chipmunk were not at the station when the photographer called or we would have made it a group. While a lot of the kiddies have the impression that "Uncle Billy" looks something like Billie Possum, there are some grown-ups who still think "G. C. A." (G. C. Arnoux), program director of WBAP, Fort Worth, Texas, is "fat and forty." We are forced to run a picture of "G. C. A." (left), in order to cut down on some of our correspondence correcting this rumor that is riot among the fair sex. At the right is Harry Sadenwater, who has been placed in charge of the technical direction of the General Electric Company's broadcasting plants. Sadenwater will be remembered as the Radio officer aboard the ill fated NC-1, one of the three flying boats of the United States Navy that attempted to cross the Atlantic in May, 1919. Mr. Sadenwater's craft ran into a heavy fog and was forced to seek safety in the ocean. The plane was badly damaged by waves but the crew was finally rescued by a Greek freighter

BRITON'S STATIONS PURPOSELY LIMITED

LICENSED RECEIVING SETS DEFRAY EXPENSE

Four Broadcasting Plants Supply News and Time for All of the British Isles

By F. N. Hollingsworth

LONDON, ENGLAND.—Britons have only four broadcasting stations to entertain them and to provide the news of the day via the air, but, considering the size of the British Isles, this seems to be amply sufficient. The number has been purposely limited, however, to lessen interference. Receiving stations are licensed, and a portion of the license fees turned over to the broadcasting stations through the British Broadcasting Association to help defray expenses of the work. The largest station is at Marconi House, with call letters 2LO, and wave lengths of 400 and 800 meters, using 1500 watts power. The station at Manchester, 3ZY, has 800 watts power and a wave length of 385 meters, while the other two are 5NO at Newcastle on 400 meters and 5IT at Birmingham, on 420 meters. In tuning in to attempt to pick up England, fans should remember that London is five hours earlier than Eastern Standard time.

Fans Wire and Phone in on WQAM's Clearness

Hotel Guests Dance by Music of Miami Plant

MIAMI, FLA.—Telegrams, letters and telephone calls coming in to The Metropolis tell of the clearness with which the programs put on by the new Radio station WQAM are heard. Among the cities reporting by wire or letter are Glen Cove, N. Y.; Somerville, N. J.; Needham, Mass.; Arcadia, Orlando and Hialeah.

Telegrams, local and long distance telephone calls, received during the broadcast of WQAM attested to the popularity of Tasillo's Le Bal Tabarin Orchestra of Hartford, Conn., which furnished a recent program.

This orchestra is now filling a season's engagement at Luna Park dancing pavilion. In several of the leading hotels of Miami and Miami Beach guests often dance to its music which was received over Radio and The Metropolis has received many expressions of thanks by telephone and telegram.

DE FOREST AWARDED MEDAL BY INSTITUTE

Special Committee Appointed to Investigate the Audion

PHILADELPHIA.—Presentation of the Elliott Cresson medal to Dr. Lee de Forest for his invention of the Audion or three-electrode vacuum tube took place here at the Franklin Institute of the State of Pennsylvania in connection with a joint meeting of the Institute of the Philadelphia Section of the American Society of Civil Engineers.

The special committee appointed by the Institute to investigate and report upon the Audion consisted of Mr. Charles E. Bonine, chairman, and Dr. George A. Hoadley, with the following consulting members: General J. J. Carty, Dr. A. E. Kennelly, Major General George Owen Squier, Mr. John Stone. The presentation address was delivered by Dr. Walton Clark.

The report upon which the award was made says in part:

"This invention of the three-electrode vacuum tube for the purpose of amplifying minute electrical currents and pressures, called by the inventor the Audion and variously known as the electron amplifier, thermionic amplifier, three-electrode bulb, et cetera, the specific invention considered in this report, is one of the most important ever made in the field of the electrical transmission of intelligence and through its development has worked a profound revolution in the art of Radio communication."

Glee Club Contest Is New Novelty of Station WEAF

NEW YORK.—Picking the winner of the Intercollegiate Glee Club Contest was the Radio audience's unusual privilege on the evening of Saturday, March 3, when WEAF broadcast the college men's voices through a special direct wire installation at Carnegie Hall. Entered in the contest were glee clubs from Yale, Harvard, Princeton, Columbia, Dartmouth, Cornell, University of Pennsylvania, New York University, Pennsylvania State, Amherst, Wesleyan and the University of Wisconsin. The latter is winner of the Intercollegiate Prize Contest held in the Middle West.

Each glee club sang one "light" song and one "college" song of their own selection, followed by a rendition of "The Hunter's Farewell" by Mendelssohn. The complete vocal merits of each club may thus be fairly judged. The Radio audience not only enjoyed a program of unusual merit, but had the opportunity to test its discriminative powers in selecting the winner, whose name is yet to be announced through WEAF as soon as the judges' decision is reached.

ETHER WAVES BRING SON BY FLYING BOAT

Huge Seaplane Delivers Man to Mother's Side

MIAMI, FLA.—The eleven-passenger flying boat Buckeye of the Aeromarine Airways, Inc., performed an unusual service recently aided by a new Radio apparatus carried aboard the huge seaplane, according to advices received by C. F. Redden, president of the company, at the executive office, Times building, New York.

Shortly before the Buckeye sailed on its first trip to Nassau from Miami, a Radio message was received from Carter De Gregory at Settlement Point at the west end of Grand Bahama island, stating that his mother was seriously ill in Nassau and requesting that the Buckeye stop for him and carry him to the British island.

F. Kuback, Radio operator aboard the Buckeye, sent a message from the flying boat to a ship in harbor at Settlement Point giving directions to have Mr. De Gregory aboard a small boat ready to be transferred to the aircraft.

The descent was made promptly for Mr. De Gregory and the voyage was resumed without delay; the Buckeye arriving in Nassau that evening.

Pullman Conductor Gives Passengers Air Concert

Receiving Set Furnishes Music for 400-Mile Trip

TEXARKANA, TEX.—People here who were passengers on Kansas City Southern passenger train No. 1, southbound, March 1, are discussing what they profess to be the first Radio entertainment for railway passengers in this territory.

The Radio set is the property of Pullman conductor, Tom Chapman. It was installed in the Pullman with aerials running along the top of the coach. The set furnished the passengers with concerts all along the 400-mile journey between here and Kansas City.

Hear WHB in New York Tube

NEW YORK, N. Y.—Officials of the Interborough Rapid Transit company of New York recently used the subway and East river tunnel to test Radio reception. Kansas City, WHB, was picked up in the concrete tube sixty feet under ground, and also midway to Brooklyn in the tube under the river.

Every state in the Union reported having heard WGY on Christmas eve. At the same time WGY was heard in London, Liverpool, Mexico, Porto Rico, Cuba and Canada.

CREATION OF NEW DEPARTMENT ASKED

NEW POST OFFICE DEPT. WILL INCLUDE RADIO

Adoption of New Department of Communication Is Not Urged By President

By Carl H. Butman

The creation of a Department of Communications, including Radio, is suggested in the report on the reorganization of the executive departments submitted to the joint committee of Congress by the President a few days ago.

The committee, headed by Walter F. Brown, suggests that the Post Office Department be renamed the Department of Communications, and that it include an Assistant Secretary for Telephone and Telegraph, including Radio.

To Add Development Bureau

In the report Mr. Brown says in part: "The only important change contemplated is the addition of a bureau (to the Post Office) to develop and extend telephone and telegraph communications, including Radio, for the general public benefit."

Apparently the Navy would retain its communication system as would the Signal Corps, but it is evident that Radio regulation would be transferred from the Commerce Department to the Department of Communication, although the Bureau of Navigation, under which the Radio section operates today, is left in the Commerce Department.

President Does Not Urge Adoption

Although the report is labelled as recommended by the President, his letter of transmittal states that with few exceptions, the changes have the sanction of the cabinet, and adds that it is his hope that the suggestions will be of assistance to the committee. Further than that, the President does not appear to urge its adoption.

Signal Corps Establishes Two New Army Net Stations

WASHINGTON.—The War Department has announced that Radio stations are to be established by the signal corps at Fort Sill, Okla., and Fort Leavenworth, Kans., as a part of the army Radio net. The station at Fort Leavenworth will be a relay point for transcontinental business. The signal corps land line in Alaska extending from Fort Gibbons to Koyukuk, a distance of about 200 miles, is to be abandoned, and a Radio station will be established at Ruby to take care of the locality previously served by that line.

PLANTS INCREASE ELEVEN IN MONTH

U. S. BROADCASTERS NUMBER 581 NOW

Losses 13, New Stations 24, Net Gain 11, During February—28 Class B's on Air

By Carl H. Butman

WASHINGTON —An increase of eleven broadcasting stations is shown on the records of the Department of Commerce during the month of February. On the first of February there were 570 stations licensed to broadcast entertainment data and news, while on March 3 there were 581 broadcasters operating.

During the past month 24 new licenses were issued to broadcast, but 13 old stations ceased to function. Of the total stations transmitting entertainment today, 28 are Class B stations operating on 400 meters, the balance being on 360.

New Stations' Calls

New stations licensed during the past three weesk follow:

WSAC, Clemson Agricultural College, Clemson College, S. C.; KFDV, Gilbrech & Stinson, Fayetteville, Ark.; WWAY, Marigold Gardens, Chicago, Ill.; WRAB, Savannah Board of Public Education, Savannah, Ga.; KFER, Auto Electric Service Co., Inc., Fort Dodge, Ia.; WQAW, Catholic University of America, Washington, D. C.; KFEV, Radio Electric Shop, Douglas, Wyo.; WTAS, George D. Carpenter, Elgin, Ill.; WDAD, Central Kansas Radio Supply, Lindsborg, Kan.; KFDO, Everett H. Cutting, Bozeman, Mont.; WQAV, Huntington & Guerry, Inc., Greenville, S. C.; KFDP, Hawkeye Radio & Supply Co., Des Moines, Ia.; KFDU, Nebraska Radio Elect. Co., Lincoln, Neb.; KFCZ, Omaha Central High School, Omaha, Neb.; WBAB, Andrew J. Potter, Syracuse, N. Y.; WQAT, Radio Equipment Corp., Westhampton, Va.; KFEQ, J. L. Scroggin, Oak, Neb.

Thirteen Stations Dropped

The thirteen stations which were dropped during February follow:

KFED, Billings Polytechnic Inst., Polytechnic, Mont.; WKAG, Edwin T. Bruce, M. D., Louisville, Ky.; WTAX, Capital Radio Co., Lincoln, Neb.; WNAF, Enid Radio Distributing Co., Enid, Okla.; WOH, Hatfield Electric Co., Indianapolis, Ind.; WLAF, Johnson Radio Co., Lincoln, Neb.; WDAR, Lit Brothers, Philadelphia, Pa.; WLAR, Mickel Music Co., Marshalltown, Ia.; WDY, Radio Corporation of America, Roselle Park, N. J.; WHAF, Radio Electric Co., Pittsburgh, Pa.; WJK, Service Radio Equipment Co., Toledo, O.; WJAE, Texas Radio Syndicate, San Antonio, Tex.; WDV, John O. Yeiser, Jr., Omaha, Neb.

Ohio vs. Michigan

COLUMBUS, O.—Ohio may have lost to Michigan in football and basketball, but "by hickory," when it comes to Radio that's different, according to members of the Ohio Amateur Radio club. "Beat Michigan" is the slogan adopted by the club for their convention which will be held at Hotel Columbus, April 6, 7 and 8. The Michigan Amateur Radio convention was held at Flint, Michigan, two weeks ago.

WKAA Uses Fifteen Watts

CEDAR RAPIDS, IA.—Station WKAA of this city is now broadcasting with fifteen watts in-put, using three five-watt tubes. This plant uses the Colpitt-De Forest circuit with grid modulation. DX fans have reported hearing WKAA over a thousand miles away.

1000—1500 MILES ON ONE-TUBE-ONE-CONTROL
150—25,000 METERS

NO Rheostat, Storage Battery, Variocoupler, Variometer, 3-coil Mounting, Variable Inductance, Taps, Dead End Losses or Radio Frequency. Complete hook-up, cuts, instructions, everything. Price $1.00. No checks. Nothing left for you to guess about. Build your own Receiver and save 50% or more and get better results. Radio Experimental Laboratory, Box 194 F, Berkeley, Cal.

Immediate Delivery
Flewelling Circuit Accessories

23 Plate Precision Condensers	$1.10
13 Plate Precision Condensers	.85
.006 Fixed Condensers	.38
Two Coil Mounts, Deforest License	2.35
D. L. 50 Honeycomb Coil	1.45
D. L. 75 Honeycomb Coil	1.45
Variable Grid Leak only	.28
Variable Grid Leak and Condenser	.35
High Grade Bakelite Rheostat	.50
W. D. 14 Tube Socket	.35
V. T. Tube Socket	.35
Hard Rubber Panel, 7x10	1.00

Write for Prices on Other Parts.
MAIL ORDER DIVISION
ECONOMY RADIO CO.
132 Nassau St., Dept. "R.D."
NEW YORK CITY, N. Y.
No C. O. D. Postage Paid

RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

ADDING to the 312 records published in the complete list last week, 45 new distance reaches were made last week. Of the past week's newcomers, 26 of these beat old records and 19 were records for stations not represented hitherto.

H. S. Olding, New Glasgow, Nova Scotia, Canada, deserves special mention for having acquired 24 of the "DX Crowns" during the week. The new records appear below, followed by the rules of the contest which are repeated for the benefit of the new Radiophans who may have become interested:

Station	Miles Away	Who Heard It
CHCF	1250	B. U. Livingston, Morristown, N. J.
CKCK	1650	L. C. Burwell, Jr., Charlotte, N. C.
KDYW	2175	Edmund Howard, Waterbury, Conn.
KFJ	1950	J. W. Mayfield, Cincinnati, O.
KHJ	3000	H. S. Olding, New Glasgow, N. S., Can.
KJR	2800	H. S. Olding, New Glasgow, N. S., Can.
NAA	2250	R. J. Gall, Blythe, Calif.
WBL	1900	H. S. Olding, New Glasgow, N. S., Can.
WBU	1250	H. S. Olding, New Glasgow, N. S., Can.
WCAE	2250	R. Taylor, Livermore, Calif.
WCAH	1950	A. B. Butlers, Los Angeles, Calif.
WCAT	1975	H. S. Olding, New Glasgow, N. S., Can.
WCAQ	1150	H. S. Olding, New Glasgow, N. S., Can.
WDAE	1625	H. S. Olding, New Glasgow, N. S., Can.
WEAB	1550	H. S. Olding, New Glasgow, N. S., Can.
WEAE	2000	R. J. Gall, Blythe, Calif.
WEAI	2075	R. J. Gall, Blythe, Calif.
WEAP	1700	R. J. Gall, Blythe, Calif.
WEAZ	1475	H. S. Olding, New Glasgow, N. S., Can.
WEY	1125	R. J. Gall, Blythe, Calif.
WFAC	1375	H. S. Olding, New Glasgow, N. S., Can.
WFAF	2200	R. J. Gall, Blythe, Calif.
WFI	2200	R. J. Gall, Blythe, Calif.
WGAK	1400	H. S. Olding, New Glasgow, N. S., Can.
WGAN	1700	H. S. Olding, New Glasgow, N. S., Can.
WGF	1425	Perkins Benneyan, Fresno, Calif.
WGV	1800	H. S. Olding, New Glasgow, N. S., Can.
WHA	1650	Perkins Benneyan, Fresno, Calif.
WHAA	1450	H. S. Olding, New Glasgow, N. S., Can.
WHAL	1100	H. S. Olding, New Glasgow, N. S., Can.
WHB	1650	H. S. Olding, New Glasgow, N. S., Can.
WIAO	1250	H. S. Olding, New Glasgow, N. S., Can.
WIZ	1175	H. S. Olding, New Glasgow, N. S., Can.
WLW	2000	R. Taylor, Livermore, Calif.
WMAG	1150	L. C. Burwell, Jr., Charlotte, N. C.
WNAB	1350	H. S. Olding, New Glasgow, N. S., Can.
WNAM	1375	H. S. Olding, New Glasgow, N. S., Can.
WOAI	2250	H. S. Olding, New Glasgow, N. S., Can.
WOAZ	1525	E. S. Macartney, Ottawa, Ont., Can.
WOK	1725	H. S. Olding, New Glasgow, N. S., Can.
WPAC	1250	Perkins Benneyan, Fresno, Calif.
WQAQ	2150	H. S. Olding, New Glasgow, N. S., Can.
WRP	1375	Guy V. Carrolo, Houston, Tex.
WRR	2000	H. S. Olding, New Glasgow, N. S., Can.
WWB	2150	R. Taylor, Livermore, Calif.

Rules to Remember

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 1,000 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records.

2. Distances must be measured AIR-LINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of Radio Digest.

WHILE THEY LAST!
250 PAIR HEADPHONES
Navy Standard Specifications
$4.70 PER PAIR
POSTAGE PREPAID
ELECTRICAL MATERIAL CO.
158 WEST LAKE STREET
CHICAGO, ILLINOIS

National Advertised RADIO APPARATUS at Reduced Prices

Federal Head Set, 2200 ohms, $8.00 list	$5.75
Victor Head Phones, $6.00 list	3.45
Brandes "Superior" Phones	5.95
Master Baldwin "C" units, with cord	4.65
CRL Vernier Rheostats, $1.50 value	$0.95
CRL Adjustable Grid Leak	1.20
CRL Rheostats, 75c list	.45
Grebe Type Dials, 2 and 3 inch	$0.25
Premier 180° Variocoupler, $4.00 Value	2.85
United Amplifying Transformer, 5 to 1 Ratio	3.25
Antenella & Ducon, Lighting Socket Aerials	1.25

Piano Hinged, Phonograph Mahogany Finished Cabinets.

7"x18"—$10.00 value	$4.75
8"x10"— 7.50 value	4.00
3 Plate Variable Condensers	$1.00
11 Plate Variable Condensers	1.25
15 Plate Variable Condensers	1.25
23 Plate Variable Condensers	1.45
43 Plate Variable Condensers	1.65

Mail Orders Receive Immediate Attention
EVERYTHING GUARANTEED AS REPRESENTED
Congress Radio Company
503 South State Street, CHICAGO, ILLINOIS

Department of Agriculture Quizzes Farmers on Reports

WASHINGTON.—That farmers throughout the country are receiving the Radio market news reports broadcast by the Department of Agriculture is shown by the replies to an inquiry sent out by Radio recently. About half of the replies received were from farmers, the rest being from grain dealers, banks, telephone companies, and other agencies which serve the farmer. Radio has developed more rapidly in the Middle West than in other farm sections of the country, and this probably accounts for the fact that the inquiry shows the greatest interest to be in grain reports. Next in interest are livestock reports and weather reports.

Christen College Station

ITHACA, N. Y.—Members of the staff of the College of Electrical Engineering at Cornell University made their first broadcast February 28. A series of talks by President Livingston Farrand and members of the faculty were broadcast from Station WEAI, the university Radio station. This station is expected to develop into a high-powered transmitting station, keeping the outside world in touch with university affairs and athletics.

Error in Advertisement

The World Battery Company's advertisements appearing in the Radio Digest, issues March 3 and March 10, were in error as to price, as at the prices quoted it would be impossible for this company to supply batteries in solid rubber cases. The correct advertisement appears immediately below.

RADIO DIAGRAMS
REINARTZ, FLEWELLING, ULTRA AUDION and TWO STAGE AMPLIFYING DIAGRAMS
These diagrams complete in every detail, and designed by our staff draftsmen.
Send fifty cents (50c) for complete set or fifteen cents (15c) each.
Special Prices to Dealers
MANUFACTURERS OUTLET CO.
28 South Wells Street, CHICAGO, ILLINOIS

The Best Phone for DX Work
N AND K-6000 OHM RADIO HEAD SET
Made by Neufeldt & Kuhnke, Germany
Regular $14.50 List Price
By Mail $8.50 Postpaid
A Large Purchase Makes This Offer Possible
ALBERT KREH
208 BROAD STREET, ELIZABETH, N. J.
Money refunded if not satisfactory in 5 days

World Radio Batteries SAVE YOU 50%
WRITTEN 2YR.GUAR
In buying WORLD the highest Quality Battery built, direct from the manufacturer, you get two profits. First, you get a battery free from extravagant selling expense. Second, you save the profit charged by the middleman.
World Radio Batteries
6 Volt—40 Amps., **$8.50**
6 Volt—80 Amps., **$12.50**
6 Volt—60 Amps., **$10.00**
6 Volt—100 Amps., **$14.50**
Full Rating Guaranteed
Out-of-town orders shipped same day as received via express, C. O. D.
WORLD BATTERY CO.
58 EAST ROOSEVELT ROAD
Phone: Wabash 8360 CHICAGO

FREE Home Demonstrations of the Famous Long-Range MICHIGAN Radio Sets

"SENIOR" SET
OUR dealers, everywhere, are instructed to arrange for free Radio Entertainments in the homes of representative citizens, the dealer doing all the wiring and other work necessary, without charge, or obligation.
If you want such a demonstration in your home, and do not know who our nearest dealer is, write us, giving the name and address of the merchant with whom you prefer to make such an arrangement.

"JUNIOR SET"
Send for Circular telling about the whole wonderful MICHIGAN line of Radio Sets and Parts
MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

The "How" of the Simplified Super Circuit

Part VII—Listening in to DX Stations Without an Aerial

By E. T. Flewelling

BECAUSE the writer started a new set and had photos taken of it to give the fans an idea as to how the material can be assembled, it seemed only fair to continue with the set and see what may be done with it. Considering that the Flivver is used by many who are not able, or do not have the privilege of putting up an outdoor antenna, it is best to build the outfit without thought of using an outdoor antenna at all.

The writer most of the time uses his Flivver without an outdoor antenna, but because there was a chance of its presence influencing the results, he checked up by disconnecting the aerial from the entrance to the house and took it down temporarily. After every chance of aid from the aerial was eliminated he prepared the Flivver for its test. The set had been wired and so a two-foot loop and variable condenser were simply placed across the tuning inductance. Then a wire was run to the ground from the grid side of the inductance.

Found Minimum Wave Length 380

The Flivver certainly was full of "pep," and although it was after 4:00 p. m., and the Shepard Stores (WNAC) was on the air or "the ground," the writer was unable to get them. The tuning condenser and the loop condenser were set at their minimum and the set was then checked by use of a wavemeter. It was found that the lowest point which could be reached was 380 meters.

A Giblin Remler 50-turn coil was being used and it was decided to make some changes in the coil. It was removed, five turns were taken off, and then the coil was replaced. A smaller variable condenser, .00025 mfd., was placed in the loop circuit and before the writer had a chance to put on the phones we heard the announcer say, "WNAC, the Shepard Stores, Boston."

Coils Have Too High Wave Length

The wavemeter now showed that the set had a range of from 335 meters to 425 meters. Most of the 50-turn coils have proved all right for broadcast use, yet more than once it has been found necessary to set the tuning condenser at the zero point on the dial before even the slightest sound of broadcasting on 360 meters could be heard, and it was necessary to remove a few turns of wire from the 50-turn coil.

As a rule the coils run very good and no trouble has been experienced from this source with the 400-meter stations. It is therefore an easy matter to check up, that is, if one hears 400-meter stations but none in 360-meters he may be sure that it is because his set cannot tune low enough.

The first station was very loud but not so clear. The grid lead R1 was changed so that the squeal was raised in pitch to a point where it was less prominent. The condenser leak R2 as a rule can be kept more or less constant after it is set correctly.

When the grid leak was adjusted so that the squeal was hardly audible the station was lost. The leak was increased in resistance to a point where a slight click was heard in the phones and then the "lost" station came in perfect. So loud was it in fact that the phones were put on a horn. The broadcast could be heard by sitting from 5 to 10 feet away from the horn.

The set was left then for more than an hour and returned to at about 7:00 p. m. for the evening's work.

Working for Distance

It was not long before stations outside of Boston were heard. They came in rather poorly and were hard to get because the Boston stations were too close to us and blanketed the weaker and more distant stations.

A total of 15 different stations were received during the evening. It must not be taken that they all came in "like a brass band;" because this was not the case. Some of them were pretty weak by the time that they arrived. WGM, Atlanta, Ga., came in with so much outside noise that the writer was unable to make out who it was until the phones were on the horn. In the next room the smaller, or rather weaker noises and the the announcer's voice could be heard better. Reception in many cases was not at all good from a musical standpoint because the set had to be pushed too hard.

Distance Versus Musical Quality

Distance work carries with it little of value as far as music is concerned, but the greater the distance your set is capable of covering, the easier and better will it get the nearby stations. Quality and distance very seldom combine one with the other.

During the evening several different tubes were used in the set, and all gave results. Some tubes gave louder reception than others, but all were able to handle the DX work. Most of the work was done with a UV-201 using 125 volts on the plate.

Typical Flivver Evening

The above is simply given as a typical evening with the Flivver. Results are sometimes better one evening than another, of course, but the question has been asked so many times whether the Flivver can get the distant stations that it seems but fair to show what can be expected of it.

Here is a little hint. The Super Flivver set is not working at its maximum unless sooner or later, you are able to bring in on the ground alone a station that is 1,000 miles away from you.

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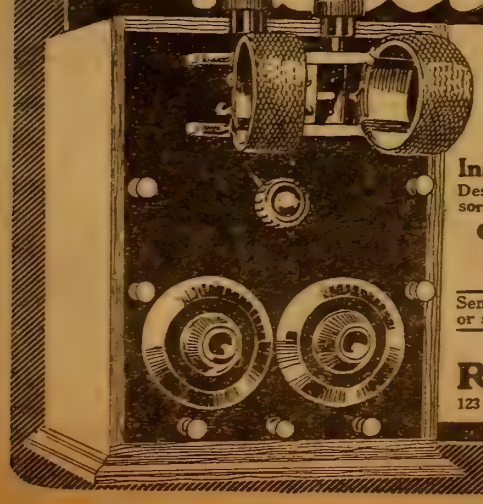
How to Make a Flewelling Receiver



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(Something new, wonderful and efficient.) 1,000 mile range and over. Consisting of 6x10 panel, 23 plate condenser, W.D.-11 socket, one honeycomb inductance coil, panel and coil mountings, one rheostat, .00025 fixed condenser with panel grid leak, 8 binding posts, 25 feet wire, and complete construction working diagram, for only..... $7.95

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W.D.-11 Bakelite sockets, 75c value	68c	75c Value phone plugs	46c
V. T. Bakelite sockets, 75c value	28c	Battery hydrometers, 75c value	40c
Plain rheostat, $1.00 value	48c	Soldering outfits, $1.00 value	85c
Super crystal	20c	Glass crystal detectors	65c
Single open circuit jacks	35c	Series parallel switch lever	39c
Double closed circuit jacks	45c	Double open circuit jacks	40c
75 Turn coils mounted	98c	50 Turn coils mounted	90c
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Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WAH, Eldorado, Kans. 485 only. The Midland Refining Co. Daily ex Sat, 10:30 am, 1:30 pm, markets, weather. Sat, 1 pm, same. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAB, Syracuse, N. Y. 300 mi. Andrew J. Potter. Daily, 7-8 pm irregular. Eastern.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30, news, reports, concerts. Sat, 6:30-6:45 pm, bible lesson. Central.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Wed, Fri, 10-11 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central.

WBZ, Springfield, Mass. 422 only. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. Temporarily discontinued.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Rodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Sun, 2-4 pm music. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Neb. 150 mi. Neb. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. Dept. of Physics, St. Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.

WCAR, San Antonio, Tex. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8:30-10 pm, music, lectures. Mon, Tues, Wed, Thurs, Fri, 5:30-6 pm, code instruction. Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports, Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 485 also. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAZ, Carthage, Ill. Carthage College.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 485 also. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Central.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Daily ex Sun, 2:30 pm, 3:30, 4:30, 5:30, music; 7:40, bedtime story; 8:15, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, time, weather; 4-4:30 pm, 8-9, music; 10:05, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-1:50 pm, industrial reports; 7:45-10 pm, music. Sun, 10:30 am-12, 5-6 pm, church services. Eastern.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Kenneth M. Hance. Daily ex Sun, 12:15-12:30 pm. Tues, Thurs, Sat, 7:30-8:15, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 10:30 am, church service; 3 pm, lecture; 7:30, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. 485 also. 150 mi. N. W. Kansas Radio Supply Co. Daily ex Sun, 11-11:30 am, markets, music; 12, markets; 1:45 pm, markets; on half hour 3:15 to 5:45, news sports. Tues, Wed, Thurs, Sat, 7:30-9, concert. Sun, 11 am, church service; 3 pm, sacred music; 7:30, church service. Central.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, O. 375, 485 also. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Central.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Tues, Thur, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. 1,500 mi. Will Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program, 8:15-9:15 pm. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAN, Hutchinson, Minn. Hutchinson Elec. Service Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri, 11 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 485 also. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Strawbridge and Clothier. Daily ex Sun, 10 am, reports; 1:16 pm, news; 2, reports; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:10 pm; Sun, 3:30 pm, organ recital. Sun, 4 pm, chapel. Eastern.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAF, Tulsa, Okla. Goller Radio Service.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAT, Lincoln, Nebr. 500 mi. Am. Legion, Dept. of Nebr. Mon, Wed, 9 pm, announcements. Fri, 9-10 pm, patriotic program, concert. Sun, 3-5 pm, sermon, Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 9-10 am, financial news; 11:30, news, opening markets; 4 pm, news, closing markets. Mon, Wed, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 500 mi. Am. Radio & Research Corp. Daily, 5-6:45 pm, Children's Hour, reports codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm. Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, 9, church services. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 400 mi. Interstate Elec. Co. Mon, Tues, Wed, 8-9 pm, music, talks. Mon, Wed, Sat, 11-12:30 pm. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 370 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 12 m, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, 7:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather; 7 pm, lectures, news. Mon, Thurs, 7:20 pm, agriograms, concerts, sports. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. Hafer Supply Co.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm, 4:30-5:30, 10-11, Sat, 10-11 am, 2-2:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:45, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 6 pm, markets, news, weather. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. 100 mi. W. Va. University. Daily, 4-6, 7-7:30, news etc. Eastern.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 250 mi. Associated Broadcasters, Inc. Daily ex Sun, 7-8 am; 9:15-10:55, 12:55-1:15 pm, 2:15-2:30, 4:15-5:30, 6:15-7, 7:30-8:30, 10:30-12 m. Tues, Wed, Fri, 7:30-8:30 pm omitted. Sun, 1-3 pm, 5-6; 10:30-12 m. Eastern.

WHX, Des Moines, Ia. 50 mi. Iowa Radio Corp. Daily, 5:30-6:15 pm. Wed, 8-9:30 pm. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeCortin. Tues, 9-10:30 pm, Fri, 12-1 am, music. Sun, 10-11:30 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 200 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music. 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Sat, 8-9 pm, concert. Sun, 4:45 pm, vesper services. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 2:30-3:30 pm. Daily, 1:30-2 pm, 7-7:30 pm. Tues, 7-12 pm. Fri, 7-9:55 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 200 mi. American Radio Co. Mon, Wed, 8:30-9 pm. Central.

WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Neb. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star. Daily ex Sun, 9 am, 11:30, 1:30 pm, 3, markets, weather, agriograms. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 200 mi. Capper Publications. Thurs, health talks. Sun, 8 pm, church services. Schedule not regular. Central.

WJAR, Providence, R. I. 485 also. 600 mi. The Outlet Co. Daily ex Sun, 10-11 am, 2-3 pm, 5-6. Fri, 8-10 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:30-6 pm, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm; Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7-8:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Sun, 5-6 pm, religious stories. Central.

WJH, Washington, D. C. 100 mi. White & Boyer Co. Daily ex Sun, 1-2 pm, music. Tues, 7:45-10 pm, music. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Radio Corp. and Westinghouse Elec. Co. Daily ex Sun, 9-9:15 am; 12-1:15 pm, 4-4:15, 7-7:30, 8-10:30. Sun, 10:30 am-1 pm, church services; 3-4:30, music. Eastern.

WKAA, Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Daily ex Sun, 6:30-7 pm, sports. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. WKY Radio Shop (Daily Oklahoman). Daily ex Sun, 12 m, weather; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WL2, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Tues, Wed, Fri, music. Mon, 10:10 pm, concert. Thurs, 9:15 pm, concert. Sat, 8:30, 10:30 pm, concert. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAS, Hutchinson, Kan. 485 also. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm, 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

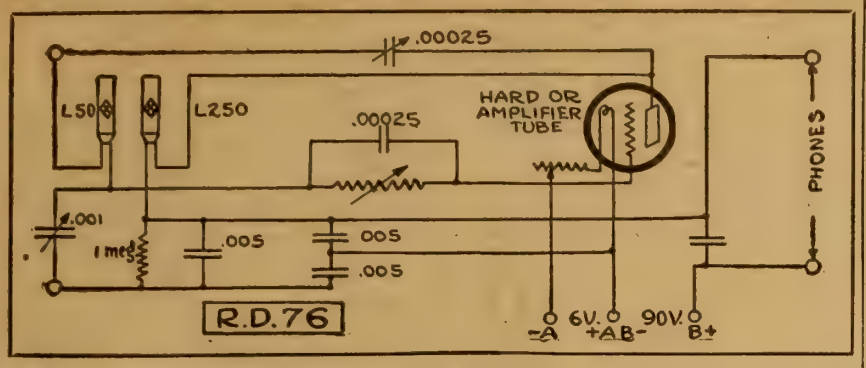
WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

FLEWELLING BASIS OF R.D. 76



MANY attempts have been made to adapt the Flewelling condenser bank to other circuits, some of which have given very good reception while others show but doubtful performance. One of the new developments of this circuit is given here as Hook-Up R.D. 76.

For some time .006 mfd. condensers were rather scarce on the market so the more standard capacity of .005 mfd. was substituted.

A 50-turn honeycomb coil is used in the antenna circuit with a .001-mfd. vernier variable condenser in series on the ground side. Regeneration has been increased by the use of a 250-turn honeycomb coil in the plate circuit. In addition a .00025 mfd. variable condenser is placed in series between the antenna and plate. A variable grid leak with a .00025 mfd. grid condenser is used as in the original Flewelling. A fixed condenser of .001 mfd. capacity is shunted across the telephone receivers. A hard tube is used in combination with about 90 volts of B battery in the plate circuit.

The resistance of the variable grid leak should be kept high and the filament rheostat, which should be of the vernier type, is turned on about three-quarters of full current. The plate condenser is kept low while the condenser in the ground circuit is adjusted for wave length. The coupling between the two coils is adjusted for best results in conjunction with variations of the plate condenser. Often the grid leak and the rheostat can be readjusted for improvements in reception.

The controls for tuning are numerous and require a little practice and some skill in operation, but the circuit is very selective and will amply repay the experimenter in results.

Book Reviews

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Revolutionary Theories in Wireless. By Frank E. Summers. A treatise in the how and why of Radio and science. A practical result of years of careful study and research by the author. Non-technical, written so you can understand it. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Never operate a receiving set in the cellar or other damp place.

Gold Plated Aerials

Gold-plated wire for the antenna is the latest for the utmost efficiency. R. H. G. Mathews, of Chicago, central division manager of the American Radio Relay League and one of the best known amateurs in America, uses gold-plated wire to avoid corrosion, which increases skin resistance and so lowers efficiency.

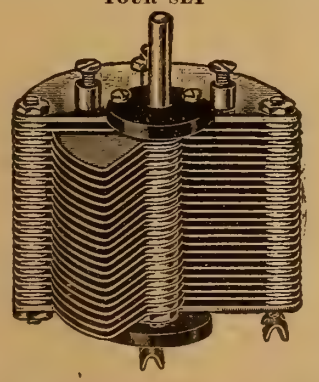
Never use oilcloth as a cover for the table on which a Radio is placed. It acts as a conductor.

FORMICA
A Laminated Phenolic Condensation Product
SHEETS TUBES RODS
RADIO PANELS
POLISHED BLACK FINISH
CUT PERFECTLY SQUARE TO ANY SIZE

1/32"	THICK	1/2¢ PER SQ. INCH
1/16"	THICK	3/4¢ PER SQ. INCH
3/32"	THICK	1¢ PER SQ. INCH
1/8"	THICK	1 1/2¢ PER SQ. INCH
3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2 1/2¢ PER SQ. INCH
3/8"	THICK	4¢ PER SQ. INCH
1/2"	THICK	5 1/4¢ PER SQ. INCH

SEND FOR COMPLETE PRICE LIST
PROMPT ATTENTION TO MAIL ORDERS
DEALERS PRICES ON APPLICATION
STARRETT MFG. CO.
519 SOUTH GREEN ST. CHICAGO

INCREASE YOUR RANGE
BY ADDING A PERFECTLY CONSTRUCTED VARIABLE CONDENSER TO YOUR SET



11 PLATE.....$1.25
23 PLATE..... 1.40
43 PLATE..... 1.75

Mail Orders Filled Same Day
Postage Extra No Personal Checks Accepted
B. K. Ford & Co. 4343 West Fifth Avenue CHICAGO, ILL.

ALL AMERICAN
AUDIO TRANSFORMERS

10-1 for 1st stage	$4.75
5-1 for 2nd stage	4.75
3-1 for 3rd stage	4.50

REAL DEALER DISCOUNTS
DUNGAN RADIO CO.
68 WEST WASHINGTON ST., CHICAGO

Largest Radio Store in America

RADIO

BUY HERE FOR LESS

Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set.
Complete $11.45

Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loud speaker or phonograph can be used in place of head-set. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel.
Complete $12.45

Moulded Variometers	$3.45	Brandes Superior Headset	$5.75
180° Moulded Varicouplers	$3.45	Phone Connectors (take 4 sets of phones)	.35c
Mahogany Variometers	$1.95	Antenella Aerial Plug	$1.15
180° Bakelite Varicouplers	$1.75	3 Coil Honeycomb Mounting	$3.45
Freshman Variable Grid Leak and Condenser	75c	2 Coil Honeycomb Mounting	$2.60
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35	WD-11 Bakelite Sockets	50c
Master Baldwin Type C Units with Cord	$3.95	4 (Four) Way Plug	$1.35
Master Baldwin Type C Head Sets	$6.95	Barchass Coils	$1.95
		Firth Cord Tip Plugs	60c
		Thordarson Amplifying Transformers	$2.45

Complete Knockdown Receiving Set

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial..... $17.95

Complete Parts for Flewelling Circuit

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set.
Complete $12.45

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now.....$1.75
$3.70 Value, 23 PLATE, now.....$1.45
$3.30 Value, 11 PLATE, now.....$1.35
$3.10 Value, 5 PLATE, now.....$1.25
$2.70 Value, 3 PLATE, now.....$1.15

U. S. A. Signal Corps Aviation Type 194-W Western Electric Phones, $7.95

Each Phone Cap is covered with large soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at..... $9.95
Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special $4.65

3000 Ohm GUARANTEED HEADSETS, $8.50 Value..... $3.65

FEDERAL JACKS—Filament Control Single Circuit..... 35c
Filament Control Double Circuit..... 50c

MAGNAVOX LOUD SPEAKER, Type R3..... $34.95

HONEYCOMB COILS

1,500 Turns	$1.50	Rheostats	.45c	Lightning Arresters	.95c
1,250 Turns	1.50	Sponge Rubber Ear Caps, Pair	.50c	2-Slide Tuning Coils, at	$1.95
1,000 Turns	1.25	Dials, 2, 3 and 3½ inch	.25c	Phone Caps, for mostly all phones	.25c
750 Turns	1.00	Grewol Detectors	$1.65	Signal Cps, Hot Wire Ammeters, at	$5.45
250 Turns	75c	Signal Corps Super Sensitive Microphone Transmitters	$2.45	Anti-Capacity Switches	$1.50
150 Turns	60c	Solid Copper Aerial Wire, 100 ft.	.35c	Lightning Switches	$2.65
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor   Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly..................$5.00 | Foreign..................$6.00
Single Copies, 10 Cents

Vol. IV   Chicago, Saturday, March 17, 1923   No. 10

Radio Controlled Airplanes

Tremendous Possibilities for Quick Action of Planes

RADIO controls an airplane in a six-hour flight. Not a soul on board but yet the ether waves from the ground turned the trick. Does this seemingly unimportant news dispatch from France have any meaning to you?

Major General Patrick, chief of the U. S. air forces, recently stated that Radio controlled planes would be common in this country before long. That being the case, the lives of many U. S. military pilots will be lengthened considerably. Nowadays, eight years is about the maximum life of our military fliers. They are often maimed for life long before the eight years are up. Radio will prolong the lives of the pilots and make military aviation a more attractive career for youths looking forward to imitating Methuselah.

Snowbound Farmers

Shut in by Large Drifts, Radio Relieves Monotony

MANY persons living in the country who looked upon Radio as a plaything are now well convinced that broadcasting is a real utility. Recently an eastern state was almost buried under snow. The cities were able to cope with the snow after a fashion, but the country was practically isolated, especially after the wind churned up the snow and drifted roads as rapidly as shovelers and tractors opened them. The farmer was snowed in. Rural mail carriers found it impossible to get through for days. In some cases the telephone lines were temporarily out of commission. Notwithstanding his isolation the farmer with a Radio receiving set was able to get the news of the day.

Ether Etiquette

The Right of One's Neighbor Should Be Considered

THERE is a certain code of action in every sport, one that is intended to permit the greatest number to enjoy that sport. In the theater, hats are removed. The person who stands in his seat at a ball game is soon requested with "down in front," and if he does not "down" he is apt to be downed. Persons who are noisy during a symphony concert are asked to leave. If you think the matter over for a moment you will appreciate that corresponding features exist in Radio broadcast reception and that "listening in" must be played as a gentlemen's game.

Every Radio receiving station consists of an antenna of some description connected to some type of receiving apparatus. The antenna intercepts and absorbs from the passing magnetic waves a certain amount of energy. This amount will vary with the type of receiver used, the operation of receiver, the size of the antenna and overall the efficiency of the receiving set.

Listeners employing crystal sets can do a great deal of good for other listeners by detuning their sets when they are in use. It is not necessary to disturb the adjustment of the crystal to do this. Merely turn your tune dial or knob, or place your tuning coil sliders to either end of their scales and your set will not absorb the energy that other listeners in wish to pick up.

Most regenerative receivers become miniature transmitters when the regeneration control is placed at a point where the receiver will oscillate. Waves radiated from a station using a receiver in this way can be picked up several blocks away by other regenerative sets.

Every Radiophan has heard the faint whistles and squeals moving over the scales of their sets, spoiling the reception of distant concerts. These whistles are caused by thoughtless fans receiving signals while their sets oscillate. These listeners find the station with their detector tube oscillating and then, by careful adjustment, lower the "beat note" to zero. By keeping the receiver at this central adjustment it is possible to receive signals with the detector tube oscillating. Since the slightest change in either the transmitting station's wave length or the receiving station's antenna or adjustments will cause a growl or squeal, this method is to be discouraged as most impolite and unsportsmanlike.

Condensed

By DIELECTRIC

Is there any special significance in the fact of thirty-four broadcasting stations failing to renew their licenses to broadcast during the month of January? Are there already enough stations operating to fulfill the needs of the Radio audiences of the country? Everyone of you knows that there are too many using the ether now, on the present allotment of wave lengths. Even with the benefits to come with the ultimate passage of the White bill, it would seem desirable to eliminate some of the less efficient broadcasting stations. We have passed the stage of quantity requirements and entered the quality era. Very few fans are content merely to hear "something." The letter printed in Radio Digest from Rochester, N. Y., is an indication of the modern trend of listeners in away from the cut-and-dried character of program. Something of the 400-meter station requirements must be made to apply to all stations in the very near future.

Homesickness, at least, may be reduced to a minimum by copying the plan of Station WWJ, which proposes to install a receiving set on the S. S. Pastores of the United Fruit Company, so that the passengers (from Detroit) may have the home news daily on their cruise to the tropics. This plan would no doubt work well aboard other vessels within a broadcasting radius of the home station. But what about that other dread malady often accompanying sea travel? If Radio can be used to prevent seasickness as well, then it will be a boon to a large number of voyagers. A reflex circuit might tend to stabilize the undue amount of oscillation set up in the feed-back system of a passenger in a rough sea. The details of this Radio specific I shall leave to some medical fan.

Radiophans in Chicago are going at the silent period program with a vengeance. They first proposed an ordinance compelling one night a week of silence on the part of local broadcasters, so that DX work might pursue its course undisturbed. It looked a little dubious to me, however, since the measure was referred to the committee on "gas." That is the subject in hand, but most such committees favor the gas-er rather than the gas-ee. However, the local plants have agreed on a silent Monday night without recourse to an ordinance. It only goes to show how determined we fans can be to gain our end. "Silence, and mighty little of that," has been the slogan of the vast majority of broadcasting stations, though I'm glad to say that quite a few have lately acceded to the popular demand without being coerced in such forceful manner. It will come to all of us eventually. In the meantime Radio Golf suffers in some quarters.

What becomes of the Radiowl in the light of this warning from the Department of Commerce? Surely the reading of letters and telegrams from Screech and Hoot owls is in contravention to the rule against acknowledging such messages by broadcasting. It is not alone the clan to which I have referred as violating this rule to whom all censure is due. There are many stations in the habit of reading communications from listeners in. This is uninteresting to most of us, as a matter of fact, and probably pleases only those whose names are being read. The revocation of licenses is a stern measure—but enforceable.

I believe much good is to come as the result of the activity of the National Radio Chamber of Commerce. This body is concerned with improving the character of broadcasting programs by eliminating much that is trivial and without real value to the main Radio public. Whether or not it should come within the scope of this organization to use its influence to debar questionable matter from the air, I do not know. That such matter is being broadcast I do know, having heard it. It may be assumed that children should be in bed while these vaudeville skits are being sent out. Quite likely. There are some adults to whom alleged witticisms carry considerable nauseating effects. Of course with the audience in the hall we are not concerned, but the larger audience wishing to hear something worthwhile and clean can hardly be expected to tune in culpable stations as frequently as would otherwise be the case. Before a number of invited guests expectantly awaiting what should come from the loudspeaker, such incidents are not helpful to the game.

Another distance record has been established by Station WHAZ, the Rennselaer Polytechnic Institute, at Troy, N. Y., and one by an amateur, A. G. Leonard, Jr., of this city. In the first instance, concert programs were received in New Zealand over a distance of 10,000 miles, both speech and music being clearly received. Mr. Leonard's record is quite noteworthy for a 200-meter station. His voice was heard by the operator of the Awaru station, at Invercargill, New Zealand, a distance of 8,000 miles. The voice was said to be very plain though weak, while the CW messages were clear and strong. These records are multiplying rapidly and you can look for a new one most any day.

Two large audiences heard speeches simultaneously, the one in Chicago and the other in New York, by means of telephonic communication, while at the same time a much larger audience was listening in to the proceedings through their receiving sets. Honor was paid to the memory and contributions of Dr. Alexander Graham Bell to telephonic development. Radio development has not yet reached the point where a two-way conversation may be carried on between two stations privately. Scientists are working out the principles involved but have not succeeded so far in attaining the desired end. Much that has seemed impossible is now a reality, so that this difficult problem may be solved and become a practical phase of Radiophony.

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

But What's in a Name?

Dear Indi—

Glancing over some of the programs of the multitudinous broadcast plants, I fain would report that Mrs. Pipes plays (the violin, not the organ) for KGW, Arthur Bean is served Seattle fans a la ether, and Mr. Head and Mr. Stern are now featured at one of the Atlantic Seaboard stations. Oh, yes, Mr. Story recently told a fairy tale for the children listeners of WGI.

—INDIPHAN.

Oh Ladio!

I called my love by Radio,
  In hopes that she would hear;
I asked her if she'd marry me,
  And closed it, "Billy Dear."

Oh! sad is my predicament—
  Indeed a sorry mess;
When I tuned in my receiving set
  I heard forty answer, "Yes!"

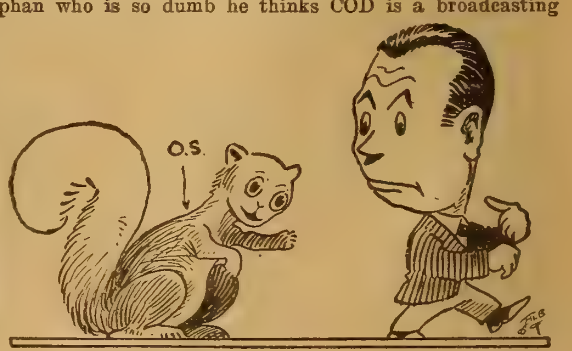
—LORD JEFF.

Here's an Old One in a New Setting

A director of a broadcasting station was asked by a prospective user of the service what the charge was. "One hundred dollars for the first ten minutes" was the answer. "All right," said the prospect, "we'll skip the first ten minutes."

His Type Cornered All the Gold Bricks

The Office Squirrell sez he heard of a so-called Radiophan who is so dumb he thinks COD is a broadcasting



station. Said dumbbell also thinks all noises other than music are created by the died-in-the-wool DX worker next door who has only been "in Radio" for ten years or more.

O. O. McIntyre, the famous New York writer, recently said, "Talking by Radio is just like talking into a knot hole."

—G. C. C. JR.

A. B. C. Lessons for Radio Beginners

Chapter XI—The Vacuum Tube as an Amplifier

By Arthur G. Mohaupt

AMPLIFICATION in Radio refers to strengthening or increasing the intensity of the signals received and detected. Prior to the perfection of the three-electrode vacuum tube, numerous attempts had been made to produce or develop some amplifier device, but all attempts were without real success. With the advent of the vacuum tube, however, the problem was solved quickly, for not only can the vacuum tube be used as a detector of Radio signals, but under the proper conditions can also be used as an amplifier of the rectified oscillations existing in the output or plate circuit of the detector tube. Exactly how this can be accomplished will now be explained.

The Vacuum Tube as an Amplifier

Although the average detector tube can also be used as an amplifier with some degree of success, better results can be obtained if a specially prepared tube, known as an amplifier tube, is employed. Although an amplifier tube greatly resembles a detector tube in its mechanical construction, it differs, however, in that a much higher vacuum exists within the amplifier tube. In fact, the degree of vacuum is practically as high as can be obtained with modern exhausting apparatus.

On account of this higher vacuum the amplifier tube is often referred to as a "hard tube" to distinguish it from the soft detector tube in which there are still small quantities of gas left. The higher vacuum makes it possible to employ a much higher plate pressure, and hence the oscillations impressed on the grid can be greatly amplified without in any way distorting or altering the nature of the signals.

General Operation of Tube

In order to understand fully how a three-electrode vacuum tube adds as an amplifier, let us review briefly the general operation. We will remember that as the filament of a tube is heated, negatively charged electrons are emitted which fill the interior of the tube. If then a positive potential is applied to the plate from some source of electrical energy, such as a group of dry cells, the electrons are attracted toward the plate and render the intervening space a good conductor of electricity.

A current can then flow in the plate circuit, the energy being supplied by the dry cells. Between the filament and the plate is the grid in the form of a screw or woven network of fine wires. The electrical condition of this intervening grid has the ability to control the electronic emission and hence also the flow of current in the plate circuit.

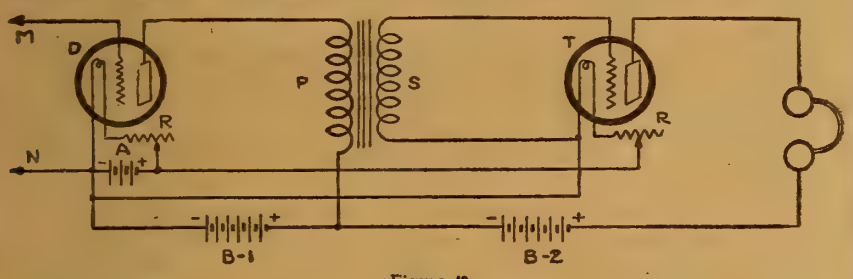


Figure 40

If the grid is negatively charged, it repels some of the electrons back upon the filament and thus weakens the plate current. On the other hand, if the grid is charged positively, it attracts the electrons on their way to the filament, increases the number that are emitted from the filament, and in this manner strengthens the current flowing in the plate circuit.

Detector and Amplifier Action

That the tube may function as a detector or rectifier of electrical oscillations, the relative electrical conditions of the three elements or electrodes has to be such that a positive charge on the grid produces a greater increase in plate current flow than the decrease in plate current flow caused by an equal negative charge.

In this manner a unidirectional pulsating current is set up in the plate circuit, and the envelope of these direct current oscillations correspond in all details to the electrical oscillations that are initially sent out at the transmitting station.

That the tube may act as an amplifier of electrical oscillations, the relative electrical conditions of the three electrodes must be slightly different. The conditions must be such that equal positive and negative variations of the grid potential will cause correspondingly equal increases and decreases in the plate circuit current. This state of affairs is effected by applying a higher positive pressure to the plate of the tube. If the increases in plate current were greater or less than the decreases, the signals would be distorted and the sounds heard would not be very pleasant.

Increase and Decrease in Plate Current

If then, an alternating electromotive force is impressed upon the input circuit of the amplifier, that is, across its filament and grid, the positive and negative voltage alternations will cause corresponding increases and decreases in the plate circuit current—with the difference, however, that the intensity of the electrical oscillations in the plate circuit is much greater than that of the oscillations initially impressed upon the plate and grid. The necessary additional energy is supplied by the battery supplying the high plate pressure.

The alternating electromotive for operating the input circuit of the amplifier tube is generally obtained by means of a transformer connected into the output circuit of the detector tube. This transformer is of the step-up type, so that the change of voltage impressed on the grid will be as high as is practically possible. Very slight, practically no current is required to affect the grid, and hence large voltage variations can be created in the plate circuit by supplying only minute quantities of energy to the grid circuit. It is for this reason that the three-electrode vacuum tube can be used so effectively as an amplifier of electrical oscillations.

Connections for Amplifying Tube

In Figure 40 is shown a wiring diagram illustrating the scheme of connections used when an amplifying tube is used in connection with a transformer for amplifying the electrical oscillations in the output circuit of a detector tube. D is the detector tube with the connections M and N leading to the turner. In the plate or output circuit, instead of having the telephone receiver, we have the primary winding of an iron-core step-up transformer. The secondary of this transformer, in turn, is connected across the filament and grid of the amplifier tube T. Into the plate circuit of this tube the telephone receivers are then connected in series with the high-voltage battery B-2.

The circuit arrangement operates in the following manner:

When the receiving apparatus is tuned to the frequency of the incoming electrical oscillations, these are impressed upon the filament and grid where they undergo rectification and are reduced to oscillations at an audio frequency. These audio frequency oscillations are then sent into the primary of the transformer and induce current oscillations of a much greater potential in the secondary circuit. These oscillations are then impressed upon the filament and grid of the amplifier tube T. Here they cause corresponding fluctuations in the plate circuit current, but since the battery B-2 is capable of supplying additional energy, the electrical oscillations are of much greater intensity and hence are capable of affecting the telephone receivers so that louder sounds are produced in them.

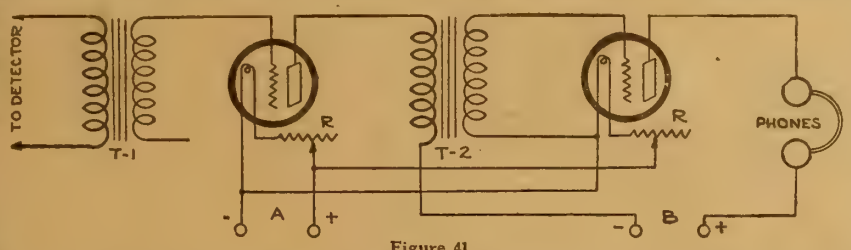


Figure 41

In case one amplifier tube does not produce sufficient amplification, a second one can be used, but it is seldom advisable to employ more than two, for otherwise undesirable distortion of the signals is likely to result.

Kinds of Amplification

Amplification in Radio circuits can be effected in several ways. The first method was explained in the previous paragraphs, and consists of sending the electrical oscillations in the output circuit of the detector tube into one or more amplifier tubes until the desired strength of signals is obtained. This method of amplification is known as "cascade amplification," for the amplifier tubes are said to be connected in cascade—the word cascade meaning one on top or above the other. It is seldom advisable, however, to employ more than two stages of such cascade amplification, for as was stated, undersirable distortion of the signals is otherwise likely to result.

This method of amplifying the audio frequency oscillations of the output circuit of the detector tube is also commonly referred to as audio frequency amplification since it affects or amplifies the audio frequency oscillations.

Connecting Amplifying Tube in Cascade

In Figure 41 is illustrated the method of connecting two amplifier tubes in cascade. Such an arrangement is known as a two-step or two-stage amplifier. As is shown, the output circuit of the detector tube is connected through an audio-frequency transformer to the input circuit of the first amplifier tube. Into the plate circuit of this amplifier tube is connected the primary of a second audio frequency transformer, and the secondary of this transformer is in turn connected into the input circuit of the second am-

(Continued on page 12)

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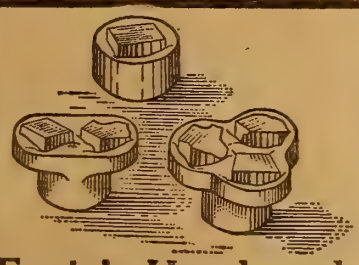

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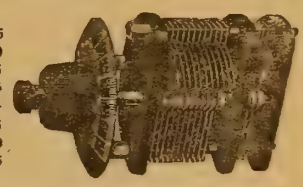

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Tapped Coil and Variocoupler Circuit

Feed Back Produced by Two Coils on One Tube

The materials necessary to make the hook-up shown in the accompanying illustration consist of one variocoupler, one 43-plate condenser, one tapped coil on a tube three inches in diameter and 12 inches long, one detector unit and other accessories such as B battery, headset, etc.

In a way the circuit is critical. The secondary of the coupler must be turned until regeneration is obtained. When once at this point, the set can be left alone, but still it will tune out the little fellow. The tapped coil consists of two separate coils, wound in the same direction but not connected. They are each tapped. About 40 turns of No. 16 or 18 wire is used for the aerial inductance. The upper portion should be the aerial inductance, and the lower the plate feed back.—Willard Tolhis, Bethesda, O.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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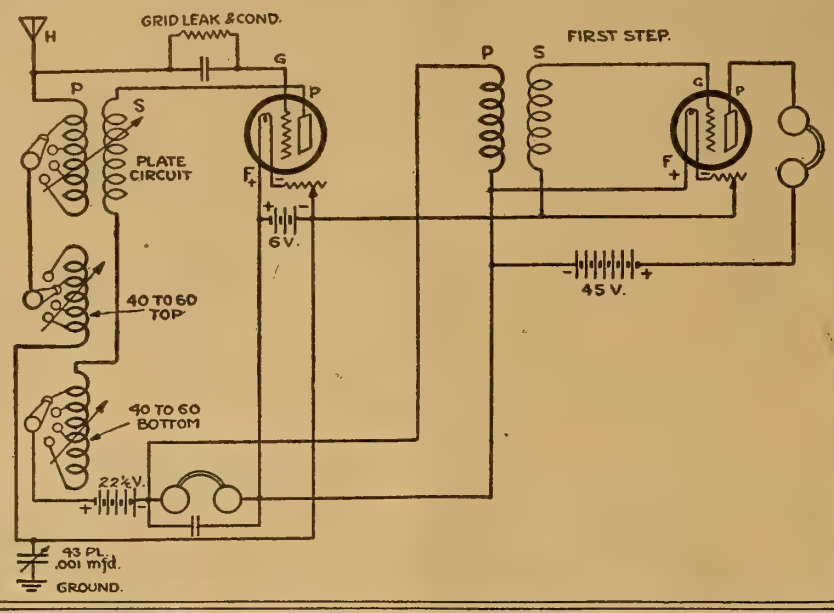
HOOK-UP FOR SELECTIVE TUNING



A. B. C. LESSONS

(Continued from page 11)

plifier tube. Into the output circuit of this tube the telephone receivers are connected in series with the battery B-2.

As was stated before, a higher plate pressure is needed for amplifier tubes than is required for detector tubes. The B batteries used in amplifier circuits generally have a pressure of 45 volts, although pressures even as high as 67 and 90 volts are sometimes used. Often a single 45-volt B battery is used with a 22½-volt tap, the plate circuit of the detector tube being connected to this tap while the plate circuit of the amplifier tubes is connected to the 45-volt terminal.

Audio Frequency Transformers

The transformers used for linking the output circuit with the input circuit of the next amplifier tube are known as audio frequency transformers, for they are used to step-up the voltage of the audio frequency electrical oscillations impressed across the primary winding.

The number of times that a transformer steps up the voltage depends upon the relative number of turns in the secondary and primary windings. Transformers are consequently rated according to the number of times they step up the voltage, this factor being termed the transformation Radio. A 10 to 1 transformer steps up the voltage ten times. It also has ten times as many turns on the secondary winding as on the primary winding.

Whenever two stages of audio frequency amplification are employed, it is better to use two transformers having a different votage ratio, especially if the ratio of the first is high. If the first transformer has a 10 to 1 ratio, it is better to use for the second transformer one having a ratio of 5 or 3 to 1. However, equally good results can be obtained, and some claim even better, if two transformers of the same ratio are used, providing the transformation ratio is not too high. Thus, very good results can be obtained by using two transformers each having a 5 to 1 ratio.

Radio Frequency Amplification

Often when the receiving apparatus is not very sensitive, or when the transmitting station is so far away that the incoming waves are too weak to properly affect the detector, it is possible to strengthen or amplify these signals before they reach the detector tube. Such amplification is known as Radio-frequency amplification, for the oscillations that are being strengthened or amplified are still at a Radio frequency.

The same amplifier tubes as were used for audio-frequency amplification can also be used for Radio frequency amplification. However, any number of steps of Radio-frequency amplification can be used without in any way affecting the quality of the signals. The successive steps of Radio-frequency amplifiers can be linked to each other in several ways, although Radio-frequency transformers are most commonly used. These transformers differ from the audio-frequency transformers mentioned above in that they do not contain an iron core.

Regenerative Amplification

Another form of amplification used very extensively is that known as regeneration or regenerative amplification.

In regenerative amplification the plate circuit of the detector tube is tuned by means of some form of inductance, such as a variometer, until it has exactly the same oscillation frequency as that of the incoming waves. Under these conditions some of the energy of the plate circuit is actually fed-back upon the grid circuit, with the result that it is again sent through the detector tube and amplified to a large extent.

Each of these methods of amplification will be taken up in detail in later chapters, where practical instructions will also be given for constructing the various types of amplifiers.

Chapter Twelve

The practical construction of a two-stage audio frequency amplifier, as well as a detector employing regenerative amplification will be taken up in Chapter Twelve. Everyone interested in the constructure of either of these circuits should not miss this most important chapter.

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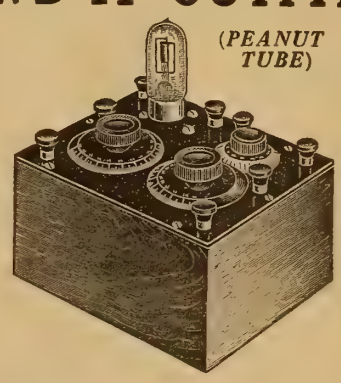
S. A. Twitchell, 1925 Western Ave., Minneapolis, Minn.

WD-11 OUTFIT



This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire, screws and picture diagram for wiring, all at above price.

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Double green silk wire on polished Bakelite spider, $1.95; Reinartz plate circuit chokes (triple adjustable), $1.70. Special Reinartz Audio Transformer with diagram, $3.35. Complete set Reinartz tuner and detector parts, $10.65. Tuner Det. and 2 stage parts, $17.95. 2 stage outfit, $8.35.

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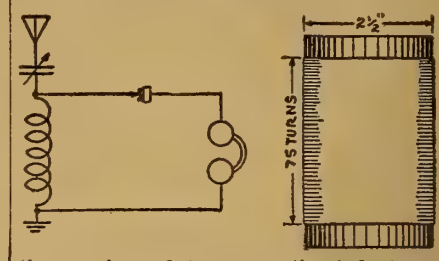
One Knob Control for Tuning a Crystal Set

The set described is tuned completely by means of a variable condenser, the inductance being fixed. The detector may be of any make, but I would suggest the use of a Grewol. The variable condenser is of the Crosley make, which is in the form of a book. The antenna is 300 feet long and 50 feet high, and the inductance consists of a 2½-inch cardboard tube wound with 75 turns of magnet wire.

Of course, if the antenna is shortened,



the number of turns on the inductance must be increased. With this set the writer has heard all of the local stations as well as WBAP, Fort Worth, Texas, which is 250 miles distant. Two other stations were easily heard, WDAF, a powerful station in Kansas City, Mo., 650 miles away, and WFAA of Dallas, Texas.—Milton Hobbs, Houston, Texas.

IMPROVED RADIO DETECTOR TUBES	$2.75
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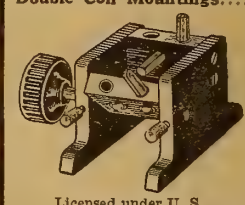

A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in.

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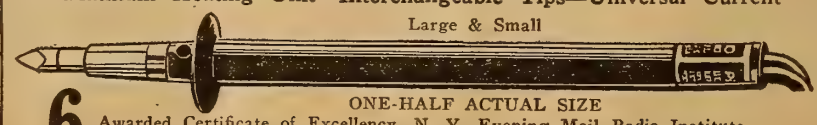

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Questions and Answers

Patent Situation

(1799) GLR, Newport News, Va.

The Flewelling circuit, featured in your paper, presents some interesting aspects for marketing in this city. We must cover distance here, the nearest broadcasting station being over one hundred miles, and the price of the instrument must be within reach of the average pocketbook. The Flewelling tuner meets these requirements.

We are anxious to manufacture and market such a tuner and would like some information regarding the legal side of this circuit. What would be necessary in order to build and market this instrument complete? Could this instrument be sold completely assembled with the exception of the wiring (directions for wiring and operating to be furnished with set) without infringing on any patents? We would also like to know if instruments such as the single circuit with tickler coil regeneration could be sold assembled but not wired, or with everything except the plate circuit wired?

A.—Armstrong undoubtedly may, in time, get his patent on the super-regenerative principle. This patent may take two years to be adjudicated. Whether the circuit is super-regenerative has been questioned. Regardless, Flewelling has applied for patent rights.

Therefore, direct and complete manufacture of the set for sale would render you liable for infringement.

However, sale of the parts, or the parts assembled except for the wiring, should not constitute an infringement. Directions for completing the wiring may also be sold legally.

This same treatment is, I am sure, applicable to any other patented circuit.

If you will read the main front page story in the December 23rd issue, you will learn some few points of interest to you and regarding some Radio patents.

Plate Voltage of Flewelling

(2209) VH, Geneseo, Ill.

In the description of the Flewelling circuit which was given in the Radio Digest for October 21, 1922, the statement was made that the plate voltage could vary from 18 to 250 volts, but that 110 volts was very good. Beginners in the construction of Radio receiving sets, who had decided that they would make a "flivver," might think this meant that the 110 volt lighting current would work, if it was direct current; in fact, the wording of the sentence suggests that very thing. However, such a connection would prove disastrous because the high amperage of the lighting circuit would scatter the bulb over the landscape. In this same connection, do not use ignition or telephone dry cells in the construction of a B battery, because their amperage is also too high.

A.—Noting your criticism of grammatical construction in description of plate voltage employed in Flewelling circuit as described in October 21st issue of Radio Digest, we do not detect any ambiguity and even though it were misinterpreted as suggested no greater damage than the possible blowing of a fuse would result. However, you are correct in statement that it wouldn't work.

Indoor Antenna

(2223) JLP, Wamego, Kan.

I have assembled a receiving set consisting of detector and two stages audio amplification and have had very satisfactory results with it. My antenna is about 130 feet long and 40 feet high and built of stranded wire. I have received practically every large station in the United States, including KHJ at Los Angeles, KDKA at Pittsburgh, WGY at Schenectady, WJZ at Newark, etc., and have also received Havana PWX. I have been able to run these stations through my loud speaker very satisfactorily.

In experimenting with an indoor antenna I put up one of stranded wire on the ceiling, the wire being about 12 feet above the ground level. By altering a few connections I received the following: WLW at Cincinnati, WBAP at Fort Worth, WFAA at Dallas, WOC at Davenport, DN4 at Denver, KHJ at Los Angeles, WSB at Atlanta, and WLAG at Minneapolis. All these were received the same evening on the detector and one stage audio frequency. They came in just as strong and clearer than with the outside antenna hooked up as before.

I would like to know if these are unusual results with an indoor antenna such as I have described. If it is unusual it is on account of the different hookup I discovered experimenting with the new antenna. Being a reader of several Radio magazines I thought you would be the most responsible authority on this subject. I will certainly appreciate any information you can give me and will advise of any further developments I might find to advance the science of Radio.

A.—In our opinion the reception you have accomplished under experimentation with an indoor antenna is much beyond the usual and worthy of congratulation. Many of the most valuable contributions to the science of Radio have come from amateur operators and Radio is indebted to a great extent to such for its present benefits.

Dry Batteries on Crystal Set

(2322) LB, Bonner Springs, Kan.

Will a few dry batteries improve the wave lengths of my crystal detector set? If so, please tell me how to connect them to it.

A.—The employment of dry cell batteries, or any other kind of battery, has absolutely no effect upon wave length range.

Loop Aerial

(2117) RPJ, Clinton, Ill.

Will you please answer through your column of the Radio Digest, what size wire, and how large should a loop aerial be made.

A.—A three foot square frame having six or eight turns of number fourteen wire, spaced one-half inch apart makes an effective loop aerial.

Plate Voltage on WD-11

(2053) AVH, Oelwein, Ia.

Please advise how much Plate or B battery to use on the WD-11—dry cell tube in the Flewelling circuit?

A.—Answering your inquiry would advise that about forty-five volts are sufficient plate voltage for WD-11 tubes.

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VARIABLE RESISTANCE LEAK

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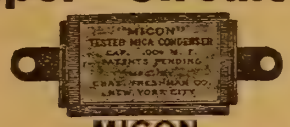

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"All Wave" Coupler

TRADE MARK

Wave Length—150 to 3,000 Meters

Why Be Confined

To listening in on nearby stations, when the "All Wave" coupler in your set will enable you to receive broadcast reception from stations thousands of miles distant?

Be Prepared

To receive on the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever increasing number.

THE "ALL WAVE" COUPLER COMBINES

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SIMPLICITY OF EFFICIENCY

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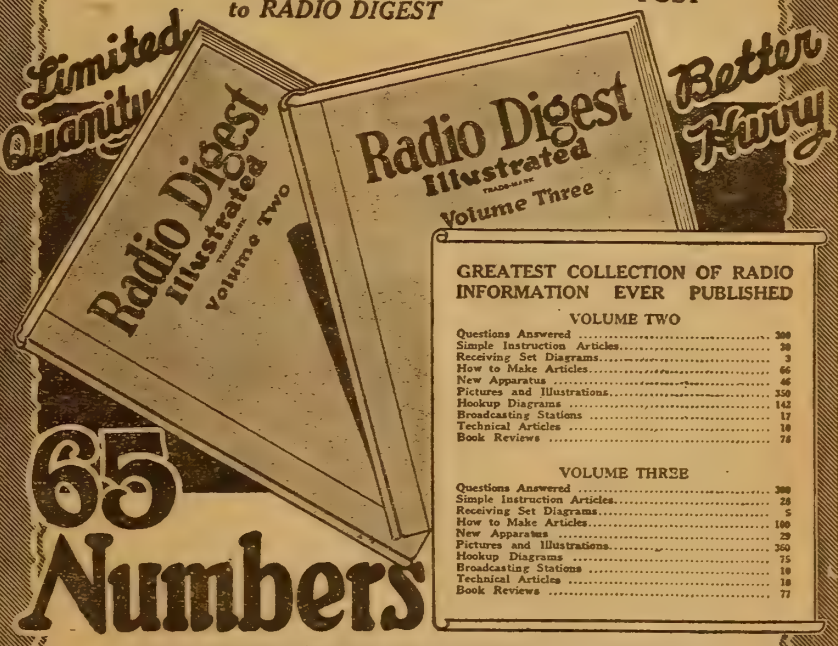

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Radio Illustriated

Andree Lafayette, descendant of the famous General, is shown here listening in on a set at the Permanent Radio Show at the Hotel Imperial, New York City. Mlle. Lafayette is a great granddaughter of that historic beauty, the Countess Valtesse de la Bigne. A message was received at the time from Station KWA, Los Angeles © U. & U.

An informal ten-minute talk by Bernays Johnson from the Wanamaker Station WOO on Radio minerals and how to operate a loud speaker on a crystal set brought forth the world's record of 5,600 letters. This is by far the largest number of letters received by any station in response to a short talk of any nature

A new transmitter invented by Dr. Phillips Thomas. With this transmitter it is said that music and other sounds are broadcast exactly as produced. In this transmitter the new diaphragm takes the place of the usual form. A minute electrical discharge takes the place of the mechanical disk. It is affected by the sound waves just like the diaphragm and responds well to all vibrations

All broadcasting stations throughout the nation are adopting some means of designating their stations by means of a slogan, chime bells or a whistle. From the great Southwest where the cattle roam the prairies comes the jingle of cow bells. The illustration shows these bells that sound out their tones from Station WBAP at Fort Worth, Texas

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Ultra Reinartz, Reflex and Flewelling Circuits

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF.

Vol. IV | Copyright, 1923 R. D. P. Co. Inc. | CHICAGO, ILL., SATURDAY, MARCH 24, 1923 | No. 11

RADIO BRINGS HEALTH

WHAS PLANT BUILDS BODY VIA AIRPHONE

Health Broadcasting from Louisville Station Becomes Popular Feature

Aids Physical Culture

Charts Help to Secure Results from Body-Building Program

(By Special Correspondent)

LOUISVILLE, KY.—Physical culture enthusiasts and other persons seeking to regain their health are now enabled to do their "daily dozen" to the commands that come over the ether from WHAS, the Courier-Journal station of this city. This was an innovation and novel form of entertainment that proved quite satisfactory to physical directors when first instituted on the phonograph records. But now science has given the people who would be healthy one step farther to go.

The lessons in physical culture along with setting-up exercises are broadcast by the Courier-Journal station each evening, excepting Sundays, at nine o'clock and last for the best part of an hour. The exercises are directed by Charles L. Shontz, physical director of the Louisville Y. M. C. A.

Allow Use of Headset

Mr. Shontz has selected and put in use a series of movements that are well-adapted to one wearing headphones. This in itself was one of the largest features to be worked out of the project. The movements to be used had to be selected to give the average person the greatest benefit in the least time or it was feared that the public would soon tire of the lessons.

Also the question of the connecting cord of the headset figured in. The exercises had to be selected so that one would not become humorously entangled in the receiver connection.

Publish Charts for Listeners

To allow listeners the maximum advantage of the broadcast health, the Courier-Journal and the Louisville Times have published charts showing eighteen positions to be used in following the Radio exercises. With the illustrations of the various movements are directions and explanations for taking the exercises.

(Continued on page 2)

JANESVILLE FAN GETS 2LO–LONDON STATION

JANESVILLE, WIS.—Dr. Stewart F. Richards, of Janesville, is the first Radiophan in this section of the country to tune in 2LO, London, England, successfully. Dr. Richards had the British station on two successive days. The feat was accomplished on a regenerative tuner using two stages of Audio frequency and a loud speaker. Reception was said to be very clear.

It is hardly necessary to tell you the charming lady at the right is Anna Q. Nilsson, for surely by this time you have seen her in "The Isle of Lost Ships," her latest movie. It was while working in this production that Anna turned Radiophan and now she can tell you the call of any station on the Pacific coast. Below is Mrs. Pearl Calhoon, a popular star at WBAP

TRADE COMMISSION WILL INVESTIGATE

Formal Order Is Issued to Make Inquiry of Alleged Monopoly

(Special to RADIO DIGEST)

WASHINGTON, D. C.—The Federal Trade Commission has formally ordered an investigation of Radio patents and an alleged monopoly, as called for by the White resolution which passed the House during the last days of Congress.

An official copy of the resolution was submitted to the commission on Friday, when the commission formally ordered an investigation. The rest of the matter is merely routine and it is not probable that a report will be made public until the next session of Congress convenes.

EGYPTIAN CONCERT IS GIVEN TO HONOR TUT

WJAX Zips Up Ether With Nile Flavored Jazz

CLEVELAND, O.—Songs of a distinctly Egyptian flavor, jazz with a regular Nile zip to it and to top it all off a travelog by Archie Bell, dramatic and music critic of the Cleveland News and News-Leader, world traveler and author, in which he told of his visit to the Valley of the Kings, marked the Cleveland News Radio concert in honor of King Tut broadcast recently from Station WJAX of the Union Trust company. As an added attraction in the "Radio night in Egypt," selections in the State Music Memory Contest were presented.

BUFFALO TO HAVE 1,250-WATT STATION

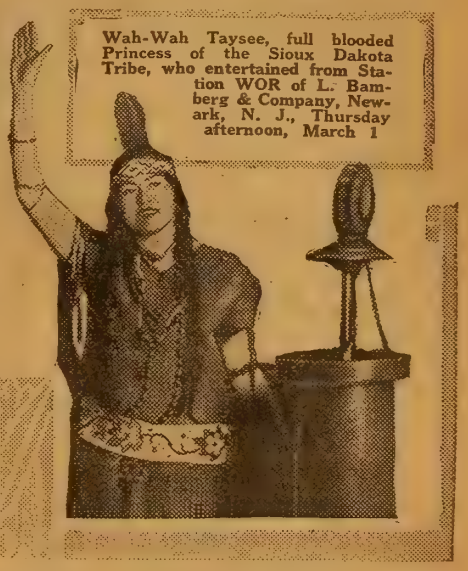
NEW PLANT SHOULD BE HEARD IN EUROPE

Will Have 1,000 Square Feet Space on Eighteenth Floor of New Hotel Statler

By Warner Bates

BUFFALO, N. Y.—The Federal Telephone & Telegraph Company of this city, will establish one of the most modern broadcasting stations in the United States atop the eighteen-story Hotel Statler that is just being finished here. The installation will be made in the early spring and it is anticipated that the sending apparatus to be constructed will be powerful enough to broadcast to Europe.

The Hotels Statler Company has allotted 1,000 feet of floor space on the eighteenth floor for the studio and reception room of the Federal Company and the power room broadcasting house will be above this, on the roof. The antenna will be hung between two large steel towers capable of withstanding a 90-mile gale, and will be visible for many miles around.



Wah-Wah Taysee, full blooded Princess of the Sioux Dakota Tribe, who entertained from Station WOR of L. Bamberg & Company, Newark, N. J., Thursday afternoon, March 1

To Use 1,250 Watts Power

The new set, now being designed by the engineering department of the Federal Telephone & Telegraph Company, will use

(Continued on page 2)

BOY DECIDES TO SKIP; FOUND BY BROADCAST

COLUMBUS, O.—Radio pulled a regular Sherlock Holmes trick, and as a result Charles Martin, aged eleven, son of Detective Clarence Martin, missing for the past week, is back home. A message sent out from a Columbus broadcasting station, giving a description of the missing youth, was picked up at a garage at South Bloomfield, where Charles was located.

BUREAU TRANSMITS TEST WAVE SIGNALS

FIRST "CHECK-UP" COVERS 1,000-MILE RADIUS

Government Is Enabling Fans to Standardize Wavemeters and Other Equipment

By L. M. Lamm

WASHINGTON, D. C.—The Bureau of Standards has been conducting preliminary tests to determine the practicability of regularly transmitting signals of known wave lengths. This has been followed by the bureau by the first regular transmission of such signals. The object of the work is to enable persons having Radio apparatus to standardize their wavemeters and other equipment.

The preliminary tests included wave length measurements by observers located within 1,000 miles of Washington, and demonstrated the practicability of transmitting such waves. In general, the results were in fair agreement, but differences as high as 7 per cent existed. Wavemeters must be in closer accord than this and it is hoped that this system of standard wave transmission will result in more accurate measurement and adjustment of Radio apparatus of all kinds.

Make First Transmission March 7

From the information obtained, it appeared desirable to transmit standard wave signals after 11:00 P. M. Eastern Standard Time, when broadcasting stations are through with their programs. Therefore, the first regular transmission of standard waves on March 6 and 7 took place from 11 P. M. to 1:30 A. M., and included wave lengths from 550 to 1,500 meters.

The general call for the transmission of standard wave lengths is "QST de WWV Standard Wave Signals" repeated and on the same frequency as the test signal. The standard wave signal is "WWV" repeated.

In the announcements, the wave length of the test signal is stated. The general call and announcements are made by both Radiophony and Radiotelegraphy. For the standard wave signal and for announcement by Radiotelegraphy, unmodulated continuous waves are used.

RESTORES HEALTH

(Continued from page 1)

The project is only one of the many achieved by Station WHAS in line with its policy of giving something a little better than that ordinarily heard by the invisible audience in the vicinity of Louisville. Credo Harris, director and manager of the station, is an idealist and has already done much toward the establishment of this reputation of the station.

Many Plants to Build Health

Some time ago, Station WGI, Medford Hillside, Mass., inaugurated the policy of transmitting setting-up exercises each morning. These were followed by weight increasing and then weight reducing exercises. The range of WGI, however, has been somewhat restricted to the New England states on account of the peculiar geological strata of that vicinity.

The wider range and larger audience of Station WHAS, it is believed, will popularize the Radiophone method of health-building. Several other stations have taken up the promotion of sports in their broadcast programs, and it is known that many of the plants are considering the upbuilding of the nation's health by the airphone.

Frisco Radio Show Will Open April 3

Exhibits Include Latest Developments and Inventions in Bath Receiving and Transmitting Apparatus

SAN FRANCISCO.—A complete Radio and Electrical show will open to the public Tuesday morning, April 3rd and will continue daily up to and including Sunday, April 8th. The entire Civic Auditorium here has been leased and arrangements for special display booth construction and decorations are under way.

The Radio Exhibits will include the latest inventions and developments in both receiving and transmitting equipment and everything electrical will be displayed from electrically heated curling irons to mammoth motors and power apparatus.

Special Features for Visitors

J. C. Johnson, local manager for the American Radio and Electrical Exposition Company, reports that display booths are being provided for 144 exhibitors. He stated that in addition to the exhibits, special features would be provided for the public education and entertainment. An entirely new program is promised for each day.

The Exposition has been endorsed by the Pacific Radio Trade Association, the California Stafe Association of Electrical Contractors and Dealers, the San Francisco Electrical Development League and the Electrical Contractors and Dealers Association of San Francisco.

Canadian Ether Cops Are on the Job to Check on Amateur Wave Lengths

Fans in Canada Are Given More Latitude Than in Any Other Country—Yet They Co-operate to Fullest Extent in Complying with Regulations on Transmission

"Free as the air we breathe" has its limitations since Canada's "ether cops" are on the job checking up Radio amateurs who start agitating the upper strata with their sending apparatus and incidentally straying from the straight and narrow path of their prescribed wave length.

Canada today has some 9,000 persons operating Radio outfits on receiving licenses and another 1,800 with transmitting licenses, in addition to the 50 licensed commercial stations which are operating in the Dominion. But with this number "in the air" at various times every day, there is little confusion or interference with commercial work, according to officials of the Radio Telegraphy Branch of the Department of Marine and Fisheries.

Every person operating a Radio outfit in the Dominion is required to take out a license, classified according to station. Receiving stations are on a flat license rate of one dollar per year, these licenses being secured through postoffices all over the Dominion. When sending licenses are issued the licensee is given a specified wave length on which he may transmit. Amateur transmission stations are thus kept down to a wave length which cannot interfere with the work of commercial stations.

In order to check the wave length which the amateur "fans" are using, inspectors have been appointed in cities of over 15,000 people, who work on a part time basis for a small salary and spend their evenings "listening in" to the various signals and gauging the wave lengths on which they are sent. These inspectors also deal with complaints from receiving stations whose work is interfered with by any amateur sender.

Some twenty-five of these "ether cops," as they are called, have thus far been appointed, and the results have more than justified the steps taken, according to officials at Ottawa. Amateur senders have cheerfully complied with the regulations, it is stated, and during the forbidden hours, 7:30 to 10 p. m., which are reserved for the larger stations sending concerts and similar material, there has of late been very little difficulty with persons who formerly delighted in "jazzing up the air" to the discomfiture of their hearers.

The expense of maintaining the "ether cops" brigade, which is composed chiefly of ex-service men who took up aerial communication work during the war, is more than met by the money received from license fees, it is stated at the Department, and as a result Canada probably suffers less from interference in aerial communication than any other country in the world. In many cases it has been found by investigation that when complaints against amateurs were received, the signals complained of really came from ships many hundreds of miles away, whose signals were clearly transmitted through some freak of atmospherical conditions.

Amateurs in Canada are given more latitude than in any other country where Radio has become popular, officials of the Department claim, and with this they have earned the respect of commercial senders everywhere by their adherence to the regulations under which they may work.

New licenses are being issued every day in great numbers, it is stated, and indications are that during the last few months more people have taken to Radio as a fad than had ever thought of it previously.

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Looking Ahead

The Second Prize Flewelling Set, designed by F. P. Hall, Owego, New York, will be described by Mr. Hall in the next issue of the Digest. Mr. Hall has shown very unique design and it will pay all Flewelling fans to read this article. The first prize winner, designed by Lawrence M. Blakey, student at Georgia Tech, will appear in the April 7 issue.

The Ultra Reinartz Receiver, Part II, next week will tell how to go about laying out the panel. This improved, long distanced receiving set, designed by H. J. Marx, has many advantages to its credit.

A-B-C Lessons for Beginners, Chapter Thirteen, next week will deal with Radio frequency amplification. The successful use of Radio frequency amplification demands a complete knowledge of its peculiar traits. Read A. G. Mohaupt's Chapter 12 in this issue and continue reading next week.

E. T. Flewelling in Part VIII of His Series, to appear next week, will describe the construction of a Flivver Super for both long and short wave reception.

The Only Complete and Weekly Directory of Broadcasting Stations appears in Radio Digest. Part I will appear next issue. The directory lists every broadcasting station in operation in Canada, Cuba, Alaska, Hawaii, Porto Rico, and, of course, the United States.

More Pictures of Announcers—Stanley W. Barnett of WOC, Davenport, J. N. Cartier, of CKAC, Montreal, and Emory L. O'Connell of WGAT, the American Legion station in Omaha, Nebraska, will be the mysterious voices pictured in the next issue of the Digest.

Did You Ever See a Real Cave-Man? Well, Radio Digest has located one down in Virginia and found that he was able to build himself a complete receiving outfit capable of reaching across the Continent. Watch for the story by Armstrong Perry in next issue.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City ..... State .....

FANS DISSENT WITH PLAN FOR SILENCE

"STAGGERED HOUR" FAILS TO REGISTER

Chicago Broadcasting Stations Fear Proposed Project Would Be Costly to Them

CHICAGO.—The "staggered-hour" plan for enabling fans to reach into the ether and bring in the waves broadcast by distant stations is not meeting with the approval that was anticipated by the authors of the idea. Instead of the one hour of silence each day, the majority of fans who have expressed their views prefer to have the silent-night plan continued.

There is also a feeling among the broadcasters in Chicago that if they are to keep off the air they should do so for economic reasons on one night rather than cancel programs at varied hours throughout the week.

Idea of Plan

The staggered-hour plan would close stations in Chicago between 6 and 7 o'clock Monday evening, between 7 and 8 Tuesday evening, between 8 and 9 Wednesday, between 9 and 10 Thursday, between 10 and 11 Friday and between 11 and 12 o'clock Saturday. Opposition to this plan has sprung up among persons who object to simultaneous broadcasting, because they fear that under the staggered-hour plan there will never be a time when only one Chicago station is in the air.

It is feared that under the silent-hour plan stations might book programs too extensive for broadcasting before being compelled to shut down for the silent hour, and rather than release the talent the stations would open up at the conclusion of the silent hour, when some other station on a different wave-length was supposed to have the air without interference.

WGR—STATLER PLANT

(Continued from page 1)

five 250-watt tubes, three acting as oscillators and two as modulators.

The present Federal station, WGR, is a 500-watt station with a 2,000 mile range. Its messages have been picked up at points in Florida, Texas, California, Oregon, Saskatchewan and other points in northern Canada. None of the present apparatus will be used in the new installation, the old station being retained for experimental purposes only.

L. C. F. Horle, chief engineer of the Federal Company, will have charge of the new installation. M. A. Riggs will be in charge of the studio. L. B. Wellen will be announcer.

Special Cables Throughout Hotel

A feature of the new installation is that special cables will connect with all the public rooms in the hotel, so that by plugging in a switch, a speech being made or music in any of the public rooms will be broadcast.

The Buffalo Hotel Statler is installing two large, specially constructed Wurlitzer organs, one in the ball room and the other in the main dining room, and organ recitals will be regular features from the Federal station. The Statler Company is also bringing to Buffalo from the Hotel Pennsylvania, New York, Vincent Lopez and his famous orchestra. They will be in the city for the opening of the hotel and remain for some time. While here, there will be daily concerts by the Vincent Lopez orchestra.

Plant Shows Steady Growth

The Federal Telephone & Telegraph Company secured its broadcasting license in March, 1922, and started with a set having a radius of 100 miles. May 21 of that year a set was completed with a calculated radius of from five to 800 miles, at which time WGR was opened.

The present location of the station WGR on the outskirts of Buffalo, has mitigated against securing all the best talent coming to the city, as many artists have declined to make the long trip to the plant, either because of lack of time or the inconvenience. It is anticipated that the new location, in the business heart of the city, will result in a great improvement in the quality of the concerts broadcast from WGR.

Passenger on Moving Train Gets Message Through Air

BUFFALO, N. Y.—The first recorded instance of a commercial Radiogram reaching a passenger on a moving train recently occurred on the Lackawanna Railroad, when a message received by telegraph at a station en route after the train had passed was relayed to it from the railroad broadcast station.

Fans Fight Induction

CHILLICOTHE, O.—Walter Barrett and Charles Wissler, of this city, are making an experiment that is being watched by local Radiophans. They are endeavoring to get rid of the noise caused by induction from the city arc lights and other high tension electric lines.

ENGLAND PLANS TO ERECT GIANT PLANT

WILL ALSO LICENSE MANY PRIVATE STATIONS

Is No Longer Considered Necessary to Exclude Non-Governmental Enterprises Says Bonar Law

LONDON.—The British Government has decided to erect a Radio station for communication with the Dominions so Premier Bonar Law announced in the House of Commons. The Government has also decided to license the erection of private Radio stations in Great Britain for World-wide communication, the Premier stated.

Asked as to whether he was aware of the disappointment on the part of the Dominions because of the delay in announcing an imperial Radio policy and whether he was able now to state the Government's policy, Premier Bonar Law replied that the policy had been recently reviewed by the Imperial Communications Committee, the chairman of which was the First Lord of the Admiralty, Col. L. C. Amery, and its recommendations had been considered by the Government.

Favors State Supported Chain

In view of the development of Radio and other circumstances since the late Government decided in favor of a state supported Radio chain, Bonar Law, said it was no longer considered necessary to exclude private enterprise from participation in Radio communication within the Empire.

This statement was received with cheers.

Proceeding the Premier said the Government therefore decided to grant licenses for the erection of Radio stations in Great Britain for communication with the Dominions and colonies and foreign countries subject to conditions necessary to secure British control.

At the same time the Government had decided that it was necessary in the interests of national security that there should be a Radio station in Great Britain capable of communicating with the Dominions wholly operated by the state. Such station, the Premier said would be erected as soon as possible and would be available for commercial traffic when necessary.

Will Promote News

Asked as to whether private enterprise would now be allowed to go ahead unopposed by subsidized state services, Bonar Law replied, "Except the opposition of competition."

An Empire Radio policy has long been urged upon the Government, as well as the encouragement of private Radio enterprise.

The London Times has been one of the strong advocates of an Empire Radio chain under central control, and it recently said: "At present it is often a matter of comment that more news of the Dominions does not appear in the newspapers here. A substantial part of the reason for any dearth there may be of news from overseas lies in the high cable rates.

Offers Reduced Rates

"One of the first results that it is hoped to reap from a co-ordinated Radio system is a cheap news service. Such a service would be of the utmost value both to the Empire as a whole and to the many countries that compose it, for it is frequently regretted that people at home know so little of the people in, say, the Antipodes and Canada, and vice versa. It would be in the power of the newspapers to dispel this mutual ignorance of they could get efficient news service by Radio at cheap rates."

SWEDISH EXPERT BUYS AMERICAN APPARATUS

United States' Company Out-Bids All Competitors

WASHINGTON, D. C.—Siffer Lemoine, Radio engineer of the Royal Board of Swedish Telegraphs, has spent the past two months in the United States making arrangements for the delivery of apparatus and equipment for the new high-power Radio station to be erected at Goteborg. The contract for this equipment, which was secured by an American company in competition with British, French, and German bidders, provides for the supplying of a 200-kilowatt Alexanderson generator, with all necessary equipment, apparatus, plans and specifications for complete installation.

The steel towers to be erected for the antennae will be similar in height and arrangements to those used in the latest American high power Radio stations, but the actual design of the towers and the material will be furnished by a Swedish firm. It is expected that the installation will be completed and the initial tests made before the end of the year.

HOOT OWLS' SHRIEKS MAKE NIGHT HIDEOUS

PORTLAND, ORE.—The Hoot Owls are making the night hideous with their hoots in the vicinity of Portland several nights each week, since KYG, the Portland Oregonian broadcasting station, has organized this order of Radio maniacs. Members are initiated both in person and via the ether. So far hundreds of night owls all over the nation have been initiated.

MISSISSIPPI DIVIDES K AND W ETHER PLANTS

WASHINGTON.—The Mississippi River is now the dividing line between the K calls of the West and the W calls of the East, as far as broadcasting stations are concerned. All new calls issued to broadcasting stations east of the Mississippi will begin with W and those west with K. Stations already listed will retain their original calls.

TINY LIGHT WARNS FAIR MISS

The Radiophan rushing to bed after a late concert is apt to forget to disconnect the battery wires of the power speaker. This is especially possible where (as in many cases) a separate battery is used for coil excitation. To prevent this, this pretty Radio Miss has placed a small six-volt lamp in parallel with the power speaker, and the burning of same is a continual reminder that the current is on. Result: no rundown batteries next morning © K. E. H.

HOTEL GUEST FANS MAKE MORE WORK

Big Demand for Top Floor Suites Cause Porters to Grumble

BOSTON, MASS.—There is a shortage in top floor suites at local hotels, owing to the demand by Radio bugs. Radio apparatus salesmen and travelers compete with each other for the choice top floor rooms and suites, so that they can string aerials far above the ground, either on the roof or set-ups inside.

"It ain't bad enough to have all we can do in regular hotel work, but to have to string eye-rails for a lot of fat old ladies and fat men—'ts too much," grumbled one hotel porter. "About every other guest wants a top floor room or suite so he can get better reception on his portable set, and if there ain't eye rails in the room, he calls for some porter to put them up."

A lot of travelers these days are taking sets about with them in their trunks and spend their time listening in instead of going down to the dance floor. Many all-winter guests, too, in Boston hotels have had sets installed, with permanent aerial set-ups.

Restrictions in Japan have kept Radio a mystery to the general public. Only colleges, newspapers and government institutions have been licensed to operate receiving sets.

Locate Microphone After Six Months' Experiments

Find Ideal Spot to Gather Cathedral's Vibrations

By Jean Sargent

BOSTON, MASS.—Relocation of microphones at St. Paul's Cathedral, following more than six months research work by broadcast experts at Station WNAC, has finally resulted in locating a transmitter in the organ chamber in the choir loft which reproduces every note both high and low. This work which has just been done by Sam Curtis, chief operator, and other officials at the Shepard Stores Station, has resulted in their organ music being declared the best ever broadcast.

Since Radio broadcasting was first done, experts have been experimenting with microphones in trying to locate them advantageously to reproduce true church organ music. Until the present time it has been unsuccessful, as the locations of the microphones or transmitters have either slighted the very high or low tones of the pipes.

It has been usual in broadcast organ recitals to use several microphones in order to secure the lower tones.

The construction of the organ and the location of the pipes in the organ chamber caused Operator Curtis to try out a microphone in among the pipes inside the organ chamber. Several days have been taken up with tests, and such authority as Sewell Cabot and others declare the broadcasting of organ music to be the best they ever listened in on.

'SALTS' RELY MORE ON RADIO COMPASS

PAST YEAR BRINGS FORTH MANY DEVELOPMENTS

Government Orders Equipment for New Fog Signals to Be Installed—Five in Use Now

WASHINGTON, D. C.—Important progress has been made in the past year in the development and use of the Radio compass as a navigational instrument on board ship, according to officials of the Lighthouse Service of the Department of Commerce. Subsequent to the conference held at the Department of Commerce last May two of the largest Radio manufacturing companies have announced their undertaking of the supplying of Radio compasses or direction finders and instruments of foreign manufacture are also available.

Installations of improved types of Radio compasses have been made on a number of vessels, including the largest coastwise steamer on the Pacific coast, some of the largest steamers on the Atlantic, and several Government vessels.

These instruments are in actual use in navigation and satisfactory results are being uniformly reported from the vessels with recent installations, both in obtaining positions by bearings taken on Radio stations on shore to locate the vessel, and by bearings on approaching vessels to avoid collision.

Fog Signals Increased

The number of Radio fog-signal stations in operation by the United States Lighthouse Service has been increased to five, namely, Fire Island Light Vessel, N. Y., Ambrose Channel Light Vessel, N. Y., Sea Girt Light Station, N. J., Diamond Shoal Light Vessel, N. C., and San Francisco Light Vessel, Calif. Radio fog signals will soon be installed at seven other stations, for which equipment has already been purchased; Boston Light Vessel, Mass., Nantucket Shoals Light Vessel, Mass., Cape Charles Light Vessel, Va., Cape Henry Light Station, Va., Swiftsure Light Vessel, Wash., Columbia River Light Vessel, Oreg., and Blunts Reef Light Vessel, Calif. These first installations are being made principally on the important outside lightships for the reason that these are the principal sea guides for a very large amount of shipping and also because in fog the signal on a light vessel has the great advantage of permitting a ship to run directly for it without risk of stranding.

Letter from Blind Man Opens Case for Charity

Government Experts Urge That Fund be Started

WASHINGTON.—A pathetic letter from a blind man in Highmore, S. D., was received recently by the Department of Commerce asking which branch of the Government was distributing Radio receiving sets to blind people. The Department Radio officials were forced to reply that the Department had no sets to distribute and knew of no appropriation from which such donations could be made.

It occurred to the Government officials, however, that there was an opportunity for some charitable organization to perform a great public service for those who cannot see. Most blind, they point out, have no means of receiving information or instruction except when they are read to. Since Radio offers an audible means of instruction and entertainment and 570 broadcasting stations furnish programs free during practically every hour of the day, Government Radio experts urge that a fund be started from which inexpensive Radio receiving sets could be purchased for those unfortunates who are forced to spend their days in darkness. Radio broadcasters are furnishing the material, and some believe there are individuals or organizations who will bring these broadcasts to the ears of those who need them most of all.

Harry F. Higgins, Northwest Broadcast Pioneer, Dies

TACOMA, WASH.—The recent death of Harry F. Higgins, managing editor of the Tacoma Ledger, deprived Radio of one of the figures who played an important part in its development in the Northwest.

It was under Mr. Higgins' leadership that KGB, The Ledger-Mullins Electric Company station, one of the best known in the West, was established. His efforts also advanced the cause of broadcasting and brought the entertainment standard to a higher plane than they had been. Many Radiophans attended his funeral.

CRIPPLED BY FALL; RADIO FILLS HOURS

6ZH, AMATEUR OPERATOR, FALLS FROM MAST

District Superintendent of American Radio Relay League Is Graduated from School by Ether

By F. N. Hollingsworth.

SAN DIEGO, CALIF.—Everyone along the Pacific Coast knows amateur station 6ZH, and there is not an amateur but will cut in and answer when he hears this station calling. For the owner is Lester Picker, an invalid who has to lie in bed with a broken back and operate his key from his bedside, but who nevertheless is district superintendent of the American Radio Relay League, and a hero to the amateur knights of the spark and key. Picker was graduated from high school by Radio, too, a distinction not achieved by any other Radiophan in the world, but not a distinction which he coveted, by any means, for it meant that he was unable to attend the exercises that mean so much to every boy and girl at some time in their lives.

Falls From Mast

He is down on his luck, but still able to get something out of life, thanks to the Radio, which has cheered many lonely hours of pain and suffering. If it were not for amateur Radio, Picker would not be lying there with a broken back. It was while he was putting up a new 55-foot mast at his station, that he fell, as the guy wires broke. He was for weeks under a doctor's care before he was able to even reach for his key. The accident happened not long before the graduating exercises at the San Diego Roosevelt Memorial High School, and he was due to receive his diploma with the rest. The chair where Picker was to sit was vacant, but their thoughts were with him, and at a word from Principal T. A. Russell, someone telephoned to another San Diego amateur, who relayed the message by Radio to 6ZH. A switch was thrown in and a hush fell over the big audience as all eyes were turned to the big horn on the platform.

Talks to Classmates

In the next few minutes there was no other sound but Picker's voice, until he signed off with his customary "Good Night, 6ZH." On this eventful night he clung to his old familiar call, after he told of his pleasure at being with his old classmates, in part at least, and expressed the hope that he might join them again at some reunion and tell of his experiences.

Every amateur on the Coast knows his story and frequently they call his station with a cheery, "Hello, old man, how are you?" Now and then an old amateur friend from far back to the Mississippi will call him, or someone in Vancouver, or maybe way down to the Gulf of California. He is always there with a cheery answer, and his signal is as quick and sharp as the crack of a whip.

Appeal Filed in Supreme Court in Intercity Case

May Not Be Argued Until Fall Term

WASHINGTON, D. C.—The Solicitor General of the United States, on behalf of the Secretary of Commerce, has filed an appeal in the Supreme Court of the United States in the case of the Intercity Radio Company against the Secretary of Commerce.

It may remembered that a short time ago the Intercity Company obtained a temporary injunction against the Secretary of Commerce from taking away its Radio license, from the Supreme Court of the District of Columbia. An appeal was made by the Secretary to the Court of Appeals of the District of Columbia. The Court of Appeals upheld the lower court and the matter has now been taken to the United States Supreme Court to obtain a definite ruling on the constitutionality of the present Radio law. It is probable that the case will not be argued until the fall term of the court.

New Club Organization to Give Members Cheaper Sets

SAN JOSE, CALIF.—One of the latest clubs to come into existence is the Radio Broadcasting Club of this city. The new club is intending a national membership and expects to soon have its supporters scattered from coast to coast. There are two notable features: First, there will be a department established to answer all questions, technical or otherwise, from members, and second, the club will have its own sales organization. It is the intention to give the members the benefit of co-operative buying. J. P. Whidden is president and can be reached through the club at 52 Ryland Building, San Jose, California.

RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

RECEIVING records during the past week reached the total of seventeen. The distances are steadily increasing, although now and then new stations beginning operation cause a flood of records for mileage spans of not far above the minimum allowed, 1,000 miles.

The following new or susperseding records were made last week:

Station—Miles Away—Who Heard It?

AS6—1250, John Kiener, Cleveland, O.
KDYX—5000, C. F. Rose, Jr., Springfield, Mass.
KDZE—1725, Philip Delano, Bonne Terre, Mo.
KFAU—1325, Ross Hansch, Baraboo, Wis.
KFCL—1250, C. E. Moothart, Firth, Nebr.
KFDL—1225, John Kiener, Cleveland, O.
KFV—1400, Elmer Gahlgun, Rice Lake, Wis.
KGY—1650, D. E. Rogers, Crandon, Wis.
KLB—1900, Billy Withington, Jackson, Mich.
KMO—1600, Ross Hansch, Baraboo, Wis.
KWH—2300, C. L. Walker, Napanee, Ont., Can.
KYI—1750, W. Schultze, Chicago, Ill.
WDAE—1700, Wm. Hurst, Jr., Winnipeg, Can.
WFAH—1025, John Kiener, Cleveland, O.
WIAG—1250, Wm. Hurst, Jr., Winnipeg, Can.
WJX—2550, Robert Rowe, Santa Clara, Calif.
WQAM—1300, Wm. Attwill, Swampscott, Mass.

Birmingham Will Give Fans Sermons from Station WSY

BIRMINGHAM, ALA.—Practically all of the sermons preached in Birmingham churches from now on will be broadcast over WSY, of the Alabama Power Company.

Dr. J. R. Hobbs, pastor of the First Baptist church, has adopted the unique plan of making the request of all listeners in to take part in the services. As a result many people in Birmingham, as well as in other towns and cities, who have Radio sets are "going to church at home" nowadays.

The Alabama Power company has received numerous letters from all parts of the country congratulating them upon this means of spreading the gospel. Judging from the number of letters received by the Alabama Power Company thousands of people listen to sermons preached in Birmingham and broadcast over WSY.

Washington State College Installs 500-Watt Plant

PULLMAN, WASH.—The new 500-watt broadcasting station of the Washington State College is now functioning.

The set was installed a few weeks ago by student engineers and is now filling a definite place in the air in the Northwest. Entertainment, music and other features are broadcast but the station was installed primarily for extension work. Weekly lectures of educational topics, constituting a regular course, are delivered by college professors.

College sports, basketball, baseball and football, will be broadcast play by play. This was first attempted at a recent basketball game between W. S. C. and the University of Idaho teams.

New International List Ready

WASHINGTON.—A new edition of the Berne International List of Radiotelegraph stations will soon be ready for distribution, the Department of Commerce has been advised. Copies of this, the 8th edition, can be secured by addressing the International Bureau of the Telegraph Union at Berne, Switzerland, for 14 francs Swiss.

KFC Out of Business

SEATTLE, WASH.—KFC, The Post-Intelligencer broadcasting station at Seattle, has discontinued broadcasting. Unforeseen conditions made the disruption of the service necessary. KFC was the pioneer broadcasting station of the State of Washington.

Seyferlich's

Panel Labeling Outfit and Soldering Iron enables anyone to mark his own Radio Panels. Duplicates the work of an expensive engraving machine and permits the Radio constructor to brand his trademark or name on the panel.

Complete set of nine separate words with holder and Cutler-Hammer Radio Soldering Iron. $25.00

Special Trademark Plates Made to Order.

Dealers' Discounts on Application

Seyferlich's Real Radio

68 W. Washington St. Chicago

Ether Drama Has Thrills of Stage

WGY'S Audience Builds Mental Scenery to Fit Plays—No Two Settings Alike

SCHENECTADY, N. Y.—When WGY puts on a weekly melodrama, broadcasted from its station, every Radio listener mentally builds his own scenery to fit the play as spoken by the actors of the drama. Thus, as no two minds work alike, and everyone's imagination differs from his fellow's in the mental pictures it sets up, there are as many varieties of scenic settings as there are listeners. The listener hears a telegraph key and lines read referring to a small village railroad station, in "The Travelling Salesman" first act, a play given recently. This sets up creative action in the mind of the listener, and he follows the players as they speak their lines, with a mental picture of the scene as it might be in reality.

Ether Drama Proves Popularity

Only "sound atmosphere" is possible in Radio drama. But one gets all the sound effects possible on the stage, such as thunder, an auto honr, the whistle of a locomotive, a telephone bell, dishes rattling or someone pounding a typewriter. The players of these "ether dramas" have to be more careful of tone inflection and shading, since they cannot help out the effect by their gestures and personal presence. The listener has the advantage of the blind man who attends the drama, however, because he has experience and so imagination to aid in mental pictures.

That there is great appreciation and enjoyment of these "ether dramas" is attested by the 800 to 1,000 letters received after every such performance, expressing appreciation of the writers, many of them coming from those who have seen actual stage productions of the same plays broadcasted.

Radiogram Rate Increased

WASHINGTON, D. C.—The Navy Department has announced that the rate for commercial traffic through all Radio stations of the Naval Communication Service except those of the Great Lakes, will be 12 cents per word effective April first.

$10.95 REGENERATIVE

2000 Mile

GUARANTEED RECEIVING

SET—Post Paid

1½ or 6 Volt Tubes Used

Dungan Radio Co.

68 West Washington Street, Chicago, Ill.

COAST STATIONS HEAR WHA BROADCAST GAME

Texas Listeners Follow Wisconsin Game Play by Play

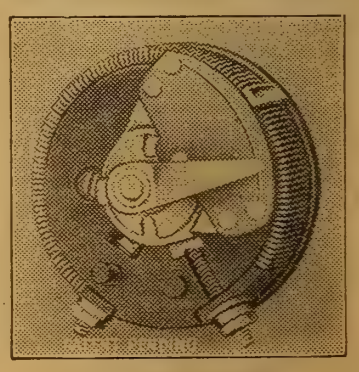
Reports from Radio receiving stations along the Atlantic, Pacific, and Gulf coasts, from states as far south as Texas, and several telegrams and hundreds of letters from listeners within a radius of 1,000 miles announced the success of the broadcasting of the recent Wisconsin basketball games by the University of Wisconsin Radio station WHA.

The games were sent directly from the gymnasium, play by play, and "listeners in" heard the applause and cheering.

December Exports of U. S. Total $163,236 Apparatus

WASHINGTON.—Radio exports shipped out of the country in December totaled $163,236 in value, less than the total for November which was $223,180. The decrease is explained by officials of the Department of Commerce as due to large shipments of apparatus to Argentine in November. In December, Canada took the largest amount valued at $74,344. Total exports of Radio apparatus for 1922 amounted to $2,897,799 being more than a thirtieth of the total electrical exports for the year, which amounted to over $63,000,000.

A Micrometer Rheostat



SPECIFICATIONS

Resistance—zero to approximately 7 ohms.
Current carrying capacity 1½ amperes.
Temperature co-efficient practically zero.
Base and knob—special heat resisting composition. Price $1.50

Jobbers write for discounts

HOWARD RADIO COMPANY
4248 N. Western Ave., Chicago, Ill., U.S.A.

Memo Pad

What I will need to make a good tube set

A Kellogg No. 501 variocoupler
A Kellogg No. 605 variable condenser
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NEW ORLEANS BOASTS THREE PLANTS

Digest Writer Visits Southern Stations During Pre-Lenten Festival

Have to Fight Heavy QRM

A Newspaper, a Business Concern and a University Unite to Promote Broadcasting

By Vera Bradley Shipman

New Orleans at Mardi Gras time. A quaint southern city, with its narrow twisted cobbled streets, its overhanging balconies and sunken courts. The French and Italian quarters, miniature cameos of foreign lands, a city of mystery, of romance, a city in its entirety given over to revelers. Mardi Gras—when King Rex rules the day.

But my primal interest was Radio and the day following my arrival I paid the New Orleans broadcasting station a visit in the interest of the Digest.

There are three New Orleans broadcasting stations: Tulane University (broadcasting on 100 watts) on Friday evenings and occasional Wednesday bulletins; Interstate Electrical Company with its Saturday evening musical programs under the direction of William A. Oppenheimer, and the Daily States, broadcasting a minstrel frolic each Thursday evening. Hubert De Ben is Radio editor of the States, featuring a Sunday page of Radio interest each week.

Heavy Interference Encountered

Crowded by heavy interference from the U. S. Naval Station and United Fruit Company wireless messages on the coast line, New Orleans broadcasting is still in its youth. However, it fills its local mission of crystal set listeners in requirements with programs of interest.

Tulane University has several good distance records and its programs are scholastic. Its director, Daniel S. Elliott, a Johns Hopkins University man, is the professor of College Physics. The senior year of Electrical Engineering at Tulane contains a Radio course of research problems. Lectures include Radio engineering and practical construction.

Extension courses of general university work are broadcasted weekly. The Tulane station WAAC, stresses particularly upon its outside aerial for good broadcasting. Dr. Elliott contends especial value in this.

New Station Being Built

A new 500 watt station is now under construction at Tulane, being entirely assembled by the students within the Electrical Engineering department and will be in operation in the spring. Tulane has been developed thru the personal efforts of Pendleton Lehde, president of the Electron Engineering Company of New Orleans, a staff Radio engineer for Tulane. Mr. Lehde has acted in the capacity of chief announcer, working in conjunction with the physics department of the college. This station evolving from the war Radio station, has developed instructive capacity. Dr. A. B. Dinwiddie, the president of Tulane, is a man of strong technical interest and has aided the Radio course and WAAC station in its greater mission of collegiate broadcasting.

Big Future Predicted

Talent for New Orleans programs is local with occasional visiting supplement, Tulane recruiting many of its programs from Newcombe College, the women's department of Tulane occupying adjoining grounds.

The Interstate Electric Company operates its Radio studio on top of its office building on Baronne street and the grand piano encourages good musical programs. Mr. Oppenheimer, director of WGV, is president of the Radio Association of New Orleans, meeting monthly in evening session with visiting speakers.

Three stations can mean a great future to New Orleans broadcasting. A newspaper, a business concern and a university: these three broadcasting. Each has the opportunity to carry the vanguard of New Orleans to the unseen audience listening in every evening in homes all over the country.

Here you have a peep back stage in the broadcasting studio of Station WJV, New Orleans, La. At the time the photographer made his visit to the plant, four pretty high school girls were entertaining the Pelican State fans with instrumenal and vocal numbers. The girls shown in the picture are students at the McDonald High School, of New Orleans, and have won favor from listeners in from the first time they volunteered their services to the station. In fact, they are one of the most popular quartets of any southern station

TWO STATIONS PLAY "ROSARY" IN HARMONY

BOSTON, MASS.—While George W. Russell, Jr., of this city, was tuning out WNAC, WNAC announced "The Rosary" by a quartet, and at that exact time he picked up WGY, and there, "on top" of WNAC was WGY announcing "The Rosary," by a violinist.

Russell held both stations during the selection, the violin playing in almost perfect time with the singers.

WJZ and 2LO Negotiate for Trans-Atlantic Test

Other Stations Will Maintain Silence During Program

NEWARK, N. J.—Tentative arrangements have been made between WJZ, the Westinghouse broadcasting station here, and 2LO, the London station of the British Broadcasting Corporation, for a special program from the latter station, in an attempt to reach the United States.

It is planned to have reception of the English program by the American station named above, after the completion of a new powerful transmitter for 2LO, which will be about April 1. The latter will conduct its tests on 360 meters, enabling fans equipped with sets to receive that length to tune in and listen direct. Newark will stand by during the test and cooperation of other stations to be silent during the period between 7:00 and 7:30 P. M. Eastern time, will be requested.

Station 2LO has been heard several times in this country by amateurs. Newark, in this case will merely listen in, and keep records of the reception and other data. It is possible that this test, if successful will open up a field for international broadcasting, by which the best music and speakers of the world may be heard in all countries.

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STATION ESTABLISHED IN FROZEN NORTHLAND

Norwegian Plant to Give Storm Warning to Ships

NEW YORK.—What will be known as the farthest north Radio station has just been erected in Jan Mayen, the tiny cone of an extinct volcano in the Arctic Ocean, north of Iceland. Akbard Ekerold is the constructor, and should become the world's greatest weather man. All science is agreed that the place where the world's weather, good or bad, originates is the Arctic zone and if storm warnings could be sent out from this region many lives might be saved and thousands of shipwrecks avoided. Until the advent of the Radio this was not possible, but now Mr. Ekerold proposes to put three stations in the Arctic, to work in co-operation in broadcasting weather forecasts daily. The Norwegian government is financing Mr. Ekerold's undertakings.

National Guard Teaches Radio

BUFFALO, N. Y.—The 174th Regiment of Buffalo is one of the first of the federalized National Guard outfits to comply with the new army regulations providing for instruction in Radio telephony in all batallion headquarters.

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U. S.–JAPAN SYSTEM BLOCKED BY JAPS

R.C.A. CONTINUES TO HOLD COMPLETE MONOPOLY

New Ministry of Communications Not so Friendly to Plan as Predecessor

TOKYO.—The impetus which the Pan-Pacific Commercial Conference at Honolulu last October gave towards obtaining better telegraphic facilities for American-Japanese news communication has almost died away. For a time it seemed that definite and beneficial results would follow, but, as previously, sustained and concentrated effort has been lacking.

The Pan-Pacific Conference, though devoted primarily to commercial questions, took up as a major point the subject of trans-Pacific news communication. It was decided that the only present hope for relief lay in the possibility of an agreement between the Japanese and United States governments which would insure co-operation between the Radio stations of the two countries. A resolution to this effect was introduced by Baron Yasushi Togo, head of the Japanese delegation, and adopted. It was resolved "that the governments of the respective countries bordering on the Pacific be urged to use their Radio facilities and other means of communication, in co-operation with each other and with other agencies, to provide means of inter-communication for the public, whenever and wherever such services cannot be obtained through privately operated agencies, to accomplish the following purposes: (1) the transmission of commercial messages at the usual commercial rates, (2) the transmission of news messages promptly and in the low rates necessary for establishing regular news reports."

Radio Corporation Monopoly

The resolution itself was weak-kneed, for in the matter of news reports the points in the Far East from which "such services cannot be obtained through privately operated agencies" are exceedingly few and usually unimportant.

The Radio Corporation's arrangement with the Japanese Government, which exercises a monopoly over all means of communication in Japan and between Japan and other countries, affords "such services." The objections which are raised so justly are directed against the quality of service rendered and the price which must be paid.

In spite of the over-cautious wording, however, the delegates understood that an American-Japanese agreement was contemplated when they adopted the resolution. This view was shared by the Pan-Pacific Association of Japan, to which the making of necessary arrangements in this country was delegated.

Document Hangs Fire

The inalienable right of committees to procrastinate has been largely responsible for the fact that nothing has been done here yet. When Baron Togo returned to Japan, after a tour of the United States, he conferred with Prince Tokugawa, president of the Pan-Pacific Association in this country. The Pan-Pacific Association of Japan is an auxiliary organization of the Pan-Pacific Union and helped materially to promote Japanese attendance at the conference. Prince Tokugawa himself was not present.

Into Prince Tokugawa's hands, Baron Togo placed the matter upon his return from the conference and his American tour. The Prince was to draft a document to be presented to the Department of Communications, recommending favorable action along the lines proposed in the resolution. As far as can be learned, the drafting of this document is still unfinished and the proposal has yet to be brought officially to the attention of the Department of Communications. The Imperial Diet is now in session and Prince Tokugawa, who is president of the House of Peers, has many demands upon his time. Baron Togo, who is a member of the Upper House, also has an unusual amount of his time occupied by official duties.

CALIFORNIA CONTINUES TO HOLD FIRST PLACE

Texas Claims Second Honors with 36 Broadcasting Stations

WASHINGTON.—California still continues to lead in number of broadcasting stations, with 59 in operation, while Texas has climbed to second place with 36. Every state except Mississippi had one or more stations on March 10 when the total of broadcasting stations had reached 588, the highest point since this art was undertaken in September, 1921.

Out of these stations 66 represent educational institutions, and 67 newspapers and periodicals dispensing information and news as well as entertainment. Several cities, a number of churches, theaters and, of course, many electrical apparatus manufacturers and distributors are also included.

British Broadcasters Must Pay for Printed Programs as Regular Ads

In London Papers Alone Announcements Run as High as One Hundred Agate Lines—Entail a Cost of $500 Per Day

LONDON.—British Radio broadcasting is passing through a baptism of fire. In recent weeks the newspapers have been printing as news the daily and week-end programs of the British Broadcasting Company—the combination of Radio apparatus manufacturers which has been entrusted by the postmaster general with the arrangements for daily broadcasting programs. Two weeks ago members of the Newspaper Proprietors' Association and the Newspaper Society notified the broadcasting company that the programs would not be inserted unless paid for at regular rates. The broadcasting company replied that it would not use advertising space to announce its programs, a decision that will be watched in its results on the Radio boom, for undoubtedly these published announcements have played a large part in its development.

Would Be $500 Daily

In the London papers alone, these programs have occupied spaces of some hundred or more agate lines, and at an average might mean an outlay by the broadcasting company of at least $500 daily. The provincial press forms another proposition of some magnitude.

Radio broadcasting has been booming in England recently. At first no news was given in the programs, but with the formation of the broadcasting company arrangements were made for the reception and broadcasting of news from Reuters, Ltd., the Press Association and the Exchange Telegraph Company. Broadcasting is now a daily feature from London, Birmingham, Manchester and Newcastle, with Cardiff and Glasgow to be added shortly.

No Sunday Evening Papers

There are no morning or afternoon programs at all, broadcasting taking place at 5 p. m. (children's stories till 6 p. m.) and from 7 to 10:30 p. m. News bulletins are given at 7 to 9 o'clock, and are preceded by announcement that the news items are the copyright of the three distributing agencies.

The bulletin gives weather reports, rates of foreign exchange and sundry news items, followed on Saturdays by football results. Up to now, no sensational event has happened to give the broadcasting service any big boost, though it was expected by many that the domestic event in which Princess Mary, Viscountess Lascelles, figured, would have been a "big noise" for the broadcasting.

In any case, it would appear that the Radio news bulletin in its present form is hardly likely to present any serious opposition to the daily newspapers, practically only the 9 o'clock items offering any opportunity for freshness and new news, the Sunday evening bulletin being the only one at all that provides a real boom in news service, since Britain has no Sunday evening papers, and there is consequently a gap of 24 otherwise newsless hours between Sunday morning and the next day.

Station WPAL Broadcasts Second Midnight Program

COLUMBUS, O.—Station WPAL, of the Superior Radio & Telephone Equipment Company, recently transmitted its second midnight program, beginning at midnight and continuing one hour. The previous late concert of the station was given three weeks ago and was so well thought of that Station WPAL is making plans to make the midnight entertainment a regular part of its weekly program.

On its first late transmission, Station WPAL made an intensive effort to reach listeners in Philadelphia and other large cities of the eastern seaboard where many of its friends were listening. That the attempt was entirely successful was shown by the large number of communications received by the station during the week following.

Cornell on Air as WEAI

ITHACA, N. Y.—The value of the higher education will be demonstrated by Cornell University through the medium of Radio. The Radio transmitter at the university was installed recently and is accomplishing good work. Members of the College of Electrical Engineering are sending out nightly talks by President Livingston Farrand and other members of the faculty, all of which deal with university topics. The new station is WEAI.

A Radio receiving set has been installed at the leper colony at San Juan, Porto Rico.

To Issue New Technical Paper

WASHINGTON.—The Bureau of Standards will shortly issue Letter Circular 87 entitled "Methods of Measuring Properties of Electron Tubes." It is a technical paper intended to advise manufacturers and engineers how the Bureau makes its tests.

Boise, Idaho, has a $10,000 Radio outfit in its high school.

"JERSEY" JONES GIVES SPORT TALKS AT WHN

Writer Will Gossip to Fans Three Nights Each Week

NEW YORK.—"Jersey" Jones, the popular and well known sport writer and boxing expert of the New York Globe, will broadcast gossip three times weekly from the WHN Radiophone Station, Ridgewood, this city. Mr. Jones has been associated with the Globe for several years and is a recognized authority on all sports.

Many letters to WHN and to the New York newspapers have shown conclusively that there is a great demand by Radiophans for live sport news and authoritative comment on all athletic activities—amateur and professional. Mr. Jones's first talks from WHN will be in the nature of an experiment, as he intends, as soon as possible, to adjust his programs to wishes of his listeners in as they are expressed to him in writing. Mondays, Wednesdays and Fridays are the days the sport talks are given and the time is 10:30 P. M. It is proposed to maintain this schedule for the time being until the fans' opinions are had.

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Consisting of 6x14 panel, one 23 plate condenser, one composition dial, 2 honeycomb coils, one double adjustable coil mount, 3 .006 condensers, one Freshman variable grid leak, one condenser, one vernier rheostat, one bakelite socket, 8 binding posts, 25 feet wire and construction diagram, for only..... $11.95

THIS WEEK'S SPECIAL—3,000 OHM HEADSETS
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W.D.-11 Bakelite sockets, 75c value	.60c	75c Value phone plugs	.46c
V. T. Bakelite sockets, 75c value	.28c	Battery hydrometers, 75c value	.40c
Plain rheostat, $1.00 value	.48c	Soldering outfits, $1.00 value	.85c
Super crystal	.20c	Glass crystal detectors	.65c
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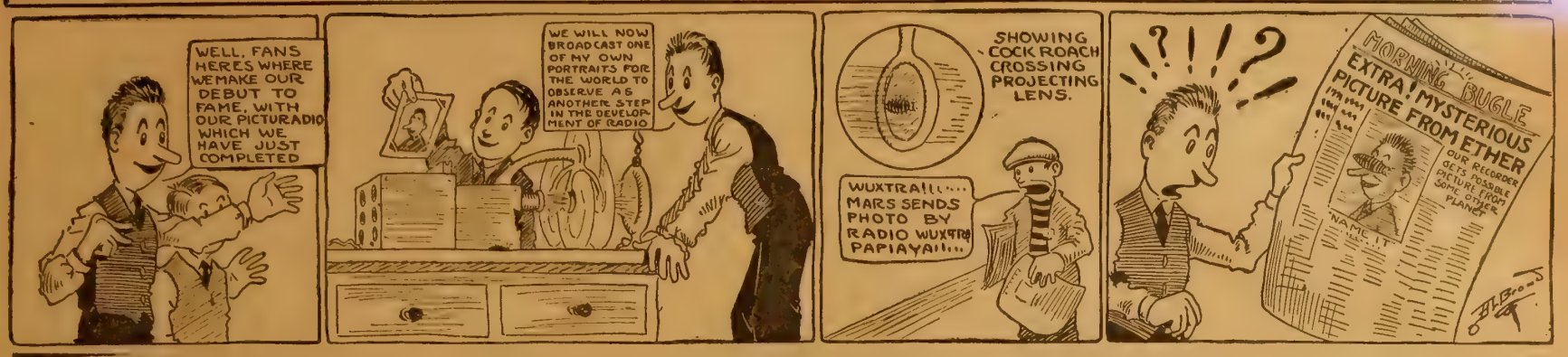

PLANES USE KITES FOR SOS ANTENNAE

ALL SHIPS OF AEROMARINE AIRWAYS ARE EQUIPPED

Recent Test of Flying Aerial Proves Successful at Miami Bay—Seaplanes Call Aid

MIAMI, FLA.—Further equipment to insure safety of passengers riding in commercial airships has been added to the seaplanes run by the Aeromarine Airways, Inc. The latest device is a signal kite equipped with a Radio aerial which makes it possible for seaplanes forced to the water to acquire a wider range in sending calls for help.

The kite, which is roughly six feet square, carries to a height of 400 or 500 feet an intense antenna for the Radio equipment inside the seaplane. It has been found that when a plane rests on the water the aerial across the wings of the ship does not give sufficient range because it is too low.

Does Double Work

While in flight, the seaplane can produce its own antenna by having a lead attached to a wire drop and swing beneath the pontoon. A kite flying at sea acts as a signal to passing ships as well as provides an antenna for Radio work.

Tests of the kite aerial were recently made by the Aeromarine Airways in Miami bay. All of the ships of the corporation are equipped with the kite, it was said. This is a second step in safety in applications installed this year, the first being the inclusion of smoke pots for signalling when a plane is in distress.

STUDENTS PERK UP TO STUDY AIRPHONE

New Subject Awakes Keen Interest Among Pupils in Canadian School

TORONTO, ONT.—The keen interest being shown in the advancement of Radio throughout the world by school-children is one of the most interesting features of the Radio world, and one that is daily growing in popularity. That the school children of Canada are not lacking in their interest was recently indicated when a discussion on the advantages and disadvantages on the Radio as compared with the telephone was held in one of the largest schools in Toronto.

The discussion lasted two hours, and, according to the principal and teachers, never had so much interest been displayed in any other subject. It was afterwards found out that of the seven hundred pupils, more than four hundred were Radiophans. Of the number, three hundred and ten owned their own Radio sets.

Catch Speed Messages

The United States army has perfected a method by which the fastest Radio message can be caught on wax cylinders and reproduced at lower speed on dictaphone machines, making the message easy to read.

Station WGI Makes Intensive Study of Visualization of Invisible Drama

Amrad Studio Conducting Experiments with Blind to Ascertain Method of Giving Plays for Listeners In—Offerings Are Complete in Every Detail Excepting Scenery

By H. M. Taylor

The Radio broadcasting station, WGI, at Medford Hillside, Massachusetts, has caught the vision of the educational possibilities of the Radio. A glance at the programs presented will be convincing as to this assertion. On the staff at Amrad are trained men in several different lines, each of whom is carrying on experiments with a view to methods of educational extension.

Professor W. Eugene Hammett, musical and dramatic director at Station WGI, the man who has charge of the "blind" experiments

Professor W. Eugene Hammett, a teacher in Boston, is one of the Amrad staff; the director of the musical and dramatic clubs. For some time Professor Hammett has been experimenting on dramatic art as associated with Radio. One of the clubs at Amrad is known as the Amrad Players, made up of Radio enthusiasts. This club is being used in the experimenting and from the reports of their work, it is proving successful.

Experiments Made with Blind

The basic principle of dramatic broadcasting is the stimulation of the imagination. Theoretically Radio listeners are "blind" and it is therefore necessary to reach the imagination through the medium of the ear. Experiments have and are being made with blind people. Careful data is kept of the results of these experiments from a physical and psychological standpoint. The data thus obtained is used in the broadcasting of plays and recitations. This data together with the comments received from Radio listeners is carefully studied. Out of this material Amrad is developing a unique method of educating the public in spoken drama.

Must Substitute for "Business"

How is the imagination to be stimulated? In previous broadcasting of plays the continuity of thought and interest has been broken. There are necessarily pauses in spoken drama during which dramatic action will take place. To those who actually see the action the attention is held. To those who are "blind" there must be some satisfactory substitute for the eye if attention is to be held. Attempts have been made to announce the stage business, but the past tense has been used. This method fails in that it does not stimulate the imagination. It does not awaken the "sensation of personal experience" of the action, which arises from a mental activity. Remember Radio listeners are theoretically "blind", and that with them the mental activity must be the imagination. Only through the ear will the imagination be aroused.

Use Present Tense

The substitute for the eye must be the voice of the announcer. Experiments have shown that if the voice has in it the spirit of the dramatic action; if the announcement of the dramatic action is in the present tense and using the participle form of the verb; if the announcement is made in the same amount of time required to perform the action, there is an effect upon the imagination which will arouse a "sensation of personal experience" of the action.

Announcement of Dramatic Action

To better explain the foregoing paragraph an example follows. In a certain play there is a long pause between the speaking lines. In order to fill up this gap and thus hold the attention of the Radio listeners, an announcement of the dramatic action is made.

"Sophie is entering, her hair and dress are disarrayed, her eye is registering ferocity, a knife is extending from the bodice of her dress. She is moving stealthily toward the Prince, she is grasping the hilt of the knife savagely, she is making ready to strike." (The speaking lines of the Prince begin here abruptly.)

This action is being performed in the studio, the announcer is affected and his voice will register the "sensation of personal experience" of action. The spirit which is in the voice will arouse the imagination of the Radio listener, who, will in turn enjoy that "sensation of personal experience" of action.

The "Human Program"

Another interesting feature has been worked out, namely, the "human program". The announcer supplies with his voice the material provided on a printed program. The method of presenting the program is based upon the habit people have formed of reading a printed one. For instance the cover page is read giving the name of the play, the writer, and the company presenting it; the cast of characters and their descriptions; the descriptions of the acts and scenes; the synopsis of the play.

The modulations of the voice, the

(Continued on page 15)

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W.D.-11 Adapter	.65
$1.50 Lightning Arrester, Indoor and Outdoor Type	.85
Murdock Loud Speaker Horn with Phone	5.00
5.50—180 Degree Variocoupler on Bakelite, Silk Wound Wire	2.45
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$5.00 43-Plate Condenser	1.95
4.00 23-Plate Condenser	1.55
2-inch Bakelite Dials	.25
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3-inch Bakelite Dials	.35
W.D.-12 Transformer for W.D.-11 Tube	4.65
$1.00 Freshman Variable Grid Leak and Condenser Combined	.65
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Mobile, WEAP
Montgomery, WKAN

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Tucson, KDZA, KFDH

Arkansas:
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Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
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Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
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Modesto, KXD
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Pasadena, KLB
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San Francisco, AG1, KDN, KDZG, KDZX, KFDB, KLS, KPO, KSL, KUO
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KLZ
Pueblo, KFGB
Trinidad, KFBS

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Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WQAW

Florida:
Jacksonville, WDAL
Miami, WIAZ, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH

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Atlanta, WGM, WSB
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Decatur, WAAS

State, City, Call

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Idaho:
Boise, KFAU, KFDD
Moscow, KFAN
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Wallace, KFCC

Illinois:
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Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WCAP, WHAP
Elgin, WTAS
Galesburg, WRAM
Mattoon, WQAL
Peoria, WJAN
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Brookville, WSAL
Evansville, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDP, WGF, WHX
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Le Mars, KFCY, WIAU
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WNAK, WTG
Marion, WRAD
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS, WLAP
Paducah, WIAR

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, WGAQ

Maine:
Auburn, WMB
Bangor, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, KFDU, WFAV, WGAT, WJAB, WKAC, WMAH, WQAP, WSAS
Norfolk, WJAG

State, City, Call

Oak, KFEQ
Omaha, KFCZ, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
York, KFDR

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV.

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW.
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

Ohio:
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WJAJ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WLAM, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA

State, City, Call

Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

Oregon:
Astoria, KFGG
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hood River, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WOAI
Stanford, WOAZ
Tyler, WOAF

State, City, Call

Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KDZL, KFCP
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Pullman, KFAE
Seattle, KDZE, KDZT, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Arlington, NAA
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CJCG, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 8:30-10. Central.

WLW, Cincinnati, O. 2,000 mi. Crosley Mfg. Co. Daily ex Sun, 10 am, 1 pm, 3, 4. Mon, Wed, 8-10 pm. Tues, Thurs, 10-12 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Mon, Wed, Thurs, 8:30-9:30 pm, concert. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 only. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 485 also. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Eastern.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Mon, 4:35-5 pm, 9:15-10. Wed, Fri, Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 485 also. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMC, Memphis, Tenn. 400, 485 only. 2,000 mi. The Commercial Appeal: Daily, 9:30 am, 12 m, 3:20 pm, weather, markets; 8 pm, entertainment. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8.9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm. Fri, 8-9:30 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. 485 also. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Groves, Mo. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAO, Mishawaka, Ind. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, Tues. night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed. only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 and 485 only. 500 mi. John Wanamaker.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, 11:30-12 m, 1:30-2 pm, 2:30-3, 6-6:30. Daily ex Sun, Mon, Wed, 8:30-9:30 pm, 10-10:05. Mon, 11-12 mid. Sun, 3-3:30 pm, 9-9:30. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB. State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7 pm, music. Wed, Fri, 10-11 pm. Sun, 2:30-3:30 pm. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. Concordia College.

WPAV, Laurium, Mich. Tinetti & Sons.

WPAW, Wilmington, Del. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.

WPAX, Thomasville, Ga. 25 mi. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music. Mon, Wed, Fri, 8:30-9:30 pm, music. Sat, 10-11 am, codes. Sun, 11:30 am-12:30, 8:30 pm-9:30, church service. Eastern.

WPAY, Bangor, Me. Bangor Radio Lab.

WPAZ, Charleston, W. Va. Dr. John R. Koch.

WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. Elec. Supply Co. pm, news. Mon, 8 pm, concert. Eastern.

(Continued page 9)

STATION SCHEDULES

(Continued from page 8)

WPM, Washington, D. C. 300 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30
WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. 200 mi. E. B. Gish.
WQAD, Waterbury, Conn. 310 only. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 6:30-7:45 pm, music, Boy Scout news. Wed, 8:30-9:30 pm, concert. Eastern.
WQAF, Sandusky, O. Sandusky Register.
WQAH, Lexington, Ky. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, Ia. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. 100 mi. Coles County Tel. & Telg. Co. Tues, Thurs, 9-11 pm, music, lectures. Central.
WQAM, Miami, Fla. 500 mi. Electrical Equip. Co. Daily ex Sun, 5:15-5:45 pm, news, stocks, weather; 7:30-9 pm, music. Sun, 9-11 pm, music. Eastern.
WQAO, New York City, N. Y. 300 mi. Calvary Baptist Church. Sun, 11:15-13:15 am, 3:30-9:30 pm, church services. Eastern.
WQAP, Lincoln, Nebr. Am. Radio Co.
WQAR, Muncie, Ind. Press Pub. Co.
WQAT, Westhampton, Va. Radio Equip. Corp.
WQAS, Lowell, Mass. 50 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WQAV, Greenville, S. C. 75 mi. Huntington & Guerry, Inc. Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.
WQAW, Washington, D. C. Catholic University of America.
WRAA, Houston, Tex. Rice Institute.
WRAB, Savannah, Ga. Savannah Board of Public Education.
WRAC, Mayville, N. D. State Normal School.
WRAD, Marion, Kans. Taylor Radio Shop.
WRAJ, Pittsburgh, Pa. M. H. Pickering Co.
WRAM, Galesburg, Ill. 200 mi. Lombard College. Wed, 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. 100 mi. Jacob C. Thomas. Tues, Fri, 7-9 pm. Central.
WRAU, Amarillo, Tex. 50 mi. Amarillo Daily News. Tues, Thurs, 7:30-8:30 pm, music. Central.
WRAV, Yellow Spring, O. Antioch College.
WRAY, Scranton, Pa. 485 also, 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7:8:30, bedtime stories, music. Sun, 3 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAA, Marietta, O. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. Clemson Agri. College.
WSAH, Chicago, Ill. A. G. Leonard, Jr.
WSAJ, Grove City, Pa. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. Franklin Elec. Co.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 10 am, 11, 12:20 pm, 2, reports. Central.
WSAV, Houston, Tex. 300 mi. Clifford W. Vick, Radio Const'n Co. Mon, 8-10 pm, concerts. Daily, 7:15-8 pm. Central.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSN, Norfolk, Va. 100 mi. Shipowners Radio Service Inc. Mon, Wed, Sat, 8:15-9:30 pm, concert. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Daily ex Sun, 3-3:30 pm. Mon, Wed, Fri, 8-8:45 pm, reports, concert. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ba-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWAY, Chicago, Ill. Marigold Gardens.
WWB, Canton, O. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400 and 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:40 am, household hints; 9:40-10:25, health talks; 10:25-10:30 am, weather; 11:55-12 m, time; 12:05-12:45 pm, music; 3-3:30 music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports; 7:30-10, entertainment. Sun, November 11, and every other week, 11 am, 4 pm, church services. Sun, fill in weeks, 2 pm, 7:30, church services, special. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.
(Note.—This completes the station schedule list. The first part will appear again next week.)

How to Solder Joints

Anyone who has experimented with a Radio set has encountered troubles due to loose connections. When wires have to be connected together or to nuts, binding posts and the like, great care should be taken to see that every joint is tight and, if possible, soldered.

In your set the only connections that should not be soldered are the ones that you will have to change from time to time, such as telephones and A and B batteries. It might even be well to solder the B battery connections, as the plate batteries usually last six months.

A good electrical joint must first be strong enough to stand any strain of handling. Where two wires are joined they always should be twisted together and soldered in the center, the soldered part making a perfect connection and the splice taking up the strain.

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Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90

Consisting of:	Regular Price	Our Price
9x10½ Formica Panel	$1.42	$ 1.20
23-Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, Plain or Bank Wound with Taps	3.00	1.95
1 Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
8 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½ with hinged top	5.00	2.95
25 ft. Hookup Wire	.20	.10
Regular Price	$19.37	

Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in a schematic form but are drawn so that anyone without any technical knowledge can follow with ease. Our Price **$11.90**

Freund's Wonder Circuit $13.20

KHG, KFI, and KYY received from Chicago on one tube.

	Regular Price	Our Price
9x10½ Formica Panel	$ 1.42	$ 1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95
Bakelite Dial	.75	.25
Variometer	5.00	1.95
43 Plate Vernier Condenser	7.00	3.45
Remler Bakelite Socket	1.00	.45
8 Binding Posts	.80	.40
CRL Variable Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
Howard Vernier Rheostat	1.50	1.35
Regular Price	$24.32	

Complete instructions for drilling, assembling and wiring furnished with each order. Written so that anyone without any technical knowledge can understand. Our Price **$13.20**

Complete Parts for Reinartz Circuit

Includes 1 7x18 Formica Panel, 1 Bakelite Socket, 1 Howard Vernier Rheostat, 23 Plate Condenser, 11 Plate Condenser, 3 Switch Levers, 2 Dozen Switch Points, 1 Reinartz Wound Coil, 1 Variable Grid Leak, 8 Binding Posts, 25 Feet Tinned Wire, 1 Base for Coil, 1 Mounting Base Board, and 1 Diagram to Construct This Set. Complete **$11.45**

Complete Parts for Flewelling Circuit

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loud speaker or phonograph can be used in place of headset. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel. Complete **$12.45**

Moulded Variometers	$3.45	Brandes Superior Headset	$5.75
180° Moulded Variocouplers	$3.45	Valley Battery Chargers	$16.20
Mahogany Variometers	$1.95	Antenella Aerial Plug	$1.15
180° Bakelite Variocouplers	$1.75	3 Coil Honeycomb Mounting	$3.45
Freshman Variable Grid Leak and Condenser	75c	2 Coil Honeycomb Mounting	$2.60
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35	WD-11 Bakelite Sockets	50c
Master Baldwin Type C Units with Cord	$3.95	Barchass Coils	$1.95
Master Baldwin Type C Head Sets	$6.95	Firth Cord Tip Plugs	60c
		Thordarson Amplifying Transformers	$2.45

Complete Knockdown Receiving Set

This includes 2 Variometers, 1 Coupler, 3 Dials, 1 Rheostat, 1 Cunningham Detector Tube, 1 Bakelite Socket, 1 Mahogany Cabinet, 7x18 Formica Panel, 6 Binding Posts, 1 Switch Lever, 12 Switch Points, 2 Stops and 1 Diagram to construct this set. Set is capable of receiving 1,000 miles if installed with outdoor aerial **$17.95**

Complete Parts for 2 Step Amplifier

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete **$12.45**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now	$1.75	$7.00 value 43-plate Vernier Variable Condenser	$3.95
$3.70 Value, 23 PLATE, now	$1.45	$6.50 value 23-plate Vernier Variable Condenser	$3.45
$3.30 Value, 11 PLATE, now	$1.35	$6.00 value 11-plate Vernier Variable Condenser	$2.95
$3.10 Value, 5 PLATE, now	$1.25		
$2.70 Value, 3 PLATE, now	$1.15		

U.S.A. SIGNAL CORPS Aviation Type 194-W WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at **$9.95**

Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special **$4.65**

3000 Ohm GUARANTEED HEADSETS, $8.50 Value $3.65

MAGNAVOX, LOUD SPEAKER, Type R3 . . . . . $27.45

Jacks

Pacent Single Circuit	$0.35
Pacent Double Circuit	.50
Federal Single Circuit Filament Control	.35
Federal Double Circuit Filament Control	.50

HONEYCOMB COIL

1,500 Turns	$1.50
1,250 Turns	1.50
1,000 Turns	1.25
750 Turns	1.00
250 Turns	75c
150 Turns	60c
100 Turns	50c
75 Turns	40c
50 Turns	40c
35 and 25 Turns	40c

Cabinets

MAHOGANY AND WALNUT

6x 5⅜"	by 6"	deep	$1.45
6x 7⅜"	by 6"	deep	1.95
6x14"	by 6"	deep	2.45
6x16½"	by 6"	deep	2.95
6x22"	by 6"	deep	2.95
9x12½"	by 7"	deep	3.95
9x10½"	by 5½"	deep	2.95

Rheostats	45c	Signal Corps Super Sensitive Microphone Transmitters	$2.45	Lightning Arresters	95c	Anti-Capacity Switches	$1.50
Sponge Rubber Ear Caps, Pair	50c	Solid Copper Aerial Wire, 100 ft.	35c	2-Slide Tuning Coils, at	$1.95	Lightning Switches	$2.65
Dials, 2, 3 and 3½ inch	25c	Spaghetti Tubing, yard	10c	Phone Caps, for mostly all phones	25c	Hydrometers, now at	45c
Grewol Detectors	$1.65						

FORMICA PANEL, ⅛" thick, Black or Brown, Square Inch 1½c

We guarantee all merchandise purchased of us. Mail orders receive immediate attention

Complete Parts for Single Tube Reflex Circuit $32.65

Consisting of	Regular Price	Our Price
43-Plate Vernier Variable Condenser	$ 7.00	$ 3.95
Radion Loop Aerial	7.00	5.95
Cunningham C301-A Tube	9.00	5.95
Grewol Glass Inclosed Detector	2.00	1.65
All American Radio Frequency Transformer	4.50	3.45
All American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
2 .001 Micon Condensers	.70	.50
1 .002 Micon Condenser	.45	.35
Howard Potentiometer	1.50	1.35
Howard 25 Ohm Rheostat	1.10	1.00
8 Binding Posts	.80	.40
9x10½ Formica Panel	1.42	1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95

Complete instructions for drilling, assembling and wiring furnished so that anyone with no technical knowledge can easily follow. Regular Price $45.22 Our Price **$32.65**

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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Columbus 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, March 24, 1923 No. 11

University Radio Courses

Large Number of Colleges Now Broadcast

ENGLAND and Germany are planning to broadcast university extension courses. A number of prominent institutions of learning in the United States have made a beginning in this direction and their reports of the encouraging success attending their efforts show us that the possibilities of the new method are not underestimated.

Sixty other educational institutions are broadcasting educational and musical programs, forty-seven of them being colleges and universities. The combined area nominally covered by these institutions has been estimated to be seven or eight times the total area of the United States.

Air-Borne Religion Aids Church

Congregation Grows Instead of Getting Smaller

THERE are some ministers who declare Radio religion a curse and that there is a disposition to loll in an easy chair and listen in a moment or two at a sermon from some broadcasting station instead of going to church.

There are many listeners in, but is Radio making serious inroads upon church attendance? We have an idea that persons who were pious enough to go to church before Radiophony became popular, still will go to church.

A few years ago, by the way, many ministers regarded the automobile as an invention of the devil because it took more people away from church than it took to church, yet around any country church nowadays on Sundays there is a whole flock of flivvers. The many who go motoring—and not to church—Sundays did not go to church when they could not go motoring. Religion that is killed by gasoline or by Radio never was alive.

Beginners Have Less Patience

Increase in Ready-Made Instruments Causes Laxity

THE Radio enthusiast developed by the growth of broadcasting has not the same amount of patience, or knack for tinkering with a set to develop and improve its latent possibilities as the boy or man who took up Radio in the days when only code was in the air.

With the great increase in the manufacture of ready-made sets of great range there has been a growth in the number of persons who are inclined to use the set that is the easiest to adjust, instead of the one that will give the best results.

The way for a novice to go about it is to start in with a small set, preferably a crystal set. After he has become familiar with its operation he may safely attempt to work a more powerful receiving set.

Many of the sets now offered for sale are very selective. This means they are capable of receiving a station only when it is tuned very closely, or when the station desired is so close as to require practically no tuning. This is a great advantage as it enables one familiar with the operation of such a set to tune in a distant station that would otherwise, if received at all, be only a jargon because of the interference from other transmitters operating on almost the same wave length.

Aid to Exploring Parties

Travelers Find Receiving Sets Invaluable

THOSE who make expeditions into desert lands are proceeding with a very much greater feeling of safety since Radio came into wide use. One of the great conveniences that Radio has furnished is the ability to get the correct time.

Scientific observations are greatly dependent upon having the correct time, and heretofore getting this has entailed hard work in the way of calculations. About a year ago an expedition was sent by the American Museum of Natural History to explore the central plateau of Asia. The members first went to Peking and from there to Kaisan and thence to Urga, Mongolia, a distance of about 800 miles.

Traveling heretofore into the desert has involved silences and isolation that often overwhelmed men, but with the present expedition, every evening at sundown, Peking was picked up by Radio and the news of the day learned, and in addition, scientific data procured.

Condensed

By DIELECTRIC

At the Franklin Institute, in Philadelphia, a very appropriate ceremony took place not long ago. The Elliott Cresson Medal, which has been awarded to only a comparatively few scientists, was bestowed upon Dr. Lee de Forest as the inventor of the audion tube. Every owner of a tube set must feel that the American Society of Civil Engineers has honored itself in honoring so eminent a Radiotrician. This invention is undoubtedly one of the most important to the progress of Radio science. Any Old Timer will verify that statement.

When baseball was in season we listened in for the returns from the World's Series and thousands enjoyed that single feature. Then football came along and many games between the great universities were followed play by play by interested persons scattered all over the country. There is always a Radio audience when sports of any kind are being broadcast and fortunately for them the winter months do not prevent certain types of games being played. Basketball is another of the sporting events receiving some share of attention by broadcasting stations. Evidently a very exciting game of basketball was played by the Universities of Michigan and Wisconsin a short while ago. At least the announcement from Station WHA, at Madison, Wis., and the very audible commendation of the crowd for one or the other team, made one listener in break out in perspiration from the excitement of witnessing a splendid forward pass reach its mark. Yes, you fairly see all that is going on as the plays come through your set. KDKA had to inform the Radio public in the vicinity of New York (as well as elsewhere) of the progress of the fight between Greb and Tunney. You may have to ask someone on the other side of the continent about events transpiring right at home—but it's on the air, if you want it.

The idea of supplying shut-ins with Radio receiving sets is worthy of commendation and emulation. There are several agencies at work seeing to it that unfortunate beings need be without contact with the Radio world no longer. One of the well-known broadcasting stations, WOC, at Davenport, is carrying on just this particular work. They announce from time to time the installation of a new set in the room of a sufferer, who is unable to get about and previously lacking means of hearing the interesting things so many of us have been enjoying for some time. Public subscriptions provide the means of purchasing sets for these people, and there is no doubt of their genuine appreciation for what is being done along this line. It is difficult to conceive of a gift that would be better suited to conditions surrounding a shut-in than a Radio set. Why not begin an organization with this idea in mind in the locality in which you are living?

In case there may be some of you readers who failed to notice the statement concerning Dr. De Forest's contribution to the advancement of the science of Radio at his alma mater, I shall take this occasion to mention it. He has provided a fund for the purchase of a library of Radio works, and another for a course of lectures by experts for the benefit of advanced students, at Yale University. What Dr. De Forest has done for the science to which he is devoting his remarkable ability, surely others could do for institutions not so favored at present. It is with the hope that someone in the habit of whiling away time in the reading of this column will be inspired to action by duplicating his example, that I pay particular attention to so worthy a subject by so eminent a man.

The first item to which your attention is called this week concerns opera. In New York City the Wagnerian Opera Festival gave permission to WJZ to broadcast a few of their performances. If there is any question in the minds of those who are at the head of things at the Metropolitan Opera House, in that city, as to the advantages to be derived from broadcasting opera music, then they are not open to any argument. Following the broadcasting for the first time from the Manhattan Opera House of one of the Wagner operas there was almost a riot for seats to the next performance. Undoubtedly Radio had nothing to do with this occurrence, so agreeable to the management!! No, the publicity element in broadcasting is unquestionably nil. Why, then, such interest in opera so suddenly manifest? Oh, well, some of the receiving sets couldn't translate the jargon so they came to headquarters to find out what it all meant. That's pretty lame reasoning, but I defy the Metropolitan to produce any better. All objections so far are weak signals and may yet fade out entirely.

It is only natural that having met with so much success the Radiowls should find a competitor in the field of Radio Clubs. The newly organized aggregation of DX Fan-atics perhaps wisely eschewed the animal kingdom in looking for a name and chose instead from the vegetable kingdom. I say "wisely" because Michigan is known as the parent state of vegetarian cults, and though Battle Creek is slightly distant from Detroit, it is not so from a DX-er's standpoint. At any rate, the Red Apple Club is a reality, made so by Station WCX, the Detroit Free Press broadcasting station. It is about time for another club with an euphonious name to spring up somewhere. How about forming the Bachelor Button Fraternity, or the Maiden Blush Sorority? If prizes are to be offered by each new club to secure larger membership, then the name really counts for little. The main requirement is to begin at a late hour (late for the particular section) and acknowledge each new member's oath of allegiance before broadcasting any entertaining (!) features. Chicago should start a "Flivver" Society. Then you would see a club with some membership!

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Classify Her as Chickenoradiophan

I must let you in on the following received at the Shepard Stores station:

Dear WNAC,

Kindly appraise Middleboro Male Singers of our appreciation Sunday Concert. Also ask them to come again.

Our set is on the dining table. Yours truly was tuning in when "Mandalay" was announced. Mrs. M. had just got her plate charged with a hot chicken dinner which she had labored long to prepare. Then the problem-climax. Which to let wait; hot dinner or "Road to Mandalay." She got them both by donning receivers, with cord draped across the table carefully dodging the gravy bowl and the boiled onions.

Can you beat that for efficiency? Just try eating and receiving and note the difficulties with only a WD-11 tube. —RADIOKNUT JEAN SARGENT.

Referred to National Museum of Radioknuts

Dear Indi.—In Scientific American supplement No. 134 July 27th, 1878 B. P., appears an article by Prof. C. W. MacCord, captioned "A Mechanical Curiosity," describing a machine of six gear wheels, which by turning the crank 262,500 times will result in one entire revolution of the smaller wheel.

Can you give me a hook-up whereby I can use this machine as a vernier adjustment in connection with the 11-plate "invariable condenser" shown on page 51 of the catalogue of a well-known Chicago River mail order house? E. E. JAYEFF.

Outdoor Sports Modernized

Dear Indi.—Little Aileen listens each night for the tale of the sandman. One cold afternoon she was taken down town by a neighbor and for the first time in her life saw a man wearing ear-muffs.

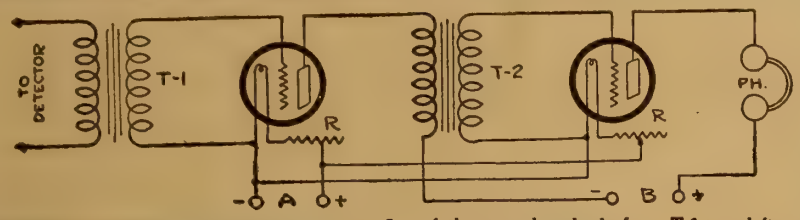
Returning home she reported the incident to her mother. "He was walking along the street with his Radio receivers on his ears," she said. POLLY-"IOWAY SHEBA."

A. B. C. Lessons for Radio Beginners

Chapter XII—Regenerative Radio Receivers

By Arthur G. Mohaupt

A VERY efficient form of Radio receiving circuit is that known as the regenerative receiver. This circuit employs the so-called feed-back principle, by which is meant that part of the energy of the plate circuit is fed back upon the grid circuit so that it has to pass through the tube a second time with the result that the intensity of the signals heard in the phones is greatly increased. We will now see how this regeneration is accomplished.



In Figure 41, Chapter XI, there was an error. One of the secondary leads from T-1 was left open. The diagram above shows the correct connection

Tuned Circuits Are Necessary

In order to consider the very fundamentals upon which the principles of regeneration are based, it is necessary to again recall the operation of the three-electrode vacuum tube. It will be remembered that under suitable conditions of plate pressure and filament current adjustments, very slight variations in the grid potential will cause relatively large changes in plate current.

Further, if the plate circuit of the system shown in Figure 42 is so adjusted that the maximum values of the current oscillations flowing in it occur at the same instant as those in the grid circuit, the result will be that part of the energy will be transferred from the plate to grid circuit. This energy will strengthen the oscillations induced from the antenna primary circuit and thus cause potential variations of much greater intensity to be impressed on the grid.

Effect of Feed Back

The effect of this plate circuit energy being fed back upon the grid circuit is that the signals are amplified many times

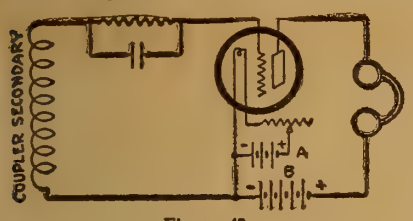


Figure 42

their normal amount in the detector tube. Signals which without regeneration can hardly be heard, can be made very strong by employing the regenerative principle. Signals from much greater distances can also be received with regenerative circuits. Other additional features are that with regenerative receivers tuning is much sharper and less interference is encountered when several nearby stations are operating at or nearly at the same wave lengths.

Converting Tube Set Into Regenerative

To convert an ordinary vacuum tube receiving circuit into a regenerative circuit, one of two schemes can be employed: Either the grid and plate circuits can be tuned so that both oscillate at the same frequency (be in resonance), or some additional device can be introduced into the circuit by means of which some of the energy of the plate circuit will be fed back upon the grid or input circuit. Such coupling of the two circuits may be either of the inductive, capacitive or resistance type. With any of these systems, however, very fine adjustments of the coupling devices must be provided so that the correct degree of regeneration can be effected without causing distortion of the signals. Inductive coupling seems to be most satisfactory and most easily operated, and hence is now used to a very great extent in all modern receiving apparatus of the better class.

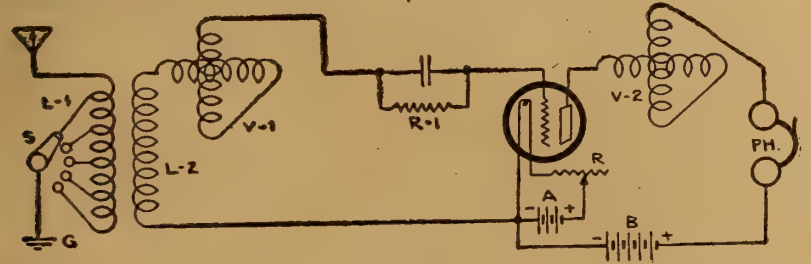


Figure 43

Two-Variometer Circuit

The so-called "two-variometer circuit" is a very popular type of receiver employing the principle of tuned plate regeneration. The circuit has been in use for a long time and has proven itself satisfactory to thousands of users.

As is illustrated in Figure 43 it consists of a variocoupler and two variometers, one variometer being connected in the grid circuit and the other in the plate circuit.

The general operation of the circuit is as follows: By means of the switch S the primary L-1 of the variocoupler is adjusted to the wave length of the incoming oscillations. The next step is to tune the grid circuit by adjusting the variometer V-1 until it has the same oscillation frequency as (is in resonance with) the received signals. After this has been accomplished, the degree of coupling is corrected by rotating the secondary L-2 of the coupler until the signals can be heard with greatest clearness. Finally the plate circuit is tuned by adjusting the variometer V-2. This throws in the regeneration and greatly increases the strength of the sounds produced in the telephone receivers. During the entire tuning process, of course, it may be necessary to make slight readjustments of the various settings in order to obtain best results.

Operating the Set

In operating a set of this kind, or any other regenerative set, the control knob marked regeneration (sometimes also called the tickler) should first of all be set for minimum or zero, before any tuning is attempted. If this is not done, such a frequency as to partially annul the weaker incoming signals, the result being that it may be very difficult, if not impossible, to catch or tune in anything at all. However, after the set is in tune, the regeneration knob is slowly turned to the right or toward the maximum position. It may be that at first no appreciable or noticeable changes will result, but suddenly a point will be reached at which a surprising increase in signal strength will occur. It is at this point that the frequency of the plate circuit is in synchronism (in resonance) with the grid circuit, and regeneration can take place.

Regeneration should not be increased too much, for otherwise the two circuits will again be thrown out of resonance, and the quality of the signals will be spoiled due to distortion. It is generally more advisable to sacrifice signal strength slightly in favor of purer and more perfect tone qualities.

Reducing Filament Current

Another worthwhile point to bear in mind is that the filament can be burned at a somewhat reduced brilliancy by increasing the regeneration. Two important advantages are gained from such operation for by burning the filament at a lower temperature the life of the tube will be greatly prolonged and the drain on the A battery will be less severe.

When first learning or attempting to operate a regenerative set of the two variometer type, a little trouble may at first be experienced by the beginner; but he should not be discouraged, for it is only a matter of becoming acquainted with the circuit and learning its peculiarities. He should bear in mind that operating a set of this kind involves two distinct and individual processes: First tuning the set to the desired wave length and then cutting in the regeneration. If both are attempted at one time serious difficulties or complications may set in.

Learning to operate a Radio receiving set involving several adjustments is very much like learning to run an automobile. A Radio set has its good qualities just as well as its limitations; and although two sets may be built exactly alike, their operating characteristics may be widely different. Patience is the main quality to be developed by the operator, and after he has learned his set all troubles will disappear and endless enjoyment and pleasure will be in store for him. Never condemn a set until you are sure that all the auxiliary equipment is in perfect operating condition—such as the antenna and ground connections, the A and B batteries, etc.

The Equipment Needed

The apparatus needed for constructing a two-variometer set of the kind just described is as follows: In the first place, a convenient size of panel to use is 7 inches by 21 inches by $\frac{1}{4}$ inch. The general layout of the panel should be arranged as is illustrated in Figure 44. As far to the left as possible is mounted the first variometer, which, as is labeled, is connected into the grid circuit. To the right of the variometer is mounted the variocoupler. The shaft of the coupler, as well as the shafts of the two variometers, project through the panel and are provided with the three-inch dials. Between the first are connected the taps of the coupler primary.

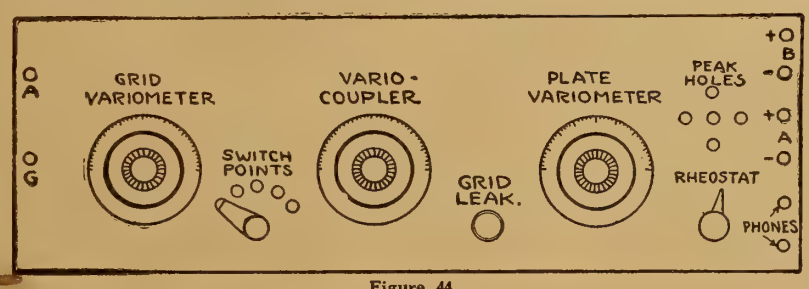


Figure 44

To the right of the coupler dial and at about the same level with the switch lever on the left, the grid leak is mounted

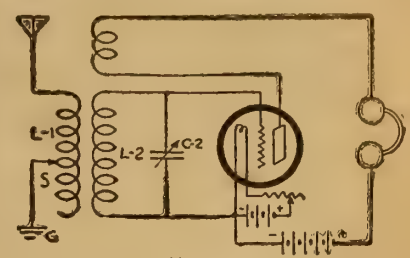


Figure 45

to the panel. This grid leak can be either of the lead pencil mark or of the variable type, although the former is much cheaper and practically just as satisfactory. Further to the right is the second or plate variometer with its control dial. And clear at the right end of the panel is the rheostat for controlling the tube filament, the socket being mounted directly in back of the rheostat. Above the rheostat a number of small peak holes are drilled

(Continued on page 12)

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Consists of 6x10 panel, one 3-1 transformer, one 7-1 transformer, two rheostats, two sockets, three jacks, five binding posts and print for construction. $10.40

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11 Plate Condenser	1.45	Phone Plug	.35	Thordarson 7-1 Trans.	2.95
5 Plate Condenser	1.10	Carter Phone Plug	1.05	All Amer. 10-1 Trans.	3.95
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One or Both Antennae Used on Receiving Set

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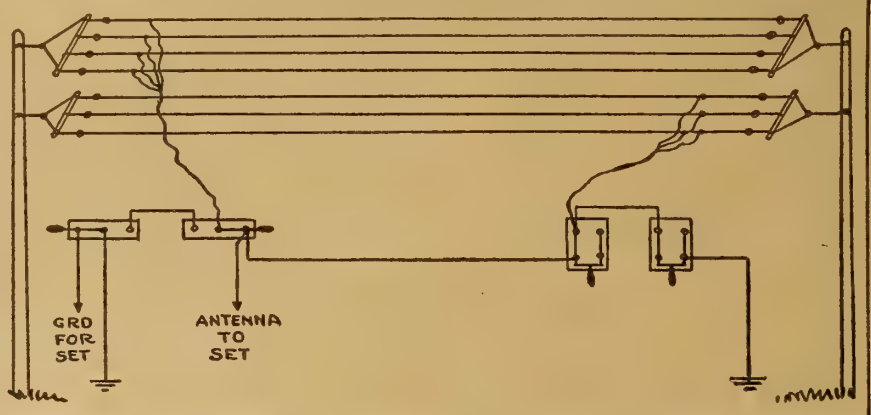
Either antenna or both can be used by manipulating the switches. Both switches are thrown to ground both antennae when it is desired to cut out interference.

This sort of a connection may be looked upon as a foolish arrangement but I have been using it for many weeks and it gives very good results.—R. L. Clinton, Hammond, Ind.

CONNECTIONS MADE TO AERIALS



WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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A. B. C. LESSONS

(Continued from page 11)

through the panel for observing the operation of the tube.

Binding Posts Needed

Eight binding posts are needed, two for the aerial and ground, two for the A battery, two for the B battery and two for the telephone receivers. The antenna and ground terminals are mounted at the left, the antenna on top and the ground below. The two binding posts for the A battery are inserted at the right end toward the bottom, and the two B battery terminals toward the top on the right. It is a good idea to mark the battery terminals positive and negative, for if the battery connections are reversed the apparatus cannot function properly.

The variometers and variocoupler can be either purchased or made at home, but it is recommended that ready built ones be used, for these are more correctly designed and will hence give better and more satisfactory operation. The wiring should preferably be done with No. 14 or 16 tinned copper wire covered with some form of insulation tubing. To present as neat an appearance as possible all wires should be run in straight lines and bend at right angles. Wherever wires cross they should always do so at right angles so as to prevent any inductive interference of one circuit upon another. Likewise another condition to be avoided as much as possible is to run parallel wires close to each other, for the inductive influence of one upon the other may cause undesirable and disturbing noises in the telephone receivers.

In making connections it is best practice to solder all contacts so as to insure electrical connection and prevent any corrosion of the touching surfaces. Soldering paste can be used to good advantage, but it should be used sparingly and the joint wiped perfectly clean when finished. Better than soldering paste is acid with zinc disolved in it, but this also should be used sparingly.

The Inductive Feed-Back Circuit

Another very common and efficient regenerative circuit operating on the inductive feed-back principle is illustrated in Figure 45. It is evident that this circuit is merely a modification of the simple vacuum tube detector circuit, regeneration being effected by means of the socalled "tickler coil" which is connected in series with the plate circuit and is in inductive relationship with the secondary of the variocoupler. This coupling, however, must be adjustable in some way so that the degree of regeneration can be altered in order to obtain the necessary amount of feed-back action. The circuit operates in the following manner.

The circuit is first tuned to the frequency of the incoming signals by adjusting the dial switch S connected to the taps on the primary of the variocoupler. The circuit is next thrown into resonance by adjusting the tuning condenser C-2 and the rotor L-3 of the variocoupler. Finally regeneration is thrown in by tuning the tickler coil to the right until the signals are heard with maximum loudness in the phones. Due to the action of the tickler coil the current oscillations flowing in the plate circuit induce corresponding potentials in the coupler secondary. These combine with the potentials induced by the coupler primary and thus cause greater variations in potential to be impressed upon the grid of the detector. This in turn causes increased current pulsations to flow in the plate circuit. In general, the circuit is comparatively simple, is easily constructed, and gives very good results.

Chapter thirteen

Chapter thirteen, which will appear in the issue of next week, will deal with Radio frequency amplification. Radio frequency amplification it will be remembered plays a very important part in long distance receiving when the incoming signals are too weak to efficiently operate the detector. It is also very important when reception with a loop aerial is attempted. Consequently everyone who wishes to obtain complete information on this important phase of Radio operation should be sure to provide himself with this next chapter.

Wherever possible, the receiving set should be inclosed in a dustproof cabinet.

Value of Short Wiring

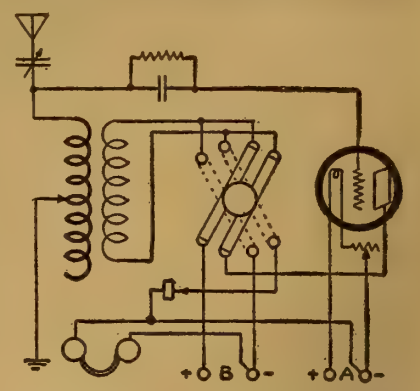
The reason for the use of short wiring and right-angle turns in connecting a set is a simple one. Every wire carrying an electric current has a magnetic field; if two wires are placed near each other, they will absorb current, but if placed at right angles they will oppose each other, which is just what they should do. If the wires are run long they will, of course, meet with other long leads, and there will be adverse induction.

Perfect Contact

All electric contacts should be soldered. They provide a continuous metal contact between wires, and this does away, to a large extent, with losses by resistance.

Circuit Using Either an Audion or Crystal

In the illustration is shown a simple hook-up in which a crystal and an audion



are used separately as desired. A series parallel switch is used for making a quick change from a crystal to an audion in the circuit.

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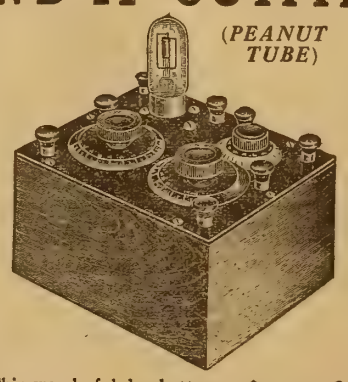

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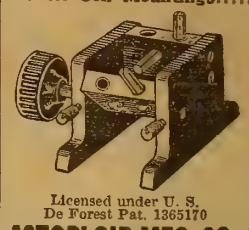

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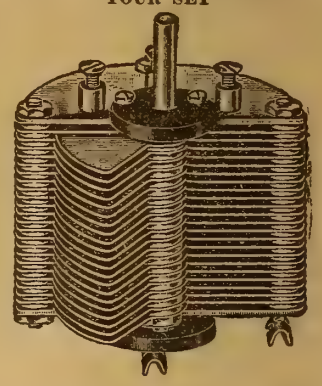

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Latest Reflex Is An "Inverse Duplex"

David Grimes Invents Radical Reflex Design

A NEW type of reflex circuit that has aroused considerable interest is the "Inverse Duplex" shown in the hook-up diagram. It is the invention of David Grimes of Staten Island. The peculiarity of design in this circuit is in the inverted reflex action.

In the popular form of reflex circuit, after the detector stage the audio frequency amplification follows in consecutive order starting from the first or second tube. The phones are connected in the plate circuit of the second or third tube depending on whether there are one or two stages of audio frequency amplification. In the inverse duplex circuit the reflex is first carried to the second tube, then from the plate circuit of this tube it runs through an audio frequency transformer and is coupled to the first tube. The phones are connected in the plate circuit of the first tube.

PARTS NEEDED

2 Radio Frequency Transformers.
2 Audio Frequency Transformers.
2 Amplifier Tubes.
1 Detector Tube.
3 Tube Sockets.
1 Vernier Rheostat.
1 Power Rheostat (2 Tubes).
4 .001 Mfd. Mica Fixed Condensers.
1 .0025 Mfd. Mica Fixed Condenser.
1 400-Ohm Potentiometer.
1 .0005 Mfd. Vernier Variable Condenser.
Panel (10 by 18 by ¼ suggested).
8 Binding Posts.

Loaded Distribution More Even

This method distributes the load more evenly between the two tubes under double duty. The second tube is carrying the amplified energy of the first tube in the Radio frequency stages. In the normal reflex, this second tube would again carry the amplified energy of the first tube for the audio frequency stages. However, in the inverse duplex, this second part is reversed, so that the first tube carries the amplified energy of the second tube for the audio frequency stages. In this way the second tube furnishes the most plate energy for the Radio frequency, while the first tube gives the most for audio frequency. This more uniform distribution of the load has resulted in an increased efficiency in the tube action and circuit operation.

By-Pass Condenser Locations

Another variation of this new circuit is the location of the by-pass condensers. Instead of being placed across the primary and secondary transformer windings they are connected directly in the grid to filament and plate to filament leads.

A potentiometer of 400 ohms resistance is used as a resistance unit for connecting in the secondary of the second audio frequency transformer to the grid circuit of the first tube. In this way the Radio energy is controlled by the resistance in series.

It will be noticed that the grid circuits of all tubes are connected to the negative filaments.

Apparatus Required

If possible all transformers used should be of the shielded type. The writer has had varied experiences with Radio frequency transformers in reflex circuits. Many of the standard types will not operate satisfactorily at all, while others are only mediocre in results. No doubt special transformers for reflex circuits will soon be on the market.

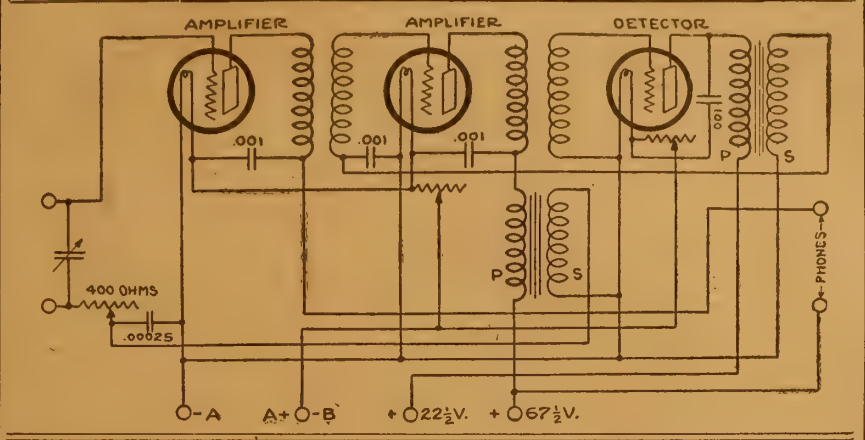
The quality of the tubes used in reflex circuits is more than an important item.

Condensers should all be of the mica dielectric type. Paper condensers cannot be substituted with any prospects of satisfactory performance.

Only two terminals of the potentiometer are used inasmuch as the connections are made similar to a rheostat.

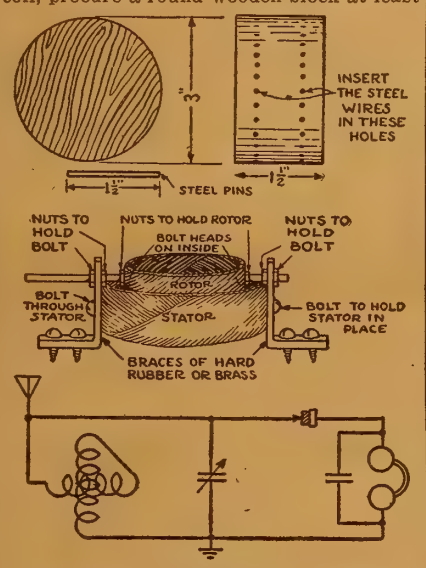
The battery connections are indicated clearly in the diagram.

GRIMES INVERTED REFLEX SET



Honeycomb Variometer

A honeycomb variometer combines both the compact and low capacity features of the honeycomb coil with the added variable inductance feature of the variometer. First, to prepare for the making of the coil, procure a round wooden block at least



three inches in diameter and 1½ inches across the end. See that it is perfectly round and then punch 25 holes evenly spaced around one end of the block. At a distance one inch from these holes punch 25 more holes exactly across from the first holes.

Winding pins of some kind are necessary. Procure some stiff steel wire and cut it into lengths 1½ inches long. The winding will require 50 of these pins. Insert these in the fifty holes. This makes the block ready for winding.

Procure some No. 22 or 24 insulated wire and wrap a couple of turns of it around one of the pins for an anchor. Count 13 pins and put the wire around the pin just opposite. Count 13 more pins and put the wire around the pin on the opposite side, which will bring the wire one pin in front of where it was started.

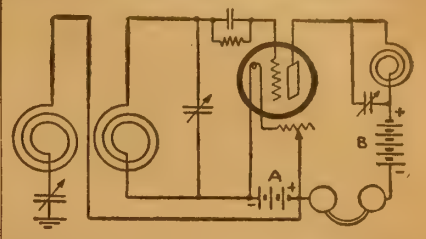
There will be no need of counting the pins any farther; just place the wire in front of the pin wound on previously. Put on sixty turns on the rotor of the variometer, two layers and ten more turns, each 13 pins being counted as a turn.

After winding the rotor do not take it off but give it a coat of banana oil or some very hard white shellac. When this is dry take a ball of string and wind it around the rotor, which is the first coil. Wind it evenly if you want a flat stator, but if a concave stator is wanted make the string crown in the center between the pins.

On top of the string make another coil exactly like the first, but with only 55 turns. The five turns less on the stator about evens up the amount of wire on each coil. Shellac the second coil very thoroughly and when dry take out the pins and remove the string between the two coils. They will have a perfectly even and close space between them. The coils are mounted on two pieces of brass with brass bolts as shown in the illustration.—Edwin Rust, Phoebus, Va.

Phantom Circuit Uses Three Spider Web Coils

Upon experimenting with the set using no aerial described in Radio Digest, issue of December 16, 1922, I found a much better circuit, the drawing of which is



shown herewith. For tuning I use three spider web coils, each having 30 turns. Three variable condensers of .001 mfd. capacity are required.—Kenneth Steele, Northumberland, Pa.

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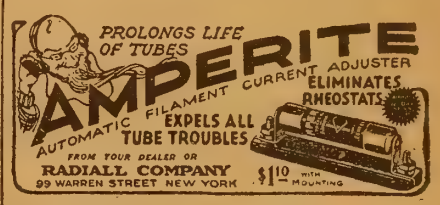

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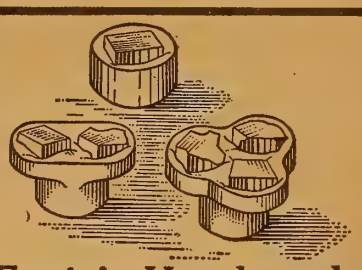

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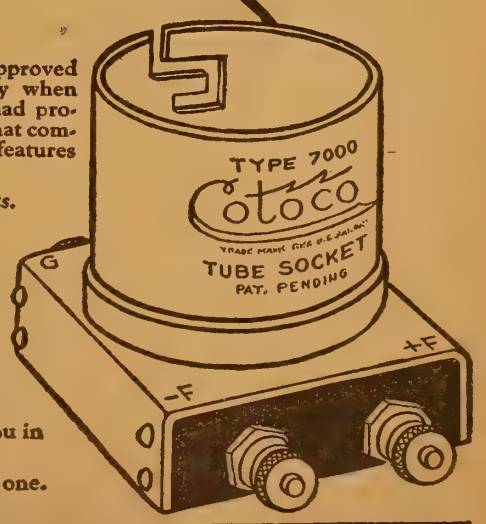

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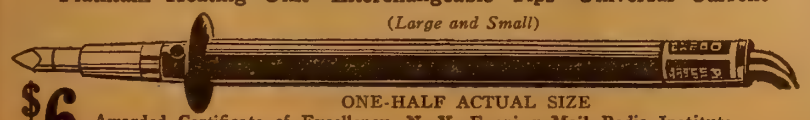

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How to Construct a Flewelling Super Set

The Third Prize Winner in the $100 Flewelling Set Contest

By A. J. Barclay, C. E.

(Editor's Note.—The following article is the third prize manuscript submitted in the $100.00 Flewelling Set Contest conducted by Radio Digest. The second prize set description will appear next week. The first prize paper will be published in the following issue, that of April 7.)

WHEN the Flewelling Circuit first made its bow to the Radio public in Radio Digest, last October, it created perhaps no more interest than any of the other new hook-ups which are announced daily in newspapers and Radio journals. But the astonishing results produced by it soon gave evidence that this circuit contained elements which bid fair to make it one of the epochal discoveries of modern Radio science.

Upon hearing of the results obtained by others, the writer decided to try some experiments of his own, the results of which have been so astonishingly and unusually successful that the present article was written in hope of assisting others to obtain equally gratifying results.

The hook-up employed in his set is shown in Figure 1, and is practically the same as the diagram shown in the January 20 issue of Radio Digest. This diagram embodies certain suggestions of the writer, as further outlined herein.

List of Parts Employed

The parts used in making the set are as follows:

A. 1 Panel, 6x8x$\frac{3}{16}$ inches, Bakelite.
B. 1 Panel, 2x4½x$\frac{3}{16}$ inches, Bakelite, for condenser bank.
C. 1 Mounting board, White Pine, 6x8x ½ inches.
D. 1 "Asterloid" 3-Coil Honeycomb mount.
E. 1 23-plate Walnart Variable Vernier Condenser.
F. 1 Howard Vernier Rheostat.
G. 1 Federal Double-Circuit Jack.
H. 3 Giblin-Remler Honeycomb Coils, L-50, L-75 and L-100.
I. 1 Freshman Variable Grid Leak and Condenser.

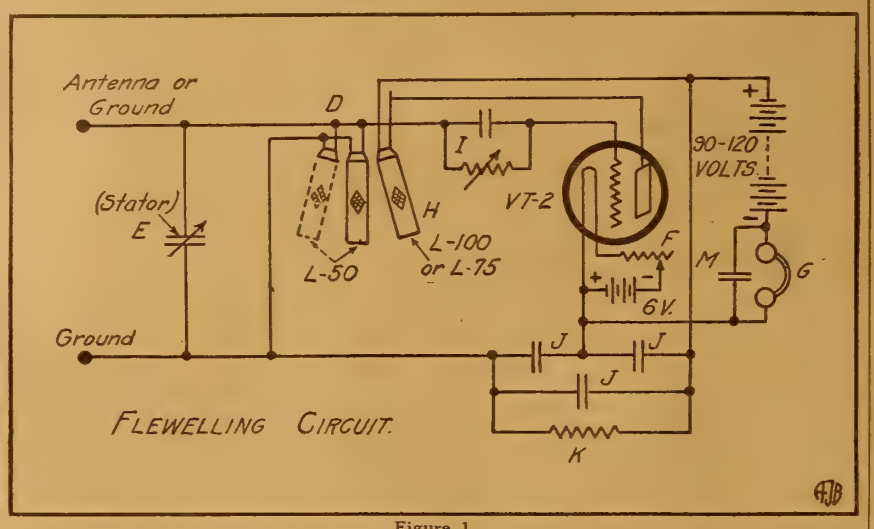

Figure 1

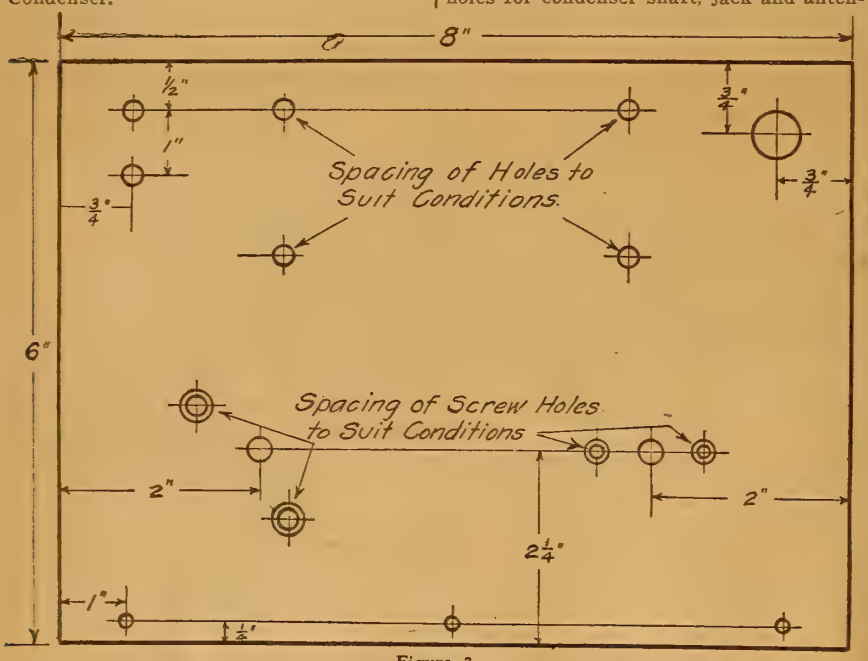

Figure 2

J. 3 Kellogg Tubular Condensers, .005 MF., with clips.
K. 1 Kellogg Tubular Grid Leak, 0.4 Meg., with clips.
L. 1 Kellogg V.T. Socket.
M. 1 Micadon phone condenser, .001 MF.
N. 1 V.T.-2, or Western Electric "E" tube.
O. 1 Sheet tin foil, 6x8 inches.
P. 1 Walnart Vernier Knob (optional).
Q. 6 Binding Posts.
R. Miscellaneous brass nuts, bolts, No. 14 tinned copper wire, etc.

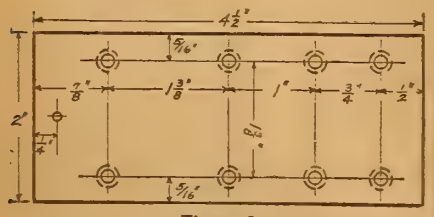

Figure 3

It will be noted that this list contains exact descriptions of each article used. This by no means signifies that this particular make is the best to use. There are on the market many articles that will serve the particular purpose just as well, and maybe even better.

The letters designating the parts above have been uniformly used in drawings, photographs and text, to avoid possible confusion.

Panels and Mounting Board

The panel A should be laid out and drilled as shown in Figure 2. Holes shown by double circles should be countersunk, all others being straight holes. Sizes of drills have not been specified, and must of course conform to the particular requirements of the apparatus used.

When the panel is drilled, and ready, it should be given a coat of shellac on the back side, and when this has dried to a sticky consistency, the sheet of tinfoil should be laid on it, and carefully rubbed into close contact. The panel holes can then be opened up with a pencil. Remove the foil for a short distance around the holes for condenser shaft, jack and antenna post, and be sure to insulate all circuits (except ground) from this shielding. Separate the variable condenser from the shield by sheet mica, or similar insulation.

Lay out and drill panel B as shown in Figure 3, this being a compact and convenient arrangement. All holes are countersunk on the back side. This panel is conveniently mounted upright on the mounting board C, by being screwed against a small block of wood mailed to the mounting board.

The mounting board C, which holds all apparatus not fastened to panels, should be boiled in paraffine or heavily varnished to prevent warping. It is fastened at right angles to panel A by means of screws through the three lower holes.

Coils Used; Assembly Suggestions

The writer used for honeycomb coils (H) an L-50 in the primary circuit and an L-75 or L-100 in the secondary. The larger coil in the secondary gave the best results, but it is suggested that some experimenting be done, as set characteristics will differ.

The photographs show more clearly than any description, the relative locations of the parts. However, a few comments on the assembly may be of value.

Use No. 14 tinned wire for connections. In general all joints should be soldered. Great care should be taken to keep heat away from the fixed condensers. It is apt to spoil them. Use screws or clips for these connections.

Body Capacity Aids

The knob of the writer's variable grid leak was slotted with a hacksaw, and the adjustments made with a long screw driver. This eliminates body capacity, which otherwise is very bad. This leak is the source of most of the trouble found in using the set, as it is very critical, and must be set just exactly right. The setting will vary with changes in the rheostat setting, and a readily changeable leak of fine graduation is essential.

Connect the stator plates of variable condenser E to the aerial circuit. This will eliminate body capacity effects, which otherwise cause serious annoyance. A vernier condenser at this place is essential, as close enough tuning can hardly be obtained by dial alone. The writer used in addition a Walnart vernier knob, and found the added convenience well worth the outlay.

How to Operate Set

In operating the set, the following suggestions will be found useful:

Place the coils close together, using middle and one outside plug. Light the filament to proper intensity, and turn condenser knob until the screeching, if any, disappears. Then adjust the variable grid leak until the oscillatory whistle almost, but not quite, disappears.

Then revolve the condenser knob slowly, and listen. First there will be silence, except for the whistle. Further turning may

(Continued on page 15)

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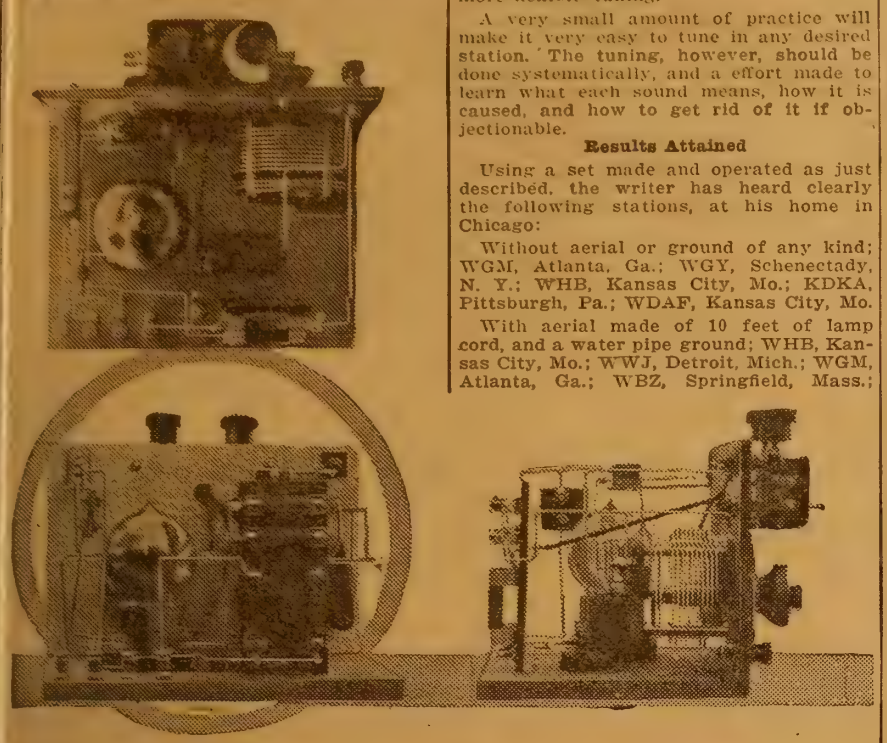
FLEWELLING SET

(Continued from page 14)

produce a gradually increasing roaring sound. Continue turning until a "twittering" sound is heard, caused by heterodyne effects within the set. When this point is reached, stop, and continue the adjustment



slowly with the vernier plates. As the vernier is turned, the heterodyne effect will sound like a siren, rising to a shrill squeal, then sinking again into silence. These silent points are the ones to watch, as any reception will be effected with the vernier in one of these positions.

Tuning Refinements

Should a careful trial of the entire "twittering" portion of the dial bring no result, separate the honeycomb coils about ⅛ inch, and repeat the condenser adjustment. If still no result, separate the coils to ¼ inch, and try again. And so on. When voice or C.W. is heard, it may be cleared and intensified by careful adjustments of coils and condenser.

By connecting the center (fixed) and free movable coil in parallel, it is possible to have the primary coil fixed or removable at will. With a movable primary, much looser coupling is obtainable, resulting under certain circumstances in more flexible tuning.

A very small amount of practice will make it very easy to tune in any desired station. The tuning, however, should be done systematically, and a effort made to learn what each sound means, how it is caused, and how to get rid of it if objectionable.

Results Attained

Using a set made and operated as just described, the writer has heard clearly the following stations, at his home in Chicago:

Without aerial or ground of any kind; WGM, Atlanta, Ga.; WGY, Schenectady, N. Y.; WHB, Kansas City, Mo.; KDKA, Pittsburgh, Pa.; WDAF, Kansas City, Mo.

With aerial made of 10 feet of lamp cord, and a water pipe ground; WHB, Kansas City, Mo.; WWJ, Detroit, Mich.; WGM, Atlanta, Ga.; WBZ, Springfield, Mass.; WHAZ, Troy, N. Y.; KSD, St. Louis, Mo.; WDAF, Kansas City, Mo.; WSB, Atlanta, Ga.; WGY, Schenectady, N. Y.

With a 10-foot lamp cord aerial only, no ground; all stations above; WDAJ, College Park, Ga.; WOC, Davenport, Ia.

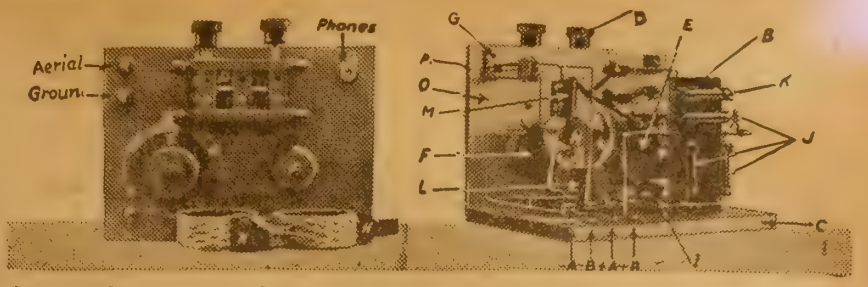
With ground only; WGM, Atlanta, Ga.; WGY, Schenectady, N. Y.; WDAF, Kansas City, Mo.; KDKA, Pittsburgh, Pa.; WWJ, Detroit, Mich.

Ground Best on Ground Post

Although instructions generally say that when the ground only is used, to put it on the antenna post, the writer got his results with the ground wire attached to the ground post as usual. In this position it really seems to drain off static, and thus to give clearer reception.

The question of a cabinet is left to the desires and ingenuity of the reader.

No amplification of this circuit has been attempted as yet. But certain faint voices, and other indications give rise to the belief that with further elaboration, even greater distances may be covered. Experiments with this circuit seem as yet to have only scratched the surface of its possibilities.



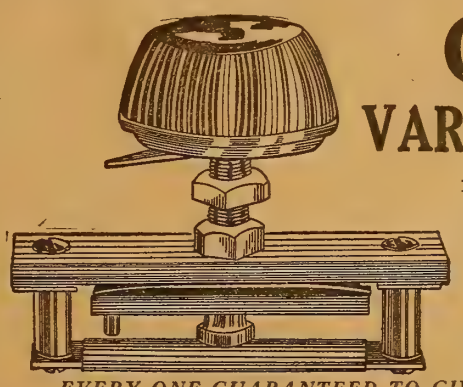
WGI "BLIND" RESEARCH

(Continued from page 7)

phraseology used and the power of description are the means by which the "human programme" places the Radio listener in a receptive attitude and does away with a greal deal of explanatory remarks during the progress of the play.

Victrola Plays Overture

A third point of interest which is meeting with the approval of Radio listeners is the overture and entr'actes. The victrola has proven to be the best so far. A great deal of careful study is being made as to the kind of music to present. There is a decided difference between a theatre audience and a Radio audience. The familiarity of home surroundings makes it imperative to choose music which will hold the attention. Another factor in this problem is the greater cosmopolitanship of the Radio audience over that of the theatre.



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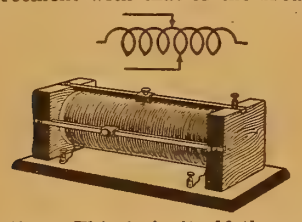
broadcasting station. The cords terminate in two tips; in the illustration above a phone slug has been connected to the tips, but this is only used in conjunction with a set equipped with telephone jacks.

Double-Slide Tuning Coil

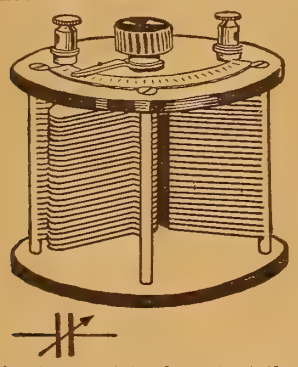
In a single slide tuning coil, only one slider is used for tuning. When a tuning coil is connected in series in the antenna and ground circuit, the antenna and the lead in already provide a certain natural wave length and the tuning coil is used to add the remainder necessary for agreement with that of the broadcast-



ing station. This is in itself then a complete circut. In addition the current has a circuit passing through the detector not the antenna and lead-in wires in and receivers. This circuit, since it has series, should have a few more turns than the antenna circuit in order to get the best results. A two-slide tuner, then, provides means for tuning this second circuit to closer agreement by adding a few more turns to it.

Variable Condenser

Another method of tuning that is often used is by means of a variable condenser. It is sometimes used alone in place of the tuning coil or in conjunction with a tuning coil when it permits much more accurate and closer adjustment. Contrary to the impression of many new fans it does not increase the volume of the



crystal set, except to the extent that more accurate tuning will give better reception. When connected in series it enables the operator to reduce the natural wave length of the set, but does not build up the wave length. It is sometimes provided with one or two rotating plates that are controlled separately from the others. This adjustment permits finer control and is called a "vernier."

Fixed Condensers

Fixed condensers as shown are usually built up of copper or tinfoil sheets wrapped in wax paper and are used as phone or grid condensers. Where connected across the receivers, a capacity of .001 or .002 microfarad is most often used and serves as a by-pass for unrectified currents to pass through the phones. With tube sets these condensers are used for grid control and have a capacity of .00025 to .0005 microfarad. Leads should never be soldered to the terminals of this type of condenser as the heat is conducted

to the sheets which in turn heat the waxed paper dielectric, soften the wax and cause short circuits, rendering the condenser valueless.

Book Reviews

Radio Simplified. By Kendall and Koehler. New developments of Radio described in non-technical terms. The latest and most efficient hook-ups. Tells about vacuum tune, loose couplers, variocouplers, variometers and everything necessary for those who aim to get the best results in building or operating a Radio outfit. Price $1.00.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

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Home Radio—How to Make it. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Raidiophones. Twelve full page illustrations and diagrams. Price, 75c.

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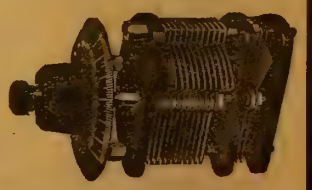

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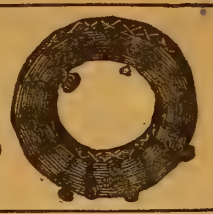

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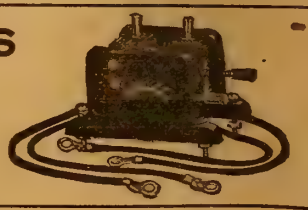

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Construction of the Ultra Reinartz Receiver

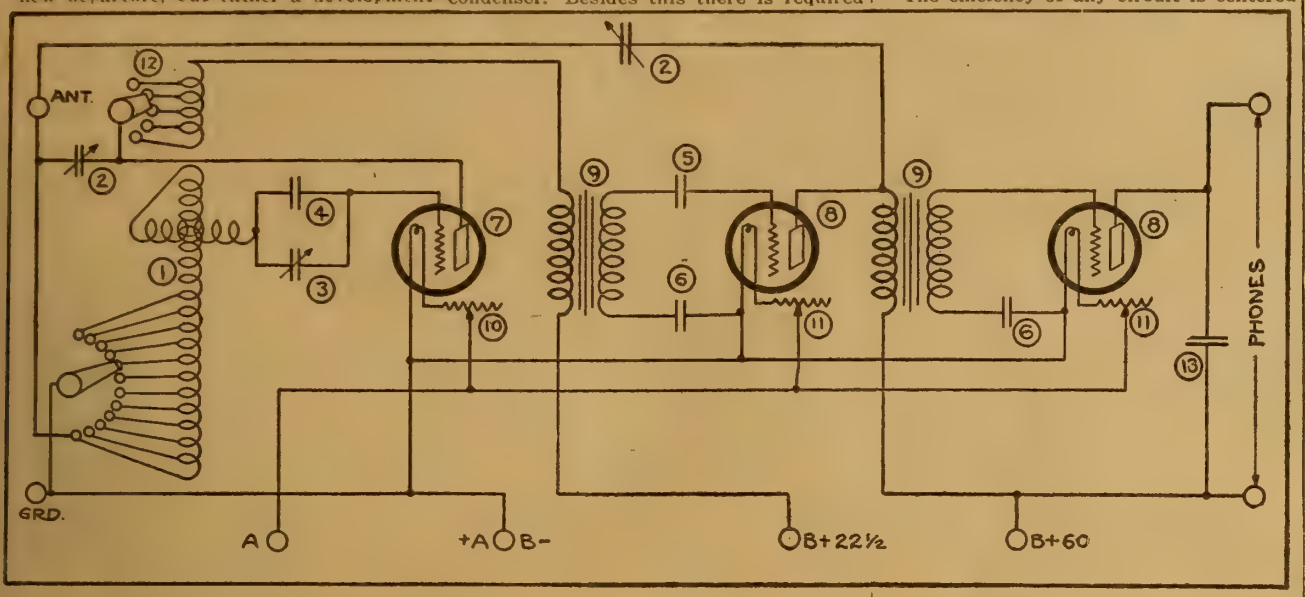
Part I—The Circuit and How to Make Tuning Unit

By H. J. Marx

THERE is a never-ending demand for new circuits, each one a little better than the preceding, and thus, each one making another step of progress in the science of Radiophony. There are but three or four types of circuits that have promised sufficient possibility of further development and thus furnished sufficient incentive for experimentation.

The Ultra Reinartz circuit then is not a new departure, but rather a development of the old familiar form of Reinartz, with some of the many improvements that have been made from time to time.

The circuit is given herein. In the series of articles complete details will be given for the construction of the set with the circuit diagram by numbers is as follows: (1) tuning unit, (2) two .0005 Mfd. vernier variable condensers, (3) .001 Mfd. vernier variable condenser, (4) .0015 Mfd. fixed condenser, (5) .0025 fixed condenser, (6) two .00015 Mfd. fixed condensers, (7) detector or soft tube, (8) two amplifier or hard tubes, (9) two audio frequency transformers, (10) vernier rheostat, (11) two ordinary rheostats, (12) tapped tickler and choke, (13) .002 Mfd. fixed condenser. Besides this there is required eight binding posts, three tube sockets, one panel 10 by 22 by ¼ inches, two switch levers and seventeen contact points.



The primary circuit as in the old form of Reinartz is controlled by a tap switch which varies the number of turns in use. The grid circuit is controlled by the variation of the self-induction similar to the variometer in the so-called two-variometer circuit.

An unusual feature is the high capacity of the grid condensers, connected in parallel with one another, one of which is fixed and the other, variable. This method of connection permits a variable control of high capacity values without expensive large capacity variable condensers.

Another departure from the usual form of circuit is the additional condensers in the grid circuit of the amplifying stages.

The Tuning Unit

The efficiency of any circuit is centered to a great extent in the tuning unit. It is important that the dimensions and instructions be followed carefully if results are to be obtained.

Fiber, bakelite or even cardboard tube can be used. The wire used in winding the tuning unit is Number 18 double cotton covered. In winding a spacing cord—any light weight string or heavy thread will do—is kept between the turns of wire. Another method is to use some Number 20 bare copper wire, winding the two wires together. When finished, the tube and winding are given a coat of celluloid-acetone solution or other "dope". When this is dry the bare copper wire is removed. This leaves the insulated winding fixed in position with even spaces and gives a minimum of between-turns capacity in the coil.

Turn Numbers and Taps

The primary winding starts with twelve turns tapped every turn. Then nine turns are wound without taps. After leaving a half-inch space nine more untapped turns are wound. The end of this winding is then connected with pigtail braid to the rotor winding.

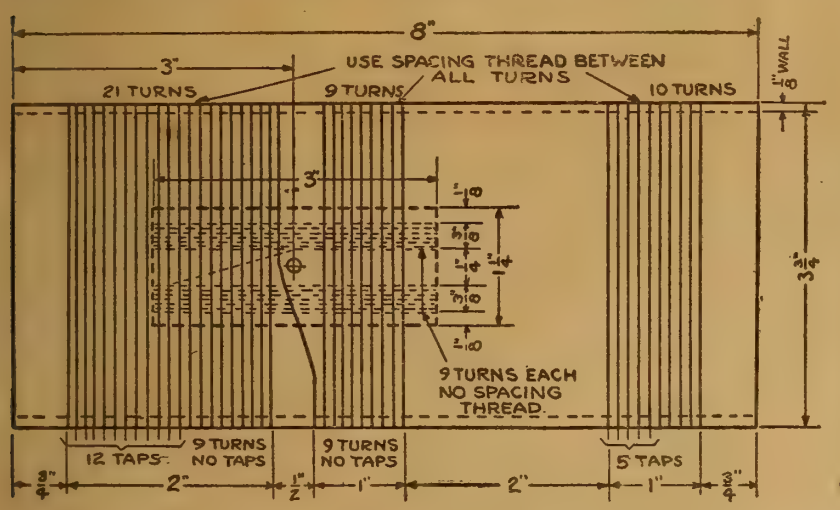
The rotor winding consists of two sets of nine turns each, wound with Number 22 D.C.C. wire not separated by spacing thread. A quarter-inch space is left between the two sets of turns. The free end is connected to a terminal on the large tube by another pigtail connection.

Tickler Coil Winding

The feed back winding is spaced two inches from the finish of the last winding on the large tube. The first five turns are each tapped but the last five are not.

All taps should be staggered around the tube so that sufficient clearance will be had for making soldered connections to the contact points of the switches without crossing and touching of the leads.

Details for mounting the tuning unit on the panel will be given in the next issue.



two stages of audio frequency amplification. The addition of Radio frequency amplification has not been attempted as yet and therefore will not be discussed.

The Ultra Reinartz Circuit

The apparatus required and shown in

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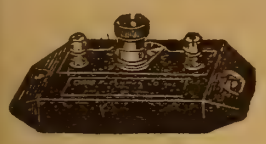

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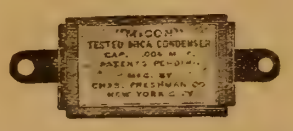

Size	Price
.00025	$ .35
.0005	.35
.001	.40
.002	.40
.0025	.50
.005	.75
.006	1.00
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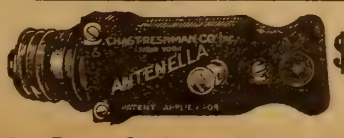

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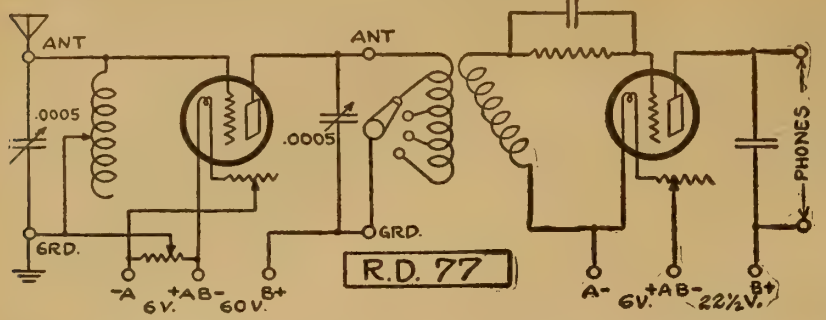
HOW TO ADD RADIO FREQUENCY



THE ONLY drawback in the minds of many Radiophans to the addition of Radio frequency amplification stages to their sets is the lack of definite knowledge concerning the necessary hook-ups. The hook-up diagram R.D. 77 illustrates an inexpensive method of hooking one stage of Radio frequency amplification to a standard type of receiving circuit. The standard type in this case is represented as a simple double-circuit variocoupler set. The parts required for the additional stage of Radio frequency are one single-slide tuning coil, a variable condenser of .0005 mfd. capacity, one hard tube, a socket, a filament rheostat, and one 200 to 400-ohm potentiometer.

The single-slide tuning coil should be one designed for from 200 to 400 meters in order to avoid dead end losses incurred in long wave length tuning units. The variable condenser need not have a vernier plate inasmuch as the single-turn contact on the tuning coil slider will give sufficiently accurate adjustment.

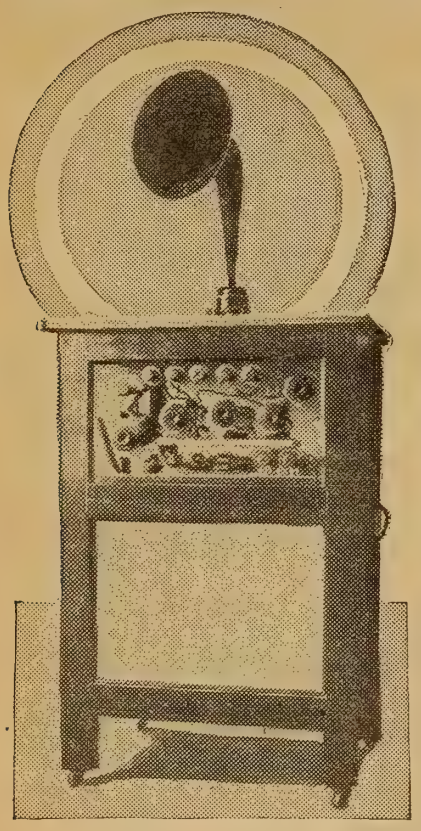
The two binding posts in the original detector set are indicated and marked as antenna and ground. The antenna post connects to the plate of the amplifier tube while the ground post is connected to the positive terminal of the 60-volt plate battery used for the plate potential on the amplifier tube. The same storage battery can be used for both tubes. The plate potential on the detector tube can be controlled by tapping the plate battery of the amplifier tube. The addition of audio frequency amplifying stages will have no effect on the Radio frequency hook-up.

This method of connecting Radio frequency amplification will be found more or less uniform and applicable to most of the receiving circuits now in use. On this account the hook-up has become popular.

Homemade Glass Panel

Ever since I saw a set with a glass panel I have wanted one. I found by trial that a hole could be drilled in glass easily. Then I made a panel of glass as follows: The panel is 12 to 24 inches, enclosing two stages of Radio with a detector and two stages of audio.

To the fans who want the best I would say by all means don't fail to give the Radio amplification a trial on a glass panel. Anybody that can drill steel can drill glass by using a little care; all that is required is to make a drill of each size you will need out of a three-cornered file, grinding it slowly on a hand emery to prevent heat and drawing the temper. Then



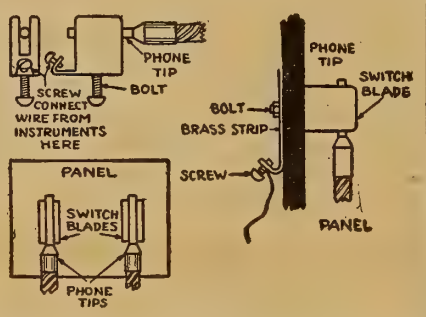
use turpentine in which gum of camphor has been dissolved for a lubricant. Lay the glass on a perfectly smooth surface and use a breast drill, drilling until the point of the drill comes through, then turn the glass over and very carefully finish the hole edge. I drilled my panel in this way, having over fifty holes, and never had a bit of trouble.

I find by using the magnavox with the four stages is much better than trying to use a horn with the receivers, as in this way I can cut back the filament on my audio tubes and eliminate much of the noise while the magnavox will amplify the music to the desired intensity. When receiving from stations in the east and California I can use the full amplifying power of all stages and bring them in loud enough to hear all over the house.—Howard N. Booth, Jackson, Miss.

Radio is being charged with the responsibility for a decrease in fiction reading during 1922.

Connection for Phone Tips

The clips or parts used to receive the blades of an ordinary knife switch will make good connections for phone tips. These clips are removed from the switch



block and mounted on the panel. The cord tips are pushed into the space used for the switch blade.—Laurence Fensky, Menasha, Wis.

Advice to Prospective Buyers

When buying a Radio set, ask the dealers to show the inside of the apparatus. If all connections are not soldered, the wires will become loose and reception will be impossible. Paste or acid, if spread carelessly over the wiring, or dirt inside the receiving box, will cause trouble. If fillings have been allowed to get into the telephone receiver, the attraction of the magnets will gradually cause them to make their way through the insulation and render the phones worthless. Watch out for these difficulties and avoid the disappointment that comes when a Radio enthusiast gets all set to listen in, and can't.

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Keeping a Log of the Day's Work in Radio

A log, whether of the Radiophan or ship's officers, is a record of the day's run or the day's work, so to speak, with a record of all the happenings aboard ship or over the Radio and brief accounts of things encountered on the voyage (by ship or Radio). Commercial Radio operators are required to keep such a daily log, and many amateurs have adopted the habit. Whether one be a spark or merely a listening enthusiast, it is not a bad scheme to adopt, and is easily kept; as easily as one's daily office memo pad or the daily diary so affected by some conscientious souls.

The log can be an ordinary blank book without ruling, to give the owner a chance to rule off the spaces for his own log. The spaces will include the date, time, call and remarks and being from page to page can be carried over from one page to another when necessary, for the day, so that the log will give data from the time of sitting in until quitting time, which in some cases might be as late as 3 A. M. The more neatly and carefully this is kept, the more satisfaction there will be in it. Any unusual distant signals heard or stations identified should be carefully logged, and in the remarks column any data entered that will serve to check up with proof that such a station was heard. Thus fans in Vancouver getting Havana, Cuba, should always enter some portion of the program, along with the exact time, in order to prove up his claims, together with comment on the quality of the signals received.

DATE	TIME	CALL	REMARKS
1-13-23	4.PM	—	One Watch
"	4.55	2LO	London England on 5 Stage
"	6.15	WGI	Medford-Code Practice
"	7.00	—	Several Stations.
"	7.30	KDKA	Children's Programs
"	7.53	—	High Pitched Spark
"	8.00	WNAC	Shepard's Commences Program
"	8.30	—	Several Local Whistles
"	9.00	WEAF	Signals Strong & Clear
"	9.15	—	Amateurs Working
"	9.55	WJZ	Time Signals
"	10.05	NAA	Weather on 710 Meters

To the regular spark this Radio log may not be such a novelty, but there are many thousands of owners of listening sets to whom such a method of keeping track of the results obtained has never occurred. Appended is a sample log, which can be modified as desired, or amplified to include more columns if deemed necessary.—F. N. Hollingsworth, Boston, Mass.

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Fixed Crystal Detector

Not being content with the usual type of crystal detector for use with a reflex circuit I proceeded to construct a fixed detector. A small crystal mounted in a metal alloy was fitted in the end of a fiber tube ½ inch in diameter and ½ inch long so that the bottom of the mounted crystal was flush with the end of the tube. A strip of brass ½ x 1 inch was fastened to the bottom of the mounted crystal with a drop of solder. The brass was fastened to a hard wood board with a small screw and was used as one connection to the crystal.

By means of a small brush dipped in shellac the edges of the crystal were coated so as to insulate the lower connection from the upper surface of the crystal. The tube was then filled with brass fillings. A wire was led from the brass fillings to a binding post on the board for the other connection. Sealing wax was then used to seal the tube.—Frank Currin, Spokane, Wash.

Westinghouse Village, in Pennsylvania, boasts of 143 Radio sets in its 200 homes.

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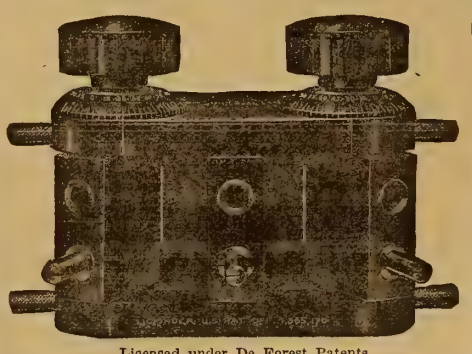

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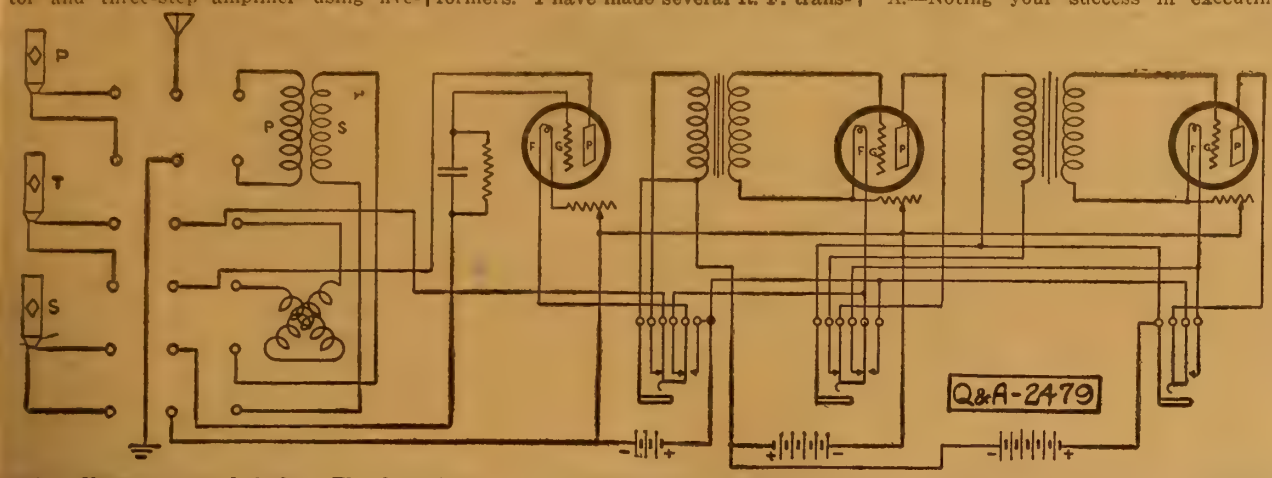
Questions and Answers

Short and Long Wave Receiver

(2479) TW, Kansas City, Mo.

I am making a short and long wave receiver and am using a variocoupler and honeycomb coils. I have a six-pole double throw switch so I can use either one of the tuners. I would like to have you publish a hook-up using the above and also a detector and three-step amplifier using five-spring filament control jacks. The last step has two jacks; a four-spring for a horn and a three-spring for phones.

A.—Complying with your request we show Diagram Q & R 2479, employing apparatus of your specifications and showing two stages of amplification. Filament control jacks are shown. A third stage of amplification may be added in like manner as those shown.



Reflex Circuit

(2092) WLF, Newark, N. J.

I am certain that you will be interested to know that I have built the one tube Reflex set described in recent issue and I desire to say that it is some little set. I get all the local stations on a loud speaker with sufficient volume to be heard all over my apartment and would say that the volume is equal to my detector regenerator using one step of audio-frequency amplification. I have also had Atlanta, Ga., on the phones with fair volume and several stations within a hundred mile radius. I am using a Murad R. F. and an Atwater-Kent A. F. transformer, a peanut tube with 67 volts on the plate and a very poor crystal. I cannot note any difference in reception by adjusting the 240 ohm potentiometer and find that the set works just as well when it is removed from the circuit. There is a very bad hum in the set similar to an A. C. hum when listening for long distance when the local stations are off and I have tried to eliminate it by adjusting the potentiometer, B battery current, filament current and even taking the set to another location, but I cannot get rid of it. It is not audible when the local stations are on, that is, tuned in, because of the fact that the music is so strong as to drown it out. What can it be?

I have become so enthusiastic over the results attained in my one tube Reflex, that I am going to build the three tube set and there are several questions I wish you would set me right on.

I would like to know if there is any gain in efficiency by using different ratios in the different stages of the R. F. transformers. I have made several R. F. transformers by winding No. 40 wire on a spool with a slot 1¼" diameter and ⅛" wide by about 1/16" deep. The first one I wound, had 90 turns for primary and 180 for secondary. When this was substituted for the Murad, in my one tube set, it was found to operate with about the same efficiency. I built three others with ratios of 1; 1½ to 1; 2½ to 1; 3 but they did not work near as well. Now what I want to know is, shall I use the 1; 2 for the first stage, the 1; 2½ for the second or use the same ratios for each stage?

I have a core of a bundle of wires from an old spark coil which measures one-half in diameter by five inches long. Can I make the 1½ millihenry choke from this and if so, how many turns and what size wire must I wind on it. I would like to cut the length of this core down to make it more compact, so please give me the proper specifications.

Can I use a single rheostat to control the three tubes or is it advisable to have separate ones for each?

What in your estimation, is the best crystal detector to withstand the high current which a set like this must necessarily pass?

Where can I buy the 50,000 ohm resistance 7A? Can a R. F. transformer be used in this stage efficiently?

Can a Reinartz or Flewelling tuner be used with the Reflex? If so, how is it connected?

A.—Noting your success in executing Reflex circuit we are pleased to congratulate you upon the fine D X reception attained!

Referring to "hum" cited; it is difficult to venture an opinion as to its source without a personal inspection. Is it possibly due to some electrical appliance in close proximity? This would cause such a condition.

There would be very slight gain in efficiency through using different ratio transformers in proposed amplification. Would advise using the same on all stages. Two layers of number twenty wire should equal one and one-half M. H.

Separate rheostats for control of tubes is advisable. Any type of Galena crystals is good for use in this circuit.

Would suggest that a grid leak will serve as resistance. Do not know, at this writing, where a fifty thousand ohm resistance could be secured.

Radio Frequenc. transformer can be used effectively, as suggested.

It would not be practical to use either Reinartz or Flewelling tuner with this Reflex circuit.

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U. V. 201A	6.50
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$45.00 Magnavox Loud Speaker, Type R3	26.95
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.50 Dials, 2 and 3-inch	.23
1.10 Dayton Rheostats	.79
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$2.00 Grewol Enclosed Crystal Detector	1.55
$25.00 6-Volt 100 Ampere hour Batteries	13.95

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Radio Illustrated

Wouldn't you like to make it tea for two, with Gilda Gray, premiére danseuse of the Follies, pouring from the Radio teapot? Of course Gilda has not the least idea whether the set has marcelled coils or is insulated with mascara, but she can hear music from 1,000 miles away and that is enough to thrill any feminine heart © Photonews

Above is a close-up of the Radio teapot set, one of the most intricate bits of apparatus made by an amateur Radiophan. It is equipped with both tube and crystal detectors and tuning is accomplished by a 13-point switch and the adjustment of the relation between three spider web coils. The size of the set can be appreciated by comparison with the hand holding it © Photonews

Front and back view of the panel and all the necessary parts on Mr. Flewelling's receiver, which has set the Radio world astir and has brought about reception that has not been equalled by so few parts. At present there has never been published a hook-up which can be used for such distance work as this set will bring in, or can there be found one that requires so little adjusting to get equivalent results

MAR 31 1923
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Reflex, Ultra Reinartz, Flewelling—This Issue

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF.

Vol. IV Copyright, 1923 R. D. P. Co. Inc. CHICAGO, ILL., SATURDAY, MARCH 31, 1923 No. 12

UNCLE SAM OWNS AIR

WILL SETTLE WAVE LENGTH SAYS HOOVER

Harold T. Powers Suggests Elimination of All Spark Sets

Receivers to Be Cheaper

Squier Says Give Broadcasters War Department's Wave Lengths

BULLETIN

By E. E. Plummer

WASHINGTON.—On Wednesday, March 21, the public hearing of the Radio Wave Length Conference was closed and the Hoover Committee went into an executive session to promulgate recommendations of changes to be made until adequate legislation can be passed.

At the hearings Wednesday, J. C. Rosenthal, of New York, representing the music publishers and authors threw a bombshell into the meeting by announcing that all broadcasting stations would be asked to make payment on copyrighted material used and if refused the matter would be taken into the courts.

WASHINGTON.—When the senate failed the American public in an emergency it automatically forced 1923 development under 1912 conditions. The only source of cheer to the Radio public then lay in the conference of representatives of the Radio industry which opened in Washington March 20.

In the opening address of the conference, Secretary of Commerce Hoover, chairman, said, as Congress had failed to bring about any step of progress that it was almost necessary and the government probably would give the broadcasters a wave band of six hundred to sixteen hundred meters.

Ether Is Government Property

Following Hoover's talk a survey of Radio inspectors and complete report of the Radio field was read. Following this all members of the conference were heard in turn. Each signified his willingness and hearty co-operation to make the old law do. Major General Squier said broadcasters could have the war department wave bands if needed, as wars do not happen daily. Hiram B. Maxim asserted it was necessary

(Continued on page 2)

Photo by White Photo by Bachrac

The first trans-Atlantic test of Radio telephony by WJZ was enhanced by "The Original Radio Girl," Miss Vaughn De Leath. (She appears in the circle to the right.) In "The Laughing Lady," recently broadcast by WJZ, Ethel Barrymore (above) plays the star role

R. C. A. OFFERS AID TO INVESTIGATE TRUSTS

Preliminary Arrangements for Commission's Probe Nearing Completion

WASHINGTON, D. C.—Officials of the Federal Trade Commission in charge of the Radio investigation under the Congressional resolution state that preliminary arrangements are being worked out. It is not believed at the present time that any hearings will be held and it is probable that only two or three experts will work on the investigation. It is understood that the Radio Corporation of America has offered to co-operate with the commission in any way in which it can.

ASSISTANT INSPECTOR VISITS DISTRICT EIGHT

SPRINGFIELD, O.—Following the report of several complaints in this section, A. G. Parkhurt, assistant Radio inspector for the eighth district, traveling out of Detroit, visited this city. He inspected several Radio stations about which there had been some complaint and will make his report within a short time.

France Handles Letters as Deferred Message Traffic

WASHINGTON, D. C.—A Radio letter service has been put into effect in France, by which letters mailed in that country and received at the Radio station are transmitted as deferred traffic after the clearance of all other messages. On arrival in the destined country they will be mailed to the addressee. The messages must be written in plain language of either the country of origin or the country of destination and must contain at least 20 words. The French Government accepts no responsibility for delays in transmission occurring in the mails of the countries concerned in the Radio letter service.

CALIFORNIA CHURCH WILL TEACH RADIO

EL CAJON, CAL.—This city has a community church that has come to the conclusion that Radio is the great thing of the day. The church, therefore, has installed a complete Radio equipment in a tower room and has invited those who are interested in the use and development of Radio to join a class for instruction. A licensed Radio operator is in charge.

U. S. STATION HEARD ALL OVER ENGLAND

ONE MAIL BRINGS FORTY-TWO LETTERS

British Fans Acknowledge Reception of Special Program Broadcast by WOR

NEWARK, N. J.—The remarkable ease with which British Radiophans receive the broadcasting stations in this country during periods when their own local stations are shut down was emphasized by the recent test made by station WOR, at Newark, N. J., in giving a special midnight program. In a single mail last week the operators of the station received forty-two letters from fans scattered all over England.

Incidentally, the test shows how thoroughly the British public have gone in for Radio, because in order to hear the program they all had to stay up until 5 o'clock in the morning. Even the most "died-in-the-wool" distance bug in this country would scarcely stay up that late for a record.

Gets Humorous Letters

By a strange coincidence, the fan who reported receiving WOR on a loud speaker was N. G. Baguley, of 23 The Park, Newark, England. He wrote a lengthy letter describing his set, which consisted of three stages of Radio-frequency amplification, a detector and two stages of audio.

All of the letters emphasized the clarity of the announcers voice—J. E. K., who in private life is Miss J. E. Koewnig. In this respect some of the letters were really funny. One from a fan in Woking, just outside of London, wrote: "Dear Sirs (and Madame your Mistress of Ceremonies whose clarity of speech is wonderful)." Another from Margate was addressed to "The Lady Announcer of WOR."

The letters give an insight to the transmission of the new broadcast stations in England, as all of them were unanimous in declaring that the modulation of all the American stations heard by them was far superior to the local stations.

WEIRD SIGNALS SAID TO COME FROM MARS

French War Ministry Conducts Investigation of Mysterious Noises

PARIS.—The war ministry is investigating mysterious Radio signals heard March 19, which some Radio experts suggest came from Mars.

The Eiffel tower, which is the most powerful station in the vicinity, did not utter the peculiar noises and no other French station emitted them, it is said.

Astronomers say they do not believe another planet was signaling the earth, but they professed ignorance of the origin of the weird Radio noises. Experts agree that it was not static.

U. S. OWNS ETHER

(Continued from page 1)

that the broadcasters learn co-operation as have the amateurs, and this was something lacking by a majority of the plants today. W. A. Wheeler, of the Department of Agriculture, said he thought the agriculture depaartment of second importance only to mobile forces, after Hoover had advanced a new theory that the ether was government property.

Sets Will Be Cheaper

Major Armstrong expressed himself as a believer that Radio sets would be at a minimum in price to everyone within a year, so increasing the listeners in of the broadcasting stations. He urged that the wave lengths be regulated as speedily as possible. L. E. Whittemore, of the Bureau of Navigation, coincided with Mr. Armstrong in his views and said he believed the summer months would not experience the slump in Radio interest as was shown last year. C. Francis Jenkins, inventor of Radio pictures, asked consideration of the conference for his new device when fixing the wave lengths.

A suggestion for the elimination of all spark transmitters was presented by Harold J. Powers of the Amrad. However, this issue was greeted as impracticable by quite a number of the conferees.

Wave Length Big Issue

The prime questions of the conference are understood to be the re-distribution of wave lengths and elimination of interference, especially in the interest of broadcasters and Radio receiving set owners. A new survey of the wave bands assigned tentatively last year to different services by the committee will be made with regard to any vital changes which may have taken place during the last twelve month.

Secretary Hoover is anxious to aid every service without handicapping any, particularly the mobile services such as ships and planes. There are a number of wave bands which it is hoped can be reassigned or transferred so as to improve general conditions.

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440			11:30-12:30			11:30-12:30	
CJCG, Winnipeg, Man.	410	8:00-10:00	7:00- 8:00		8:00-10:00	5:30- 6:45		8:00- 9:00
CKAC, Montreal, Que.	430		6:00-10:30		6:00-10:30		6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	400	6:00- 8:00		6:00- 8:00		6:00- 8:00		5:00- 5:30
KFI, Los Angeles, Calif.	400	5:00- 9:00	5:00-12:30	5:00- 9:00	5:00- 9:00	5:00-12:30	5:00- 9:00	6:00- 8:00
KGW, Portland, Ore.	400	6:00-10:00		6:00- 7:00		6:00-10:00		5:00- 6:00
KHJ, Los Angeles, Calif.	400	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	
KPO, San Francisco, Calif.	400		6:00- 8:00				6:00- 8:00	
KSD, St. Louis, Mo.	400	8:00-12:30	8:00-10:00	8:00-10:00	11:30-12:30	8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	400	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:00	6:45- 7:40	7:00- 8:40	5:45- 7:40	7:00- 8:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	400	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	8:00- 1:00	11:45- 1:00	4:00- 5:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:10-11:00	5:30- 6:00	9:10-11:00	7:00- 8:30	
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	7:30- 8:30
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30
WGR, Buffalo, N. Y.	400	7:00- 9:00		7:00- 9:00		7:00- 9:00		
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	400	7:15- 8:30						
WHB, Kansas City, Mo.	400		8:00-10:00		8:00-10:00			8:00-10:00
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	
WJAX, Cleveland, O.	400		6:00- 7:30		7:15- 9:30			
WJZ, Newark, N. J.	360	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30
WKAQ, San Juan, P. R.	360				7:30- 9:30		7:30- 9:30	
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00			
WMAQ, Chicago, Ill.	400		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	400	8:00- 9:30	11:00- 1:00	8:00- 9:30	8:00- 9:30	11:00- 1:00	8:00- 9:30	
WOAI, San Antonio, Texas	360		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	8:00- 9:00
WOO, Philadelphia, Pa.	400	6:30- 9:00			6:30- 9:30			
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	400		6:30- 9:00	6:30- 9:00	6:30- 9:00	6:30- 9:00	6:30-	

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

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Looking Ahead

The First Prize Flewelling Set, designed and made by Mr. Lawrence M. Blakely, student at Georgia Institute of Technology, Atlanta, Ga., will appear in the next issue of the Digest. Blakely's design showed such dexterious workmanship and complete understanding of the "Flivver" that the judges were sold on it at first sight. This appears in the April 7th issue. Don't miss it.

The Q and A Page will be devoted to questions and answers on the Reflex circuit. Every day the Digest's mail is flooded with requests for information on the recently popular hook-up. As a result we have decided to turn over the entire Q and A departmnt to the Reflex April 7. Get a copy.

The Announcers Series will be continued in the next issue. This time we will not tell you who they are until the April 7th number appears. Who do you think they are? Maybe it's the announcer from your favorite plant. Better see.

Part II of Broadcasting Station Schedule appears in the Digest next week. Three issues of the Digest gives you the only popular directory published.

E. T. Flewelling will continue his exclusive series of articles on the "Flivver" circuit set. If you are a flivver owner or contemplate building one, don't miss a single article of Flewelling's. Reserve your copy of April 7th at your newsstand.

The Radio Conference was covered in person by E. E. Plummer, of the Digest staff. Mr. Plummer was in Washington and together with the regular correspondent at the Capital, L. M. Lamm, will give you all the latest news in the April 7th issue on the new Hoover regulations. You'll want to know.

A-B-C Lessons for Radio Beginners, Chapter Fourteen to appear next week will in no way fail to keep up the high standard Arthur G. Mohaup has attained. Turn to page 11, this issue, and read chapter thirteen.

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8.00 Dayton Variocoupler	5.45
DURaTEK Permanent Crystal Detector	2.00
W.D.-11 Adapter	.85
$1.50 Lightning Arrester, Indoor and Outdoor Type	.85
Ammeter for Testing "B" Batteries	.49
$5.00 43-Plate Condenser	1.95
2-inch Bakelite Dials	.25
4-inch Electros Dials	.75
3-inch Bakelite Dials	.35
W.D.-12 Transformer for W.D.-11 Tube	4.65
$1.00 Freshman Variable Grid Leak and Condenser Combined	.75
$ 8.00 Genuine All-Wave Coupler	6.95
10.00—3000 Meter Coupler	4.95
18.50 Homcharger DeLuxe	13.95
1.00 Bakelite Socket	.50
20.00 Dictograph Loud Speaker	13.95
Bristol Loud Speaker	22.50

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BROADCASTERS WILL RECEIVE LIST OF OWNERS

Telegraph Administration Will Provide Operating Personnel and Cost of Maintenance

WASHINGTON, D. C.—The Norwegian Telegraph Administration has recently made public a memorandum intended to form the basis for negotiations with foreign companies applying for broadcasting licenses in Norway, according to a report received by the Department of Commerce from the American Vice Consul at Christiania. The principal provisions of this memorandum are as follows:

The company to which a license for broadcasting is to be issued must be a stock company in which only Norwegian capital is represented and in which Norwegian Radio manufacturers, Norwegian press, and local amusement syndicates must have an interest. Material to be broadcast will be limited to entertainment, general information, and news. All Norwegian firms interested in any way in the manufacture of Radio receiving apparatus, and all press associations, whether agencies, bureaus, or newspapers, shall be invited to subscribe for stock in the company.

Administration Bears Expense

The Telegraph Administration will place the use of the Christiania Radio station at the disposal of the broadcasting company for experimental purposes and for the erection of any apparatus needed for broadcasting. This additional apparatus must be supplied by the company at its own expense. The Telegraph Administration will provide the operating personnel and bear the cost of maintenance, including the power required. To cover the cost of overhead and operating expenditures, the company will pay the Telegraph Administration a fixed monthly sum to be agreed upon.

Broadcasting from the Christiania Radio station is to be limited to a few hours in the evening. At all other times the Telegraph Administration is to have exclusive use of the station. All material to be broadcast must be censored and edited by the Telegraph Administration or by any other government agency which it may designate. The term of the concession or franchise will be limited to two years pending future legislation.

Can Not Monopolize

Licenses for receiving apparatus are to be sold or rented only to persons who have secured licenses from the Telegraph Administration. The broadcasting company is to furnish each owner or renter of such apparatus with a catalogue containing the names and addresses of all owners or renters. Furthermore, licenses for receiving apparatus will be issued only to those possessing apparatus of Norwegian manufacture, approved by the Telegraph Administration and bearing its seal and registered.

The company is not to have a monopoly in the manufacture of receiving apparatus, but may require a remuneration for broadcasting, the amount of which is to be approved by the Telegraph Administration. Foreign manufacturers shall have the right to make an agreement on reasonable conditions with the broadcasting company. The company shall pay a definite fee to the Telegraph Administration for every receiving set sold or rented.

Convict Has Receiver in Ohio State Penitentiary

COLUMBUS, O.—The most rabid Radiophan in this section has been found. He is Erwin F. Kumler, an inmate of the Ohio penitentiary serving from three to five years for automobile stealing. He was returned recently to Cleveland to testify at the trial of his alleged partner and was given permission to return to his cell with his Radio outfit by Warden P. E. Thomas.

Kumler brought the set back from his trip and has installed it in the pen. The concert hours have been set from 6 to 7 p. m., and a loud speaker will be used. After these hours, Kumler will be allowed to continue his listening in with an individual headset.

Niagara Falls Fans Band to Combat Interferences

NIAGARA FALLS, N. Y.—To combat the evils of nightly disturbances by amateur Radio senders who disregard all rules of the air, about 100 of the Niagara Falls fans have organized a Radio Association. Efforts are being made to bring membership up to 300. The association has entered complaint regarding unwarranted disturbances to the Radio inspector for the district. There are approximately 1500 fans in Niagara Falls.

USE RADIO TO SELL NEW YORK BUILDING

NEW YORK.—A $1,200,000 real estate deal was completed by Radio today, after E. Clifford Potter, cruising in the Mediterranean aboard the Adriatic, had "sat in" with his colleagues in discussions of the deal in this city. By the long distance Radio transaction, the seven-story building at Broadway and 39th street was sold to the Amri Realty Company.

BOSTON DX AMATEUR HEARS KDYX–HAWAII

EMORY J. PRISTAS, 62 Bromfield Road, West Somerville (Boston), Mass., picked up Honolulu on the evening of January 7, at 12:15 E. S. T. He heard snatches of a violin solo. He wrote Station KDYX, Honolulu, Hawaii, for confirmation, and after several weeks of waiting, received verification. Honolulu is over 5,100 miles from Boston. This is believed to be a DX record.

THE CHIC RADIO-HAT GIRL

"Something always new," is the spirit of the eternal feminine. Perhaps it is just to keep a step ahead of the opposite sex. But you must admit the Radio Hat is NEW. The petite Miss above exhibited the novel head gear at a recent millinery show and came away with first prize. The best part about it is that it actually works and one can receive messages over it for some distance. This fact was proved by bringing in stations 1,000 miles away

PLAN TO AIRPHONE NEWS TO VETERANS

Commander Personally to Address 50,000 Legionnaires Over Ether

BOSTON, MASS.—Plans are being perfected by State Commander William H. Doyle of the American Legion to have broadcasted all legislation and Legion business of interest to Massachusetts World War veterans, as a means of personally reaching thousands of Legionnaires in their homes and Legion posts throughout the state. The innovation has been approved by National headquarters, and steps have been taken by the latter to have broadcasted weekly Legion news of importance throughout the country.

According to plans now being completed, a special entertainment under the direction of State Legion officials from some central broadcasting station, and arrangements are being made for the placing of a receiving set in every post in the state. Commander Doyle will address the 50,000 or more Legionnaires in this manner, and a synopsis of legislation affecting Legion members will also be given. Weekly concerts for the benefit of disabled veterans in Bay State hospitals is part of the plan also.

FIRE STOPS PLANT IN MIDST OF BROADCAST

WEAN Will Be Off Air Pending Repairs

PROVIDENCE, R. I.—A fire that recently caused a damage of $1,500,000 in the Shepard Stores here, run by the same management as the Shepard Stores of Boston, burned out the Shepard broadcasting station, WEAN, in the store.

About twenty persons were gathered in the Radio room, listening to a concert that was in progress from the broadcasting department, when the fire started. Immediately the announcer gave out word that there was a fire in the store and that the program would have to be stopped. Before firemen got the blaze under control, it having started a second time when they were about ready to leave, three floors were burned out, with the enormously valuable stock of merchandise, with the damage estimated at over a million.

A hundred lines of hose from surrounding cities and towns poured tons of water into the fourth, fifth and sixth floors for hours before any impression was made. At times it seemed as though half the business section around was doomed. Until repairs are made to the building, the broadcasting station will be out of commission.

"DAUGHTERS OF THE SEA" PHONE CHEER

SEATTLE ORGANIZATION TO LOOK AFTER SAILORS

A Powerful Transmitting Plant Will Give Messages of Courage to Those in Danger

SEATTLE, WASH.—For the purpose of making more comfortable and pleasant the hours spent in their home ports by the masters, mates and pilots of the Pacific and developing Radio broadcasting to their ships while at sea, wives, daughters and sweethearts of mariners living in Seattle have formed an organization called the "Daughters of the Sea."

The Daughters of the Sea plan to bring home closer to the ship, and the Radio will be their chief means toward that end. The club has undertaken the fitting up of quarters on the top floor of one of the city's tall buildings, and is furnishing them with a library, comfortable chairs, smoking accessories and marine glasses, so that seafarers may watch from the windows the ships making and leaving port.

A powerful Radio sending and receiving apparatus is to be installed on the roof of the building and entertainments, concerts, etc., in the clubrooms will be broadcast to the ships at sea. The personnel of vessels in any storm area will be cheered by the voices of loved ones at home. A practical service also will be maintained; the location of all ships from the home port will be recorded from day to day. The plans also include the entertainment of visiting captains from other ports of the world. There will be a committee supplying all arriving ships with flowers, and seamen strangers will be provided with comfort and entertainment.

AMATEUR CONVENTION WILL BE HELD APRIL 6

Ohio A. R. R. L. to Hold Its Second Get-to-gether

COLUMBUS, O.—Arrangements are almost complete for the second Ohio A. R. R. L. Amateur Radio convention to be held at Hotel Columbus in this city on April 6, 7 and 8. The committee in charge of the various phases of the meeting have promised that this will be by far the most elaborate and most interesting gathering of Radiophans ever staged in Ohio.

Numerous attractions have been provided, including the following: Trip to the signal corps station WVZ at Fort Hayes, convention association meeting, A. R. R. L. traffic meeting, code and other contests with many valuable apparatus prizes, meeting a Hartford representative of the A. R. R. L., five-minute talks by district superintendents of Ohio, practical information of C. W. transmitters, information on all types of receiving equipment, discussion of fundamental electrical facts that every amateur should know, initiation services into the Royal Order of Wouf Hong, with every good A. R. R. L. man eligible; visits to Columbus stations, displays of apparatus by dealers and manufacturers, discussion of filters, rectifiers and what not and a great banquet on the closing evening of the convention.

Bob Bohannan, technical adviser of the club and operator of station WBAV, will install a 10-watt broadcasting set in the hotel for demonstration purposes. It will operate with a loop antenna. The first two days of the convention will be for delegates only, and only those having badges will be admitted to the sessions. The third day, Sunday, will be open to the public. Exhibits of dealers and manufacturers will be open at all times to public inspection.

SOS CALL OF SHIP SAVES MAN'S LIFE

Stricken Man Carried from Ships to Hospital in Raging Sea

CAPE MAY, N. J.—John H. Steel today owes his life to the miracle of the Radio and the courage of two hardy skippers who risked their lives, with those of their crews, to save him.

Steel, a member of the crew of the Fenwick Island lightship, anchored thirty miles southeast of this city, was attacked with appendicitis Saturday night. The skipper broadcast a Radio appeal, which was picked up here. He rushed it to Capt. R. C. Weightman of the coast guard cutter Kickapoo.

Despite a raging sea and vicious wind, Capt. Weightman put to sea, and by 8 o'clock was alongside the Fenwick. The latter's crew put a boat over with Steel in it, and after a hard fight transferred the sick man to the Kickapoo, whence he was hurried to the government hospital at Lewes.

STATE AND CHURCH UNITE IN SERVICES

TO BROADCAST ADDRESS FROM THEATER

Columbus, Ohio, Holy Week Services Will be Heard by Thousands of Fans

COLUMBUS, OHIO.—Epoch-making in the movement of the alliance of the church and stage will be the fact that the address of President William O. Thompson, of Ohio State university, will be broadcast from the Keith stage in this city on Good Friday. This event will mark the closing of the Holy Week services which will be held at the noon hour at Keith's theater.

Offers Theater

President Thompson will be the daily speaker. The services will be held under the auspices of the Columbus Federation of Churches through the courtesy of manager W. W. Prosser, of the local Keith theater, who each year places the theater at the disposal of the organization for the Holy Week services. Last year, the theater was packed daily by representative men and women of Columbus, including bankers, brokers, state, city and county officials, attorneys, physicians and ministers—in fact all busy people who were glad of the noon-time opportunity to attend Holy Week services at a place so convenient to the center of the city.

President Thompson's final address will be broadcast throughout the country, the station to have this privilege to be announced later.

Sunday School Lesson By Air

ATHENS, O.—Rev. Deforest Murch, of Cincinnati, formerly of this city, taught the Sunday school lesson recently at the Christian church in Athens by Radio from Cincinnati.

ETHER WAVES PEP UP MAIL SORTERS

"Mr. Gallagher and Mr. Shean" Help Get Mail Out on Time

WASHINGTON, D. C.—Sorting mail by Radio is the very latest thing in the postal service, exemplified at the Washington city post office from 9 to 11 o'clock one evening last week.

A thousand clerks and carriers did their duties in the great workroom of the office while a Radio receiving set filled the air with music drawn from the air.

First Assistant Postmaster General Bartlett inaugurated the novelty by broadcasting a message to the workers from the Post Office Department sending station. This brief message was broadcast by Mr. Bartlett exactly at 9 o'clock. Following that there were no more speeches, nothing but lively music to help put speed into the workers and "pep up" their general enjoyment of life.

Last year the Minneapolis post office introduced a phonograph on its night shifts, but the local office is said to be the first in the country to entertain its workers by Radio.

The receiving appartus is one owned by the office of the air mail service, Post Office Department.

If the operator tuned in on a "bedtime story" or a lecture on housekeeping, he switched off to some other wave length as it was not believed that such entertainment and the proper sorting of mail would mix. But any distributor can sort letters better, it is held, to the lively strains of the tune that made Gallagher and Shean famous. So the aim was to "listen in" on concerts, selecting the best from the air waves. Postmaster Chance introduced the novelty by way of experiment.

A new Radio station has been opened at Vari, Greece. The call is SXB.

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Memo Pad

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GREBE RADIO

"He who lightly promises is sure to keep but little faith."
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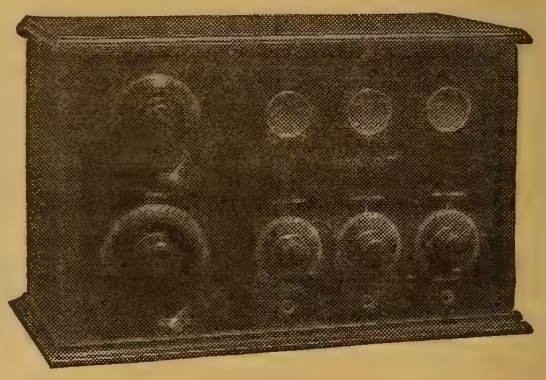

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A Long-Distance Wonder-Worker

HIGHEST type of Regenerative Receiver. Licensed under Armstrong U. S. Pat. 1,113,149 and pending Letters Patent 807,388.

Enthusiastic letters from customers all over the country tell of nightly triumphs in tuning in distant or elusive stations, thru both headphone and loudspeaker.

Set comprises tuner, detector and two stages of amplification in one handsome mahogany cabinet. Dials are operated by the famous MRC Split-Hair Vernier. Price, without tubes or batteries.. **$125.00**

"JUNIOR" SET

MRC "Junior" Regenerative Receiver similar to the "Senior" but without the amplification. Price, less tubes and batteries..... **$57.50**

Also ask us about the Michigan Two-Stage Amplifier and our line of Condensers, Vario-Couplers, Variometers, Rheostats, Etc.

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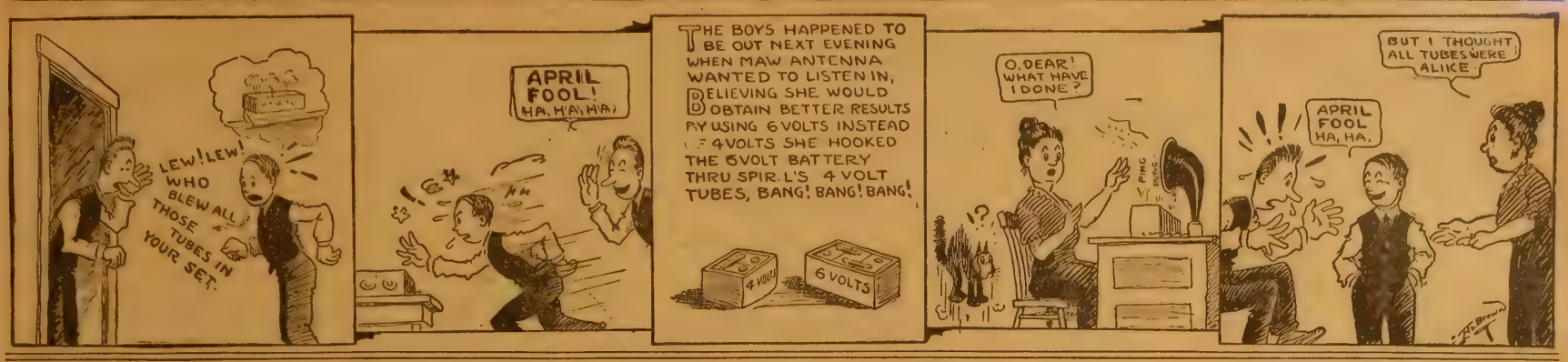


KYW Jazz Revues Keep Fans Awake

Many Small Town Clubs Hold Dances to Isham Jones, Cook and Melody Boys

By ROBERT J. STANTON.

Insomnia has become prevalent with the Chicago Radio audience since the inauguration of the midnight revues which are broadcast every Friday night from Westinghouse Station KYW, a theater without footlights. The old fashioned nightcaps have become a style of the past and have been replaced by the more up-to-date headphones.

Can you imagine reclining at ease in your downy cot while being entertained with a program of the latest popular music with nothing more to do when the show has ended that to shut off your set, remove your headphones and open the gates to the "Land of Nod". However, there is a fly in the ointment, as it is impossible to lie in bed when Isham Jones, Cook's Dreamland, and the Alabama Melody Boys play such "hot" dance selections that even the microphone in the studio starts to "shake and shiver."

Clubs Dance to KYW Jazz

Many clubs in small towns throughout the country have held Radio dances, for which the music has been supplied by selections played during these midnight revues from KYW. Many of the programs have been furnished by musical comedies playing in Chicago theaters, such as Shuffle Along, The Greenwich Village Follies, Spice of 1922, Lillies of the Field, and the French Doll. The next musical comedy to furnish a midnight program will be Raymond Hitchcock's new show which is scheduled to arrive in Chicago this month. Mr. Hitchcock claims the Radio is now his second nature and that he is preparing a special monologue to broadcast from KYW.

SEAMAN FAN SAVES SHIP BY SOS CALL

Amateur Substitutes for Operator and Succeeds in Bringing Aid

SEATTLE, WASH.—With only a slight knowledge of the international Morse code, Seaman Addison Galligan recently saved the entire crew of the wooden steamship Nika, thirty-three men in all, when he sent an "SOS" which brought the Coast Guard cutter Snohomish to the side of his vessel near Umatilla Reef. The ship was rudderless and blazing with a fire that had started in the coal bunkers.

For a long while Galligan had been experimenting with a Radio receiving set at his home in Everett, and like hundreds of Radiophans, he realized the value of the code. Some day, he thought, it might come in handy at sea.

Galligan was a seaman, and pressed into service in the absence of a regular operator, he slowly tapped out the call for help and the letters "F-i-r-e."

Fifteen minutes after the Snohomish caught the first call she was on her way to Umatilla Reef.

The United States now has six transmitting stations and one central receiving station on the Atlantic Coast which serve to connect this country with Europe.

THIEVES USE ETHER FOR COMMUNICATION

BOSTON, MASS.—A high government official expresses the belief that the principals arrested recently and indicted for alleged conspiracy in the theft of $100,000 worth of motor cars, and violation of the Dyer act, used the Radio in communicating with one another or with so-called agents. It is said that $100,000 is an estimate of the value of the cars stolen.

J. P. Kibler, Luray Cavern Guide, Is Original and Only "Cave Man" Fan

Guide Learns Code on Improvised Set Built of Nondescript Parts and Crystal Dug from Virginia Mine—Uses Rural Telephone Line for Aerial

By Armstrong Perry

WASHINGTON.—If I had found a mole soaring over the house with the crows and turkey buzzards I would not have been much more surprised than I was to find that J. P. Kibler, Luray Caverns guide, was a Radio enthusiast.

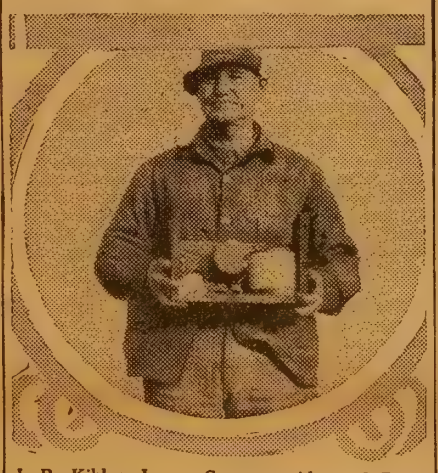
With other officials of the Cave Men's Club of America, I accepted the cordial invitation of T. C. Northcott, owner of the property, to explore Luray and Ruffner's caves. Both are located in the same hill and in spite of the failure of other explorers we hoped to find some connection between the two. Mr. Kibler stayed with us through two days of hard climbing and squeezing. If I wormed my way into any passage that he did not enter it was purely a matter of avoirdupois.

J. P. Kibler emerging from Ruffner's Cave, Luray, Va., where underground Radio experiments are to be made. This cave is not open to the public

Finds Home-Made Genius

After we had penetrated every nook and corner of the two great caverns I walked home with him. He lives on his own farm about a mile from the Luray entrance pavilion. Two men in a carriage were waiting for Mr. Kibler. Going to a shop near the house he brought out some repaired parts of farm implements for one, then he went into the house and brought out a watch he had repaired for the other. I began to wonder what kind of a genius I had met up with.

He took me in. One of the first things I saw was a bookcase full of technical books. Here and there about the room were other watches, repaired or in process, tools and Radio apparatus. A completed



J. P. Kibler, Luray Cavern guide, and Radio amateur—with his cheap but efficient home-made receiver

Radio receiver consisted of an oatmeal box wound with No. 20 single cotton covered wire. The first six turns were tapped singly. There were sixty more turns, tapped every ten turns. A 23-plate variable condenser, an electron tube from a mail order house, and a home-made grid leak and condenser were other elements in the receiver. The latter was made from two pieces of hard rubber with mica and copper sheets between them, and a lead pencil mark. Using 2,000-ohm phones he had heard stations as far away as Seattle and Des Moines on the one tube. He lighted his filament with an auto battery and for the "B" battery used seventy-five cents' worth of dry cells from a mail order house.

Uses Telephone Aerial

He is patiently learning code by means of a home-made crystal detector. The base is hard rubber. The galena he dug himself from a Virginia mine. The cat whisker is held by a brass spring. In his code work he uses as an aerial the rural telephone line, on which he has worked enough to learn all its various uses.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
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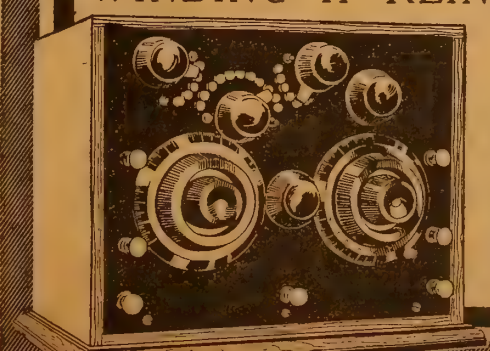

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The "How" of the Simplified Super Circuit

Part VIII—A Radical Departure in the Flivver Circuit

By E. T. Flewelling

IT HAS been proven rather conclusively that the best all around Radio receiver is also the most simple one. However, most Radiophans like a large number of controls to procure the finest adjustment. It is a good idea to strive for simple means of attaining our ends and in Radio as in other things we are rewarded by better all around results if simplicity is closely followed.

It is understood that during the recent Trans-Atlantic tests that most of the results were obtained by simple receivers, and that even the super-heterodyne, admittedly the most elaborate of all Radio

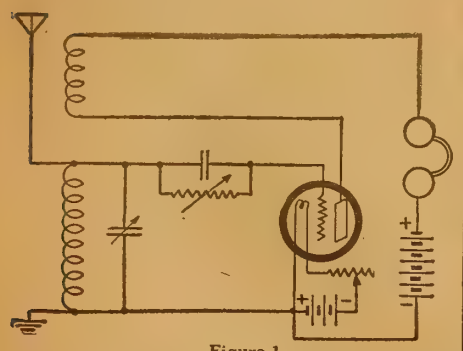


Figure 1

receivers, failed to score a hit in these tests.

Interchangeable Coils Give Wide Range

Let us consider the circuit shown in Figure 1. This is a straight single-circuit tickler coil type of regenerative receiver, is as simple as can be wished for and is a type that is very popular. If an interchangeable type of coil such as the honeycomb or Giblin-Remler coil is used in such a circuit—one may reach any wave length commonly in use, by the simple method of changing coils. Various sizes of coils are available in these types. These coils are perhaps the most efficient available to most of us. They eliminate dead end losses, due to unused turns of wire, and they contain a minimum amount of distributed capacity. Because of these points they give us a receiver of good

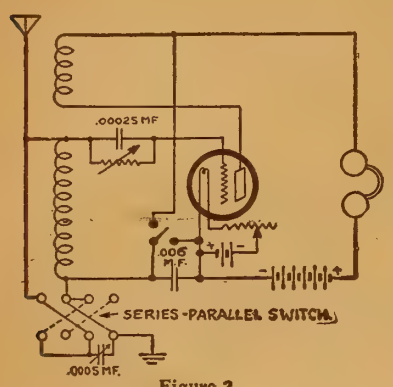


Figure 2

tonal qualities and highest efficiency, which is surely worth while.

Change in Circuit

If such a circuit is slightly changed to allow the super effect to be used at will, we have a still better receiver. If you use Giblin coils to cover the wave lengths in use, it will be found that even greater flexibility may be secured if the tuning condenser is arranged so that it may be connected in series or in parallel with the tuning inductances as may be desired. The maximum range with a minimum number of coils may be covered. For these reasons it is of advantage to add to the circuit two switches that will enable us to make these changes at will. Such a circuit arrangement is shown in Figure 2 and constitutes an extraordinary receiver in many ways.

Condenser Bank Eliminated

The familiar bank of three condensers and the second adjustable grid leak peculiar to the Flewelling circuit is omitted in this circuit. The answer is as follows:

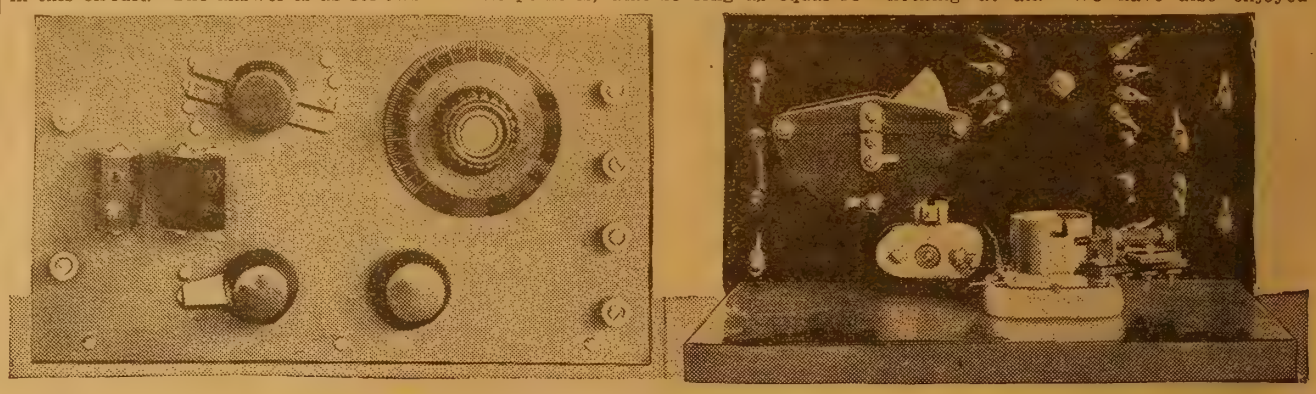


Photo Showing Arrangements of Parts of Simplified Flivver Set

When the theory of the Flewelling Super is understood it will be seen that the effect is caused principally by the blocking and freeing of the tube working in conjunction with condensers. It has been found that only one condenser is needed to attain this end if a good control is maintained over the grid of the tube by means of a suitable variable grid leak and the other points that we have taken up in our previous articles are taken care of. The condenser is the familiar .006 Mfd. capacity and the grid leak is one that is not affected by changing atmospheric conditions, the cartridge type of enclosed resistance of the Pudlin Engineering Company, being very satisfactory.

More Simple to Operate

We have made exhaustive tests and comparisons with this one-condenser circuit and the three-condenser bank type and have no hesitancy in reporting that results were identical in both cases, but of course, slightly easier to secure in the case of the one-condenser circuit due to its being the more simple. The circuit is confidently offered to meet with full approval.

The photographs show a convenient manner to mount the parts of this circuit. Front and rear views of an unwired set are shown, and the assembly is the result of study as to the arrangement so that the set will have the most convenient operating characteristics.

It will be noticed that the grid condenser and the grid leak are mounted directly upon the grid post of the socket. This is a convenient mount for them and also has the further advantage of giving minimum length to the grid lead, an important item to consider.

Binding Posts and Switches

The series-parallel switch is mounted at the top of the panel (because it is not often used, where the location means minimum length of leads between the tuning inductance and the tuning condenser.

The two-pole switch at the bottom is used to change from the simple regenerative set to the super set. The reason for the arrangement of the other parts was covered in our previous article.

Posts are shown for both antenna and ground connection in the usual manner and in changing over from the plain circuit to the super this connection need not be changed if the proper inductance coils are in use.

Use of Both Aerial and Ground

In our various articles on the use of super sets mention has been made that it was not possible to use both ground and antenna at one time, or to the contrary, that radical results might be obtained if they were used. Let me say here that if the inductance coils are changed to compensate for the additional capacity in the circuit when both aerial and ground are used at one time, any type of super set will work in practically the same manner that it will if the antenna or ground alone is used.

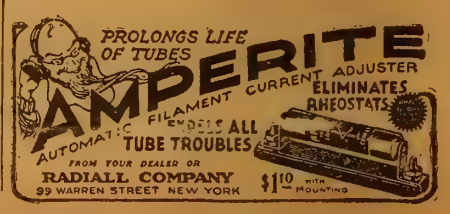
The point is, that so long as equal results are obtained with one, why use both? If both are used, say in the case of the 360-meter stations, it simply means that we use smaller coils because the additional capacity required is supplied by the added ground or antenna.

We have been considering the use of the super using only ground or aerial, and so recommend 50 and 75-turn coils as best suited to cover the average needs. If both antenna and ground are used, as in the case of the set under consideration, you will probably find that a combination use of a 35 and a 50-turn coil will be sufficient for 360-meter work.

Receiver Proves Excellent

If it will be of any assistance to the fans in considering the relative value of the set shown, let me say that such a set has been in use by the writer for some time and has given a great amount of satisfaction. It has been used to receive in the usual super manner, both broadcasting on the usual wavelengths and code on wavelengths ranging from 150 to 25,000 meters. This was done while working with either antenna, ground, loop, combinations of these, or even with nothing at all. We have also enjoyed many concerts while using the set in the auto.

The super is at its best, of course, on short waves. When it is desired to reach the longer ones it is only necessary to plug in the right coil and turn the switch to cut out the super action. Various combinations of coils super action and series or parallel connections of the tuning condensers are at the finger tips.



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Moulded Rheostats	1.00	.40
Klesner Vernier Rheostats	1.50	.75
Framingham Vernier Rheostat	1.50	1.15
Amsco Potentiometers—360 Ohms Resistance	1.75	1.00
JACKS		
Firco Jacks, Open Circuit	.70	.30
Firco Jacks, Closed Circuit	.85	.40
PLUGS		
Flat Plugs	1.00	.50
Round Plugs—Bulldog Grip	1.25	.60
4 Way Plug	1.50	1.25
CRYSTAL DETECTORS		
Glass-enclosed, moisture proof, spring adjustment, moulded bakelite base, with tested crystal, perfect design	.50	1.25
Open type—moulded base (completely assembled)	1.50	.50
DIAL AND KNOB		
3 inch Composition Dial and Knob	.75	.30
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4 inch Composition Dial and Knob—¼ inch Hole	1.25	.50
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Single Sockets—Brass Tubing	1.00	.40
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Triple Sockets—Brass Tubing	3.00	1.35
Single Sockets—Alden Napier red moulded condensite	1.00	.55
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VARIOMETERS		
Fisher Mahogany—150 to 500 meters	5.00	2.50
Franco Mahogany	5.00	2.50
Pathe Moulded	6.00	3.50
Raven Red Moulded Bakelite Variometers—Silk Wound	7.00	4.75
Columbia Black Moulded Bakelite Variometers—Silk Wound	5.50	4.30
Eagle Red Moulded Bakelite—the best made	8.00	5.50
VARIOCOUPLERS		
Franco Mahogany—Silk wound Fibre Tubing	5.00	2.25
Fisher Mahogany Variocouplers	5.00	2.50
Fisher 180° Variocoupler	5.00	2.50
Pathe Moulded Silk Wound	6.00	3.50
Eagle Moulded Red Bakelite—the best made	8.50	5.75
Franco 180° Variocoupler, Bakelite Silk Wound	5.00	2.75
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Bright Star "B" Battery, 22½ Volts	1.75	1.10
Bright Star "B" Battery	3.00	2.00
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J. N. Cartier, manager and announcer (before megaphone), a direct lineal descendant of the French explorer and discoverer of Canada, whose name he bears. Cartier's voice at CKAC has been heard in Juneau, Alaska, in Copenhagen, and by amateurs on the French coast, including ships in the Bay of Biscay. His voice is strikingly discernible among others, owing to the fact that he speaks French and English without the slightest trace of foreign accent

Stanley W. Barnett (at the left) is in the air every evening and heard all over the country as announcer for WOC, Davenport, Iowa. In addition to having achieved fame as an announcer, Mr. Barnett is licensed as a first class Radio operator. His popularity among fans is best expressed in the words of one Radiophan who wrote, "I think the voice of the announcer at WOC is best adapted to his work. He has many rivals but none better"

Emory L. O'Connell, announcer for WGAT (at the right), the American Legion, department of Nebraska broadcasting station at Lincoln. Emory is a disabled World War veteran studying law at the University of Nebraska. He says that the announcer's job is excellent training for his chosen profession, as a lawyer's words must go "a long way" to convince the average jury. He also says that it trains a man to speak while on his feet

ANNOUNCER MAKES GRAMMATIC BREAK

REQUEST FOR TELEGRAMS HEARD BY FANS

CFCN Draws 373 Fan Letters from United States, Canada and Alaska

By Jeffrey I. Dingman

CALGARY, ALTA.—Once again CFCN the broadcasting station of the W. W. Grant Radio, Ltd., at Calgary has startled Radiophans; in fact, rather shocked them, and another Radiophan has given CFCN the credit for accomplishing something entirely new in broadcasting.

Imagine the startled look that would appear on the countenance of a listener who heard the words, "Where the h—l are those telegrams?" floating in from a station hundreds of miles distant. That is what happened to Edward M. Sehorn, proprietor of The Daily Journal, Willows, California, recently.

Sehorn Chides Grant

In a letter to CFCN, in which he gently chided Mr. Grant, Mr. Sehorn said:

"Last night while listening to your concert—which, by the way, came in as well as the best on the Coast—I distinctly heard your announcer say: 'Where the h—l are those telegrams?' or words to that effect. He probably said it to himself, not realizing that his softly-spoken 'h—l' would be heard all over the country. I don't object to such mild swear-words, however, and this is probably the first time on record such a word has been broadcast."

Mr. Grant laughingly pleaded guilty to the charge, saying he was about to broadcast telegrams from distant points, but the communications had been mislaid.

Draws 372 Letters

"I know I had the microphone extended at arm's length," said Mr. Grant. "I would have spared my audience had I thought my words would have been heard by the outside world. Still, it is certainly an indication of the enormous output power CFCN possesses."

In the same morning's mail with this letter there were 372 other communications from Radiophans who had heard the request for the missing telegrams from the Calgary station. They were from thirty states in the Union, six from provinces of Canada, and one from Alaska.

WPAL Broadcasts Chorus

COLUMBUS, O.—The Westgate Masonic chorus of forty male voices rendered a complete program broadcast from WPAL, the Superior Radio and Equipment Company here. The concert by the chorus was its first experience in the Radio studio.

Station WPAL has inaugurated readings on operas. The first of this series was the opera "Tannhauser" with Burleigh Cupp, member of the faculty of the Morey School of Music, explaining the three sets in the opera.

Station KPO Is Monument in Memory of F. J. McCarthy, Cash-Boy-Inventor

Charles V. Logwood Tells of Many Hardships Undergone by Himself and Deceased Companion Who Gave Valuable Aid to Airphone in Its Beginning

By Albert H. Munday

It is not generally known to Radiophans throughout the world, and in San Francisco especially, that the high power station KPO, one of the most powerful in the world, on the top of Hale Brothers' Store at Fifth and Market streets, is a monument to the memory of a boy who, had he lived, would have been one of the wizards of Radio today. That boy was Francis Joseph McCarthy, who in 1906, when only 17 years of age, gave demonstrations on a Radiophone on which he had been working for more than three years. McCarthy was probably the first boy Radiophan in the world and one who was destined to lead the world in matters of Radio. Unfortunately he was killed in an accident in Oakland in 1906, shortly after his first success, but his Radiophone patents have brought his family the sum of $100,000.

Starved to Get Set

Although only a mere lad he had his assistant and that boy is still one of the leaders in the Radio world today. It is Charles V. Logwood, who claims that had McCarthy lived he would have revolutionized the world with his inventions and his service to the Radiophans. Mr. Logwood worked day and night with McCarthy and together they actually starved for days at a time in order that the money they saved could be spent in making a new set. It must be remembered that in those days it was impossible to buy the parts to make a set and everything piece by piece had to be designed and made by the experimenters.

Will Help the Amateur

The story of McCarthy and his assistant Logwood as boys who toiled for months and years to perfect their youthful inventions, reads like a romance, and is a story that will eventually go down as a part of history of the Radio world. Giving all credit to McCarthy, who he considered a genius, Mr. Logwood told his story especially to the representative of the Digest in order to show that the future of the science really rested with the Radiophans who are struggling day in and day out with their new sets and their experiments. It is chiefly due to his many trials and difficulties that Mr. Logwood understands the trouble of the youthful Radiophans of today whom he is very eager to help them to help themselves. As soon as the Armstrong vs. Logwood case, now pending in the United States Patent Office, is settled, Mr. Logwood intends to work on several new circuits that will be especially suitable for youthful Radiophans. He pointed out that it was only in helping them that the future of the science can progress and emphasized that in their ranks must be found the future experts who are to carry on with the development of the new science.

Start First Radiophone Company

"McCarthy first started working at the age of twelve for the Pacific Telephone and Telegraph Company in 1903, "related Mr. Logwood. "He was then a freckled-faced youngster helping to install house telephones. I was also with the company and we often worked together. We were both interested in Radio and spent considerable time and money in making small sets. Later McCarthy went to work as a cash boy in Hale Brothers store. One day Prentiss Cobb Hale asked young McCarthy what his hobby was and he promptly told Mr. Hale that the only thing he was ever interested in was Radio telephony. Mr. Hale promised to help him and immediately bought several expensive books and encouraged McCarthy as much as possible. A short time later the first Radiophone company to be started in the world was floated by young McCarthy and I was appointed his assistant. We built a station on the beach at San Francisco and carried out many experiments which were successful. In 1905 we gave our first demonstration and spoke a distance of one mile from the Cliff House to Mile Rest. I was sent to New York to purchase special equipment and had just returned to San Francisco when the earthquake came and our apparatus was wrecked. McCarthy was killed in an accident a few weeks later."

Big Station Nearly Ready to Link Argentina to U. S.

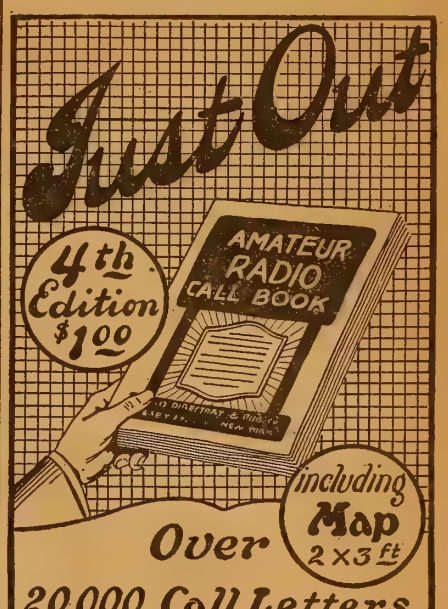
BUENOS AIRES.—The big, high-power Radio station at Monte Grande, near Buenos Aires, the first South American station in the international commercial Radio system, is almost completed, and it is announced that service will begin in June or July next.

It will place Argentine in direct Radio communication with the United States for the first time, as well as with Europe. Engineers say there are two strange, static "dead areas," one near the equator off Brazil and one in the South Atlantic which only a station equipped like that at Monte Grande can overcome.

Fifty-one Radiophone stations are broadcasting daily the national crop and market reports of the Department of Agriculture. More than 15,000 individuals, firms and railroads co-operate in gathering the data broadcast throughout the country.

All-Zanesville Program Broadcast by Rotarians

COLUMBUS, O.—An all-Zanesville Radio program was broadcast from Station WBAV, Erner & Hopkins Company, here recently. The program was the second of a series of concerts being presented by talent from various Ohio cities from the Columbus station. The Zanesville Rotrians had charge of the arrangement.



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AG1, Presidio of San Francisco, Calif. 50 mi. Signal Corps, U. S. A. Sun, Thurs, 8-9 pm, instruction, music. Pacific

AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.

AV7, St. Paul, Minn. 400 only. 500 mi. Signal Corps, U. S. A. (St. Paul Armory). Daily ex Sun, 2-2:30 pm, music, announcements. Thurs, 8:30-9:15 pm. Central.

BE1, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army. Third Signal Co. Daily ex Sat, Sun, 6-7 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd., (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45-9:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Vancouver Daily Province. Daily. 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed. Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCN, Calgary, Alta., Can. 275, 440 only. 1500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co.

CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCQ, Calgary, Alta., Can. 400 only. 150 mi. Western Radio Co., Ltd. Daily ex Sun, 3:30-4:30 pm. Daily, 7:45-8:45 pm. Mountain.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.

CHYC, Montreal, Que., Can. Northern Elec. Co.

CHXC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.

CIBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis Freres. Wed. Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Pacific.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.

CJCF, Kitchener, Ont. Can. 420 only. 50 mi. The News Record, Ltd. Thurs, 9-11 pm. Eastern.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm. Fri, 8-10 pm. Alternate Sun, 8:30-10 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 2 pm, weather; 4:30-4:35, reports; 4:15-5:15, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8.30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDBZ, Bakersfield, Calif. 100 mi. Frank Siefert. Daily ex Sun, 7:30-3:15 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 7-9:55 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7.15 music, reports, concert. Pacific.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. Savoy Theater.

KDYQ, Portland, Ore. 485 also. 25 mi. Oregon Institute of Technology. Tues, 9-10 pm. Radio lectures. Pacific.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Daily 12 m, weather, time. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYV, Salt Lake City, Utah. Cope & Cornwell Co.

KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Tues, Fri, 3:45-4:30 pm. Sun, 11 am-12:15 pm, 5-6, Church services. 120th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. Frank E. Siefert.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZH, Fresno, Calif. 485 also. 50 mi. The Herald-Buford Co. Daily ex Sun, 8:15 am, 4-5 pm, news, reports. Daily ex Tues, Fri, 8-9 pm, reports, music. Tues, Fri, 6:30-7:30 pm. Sun, 8-9 am, church service. Pacific.

KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 50 mi. Nevada Mch. & Elec. Co. (Nevada State Journal.) Daily ex Sun, 4-4:30 pm, news. Wed. 6:30-7:30 pm, music. Fri, 8-9 pm, special. Pacific.

KDZL, Ogden, Utah. 100 mi. Rocky Mountain Radio Corp. Mon, 12-1 pm, 7-9 pm. Mountain.

KDZM, Centralia, Wash. 50 mi. Hollingworth Hdwe. & Radio Supply Store. Daily ex Sat & Sun, 8-9 pm, music. Pacific.

KDZQ, Denver, Colo. 500 mi. Wm. D. Pyle. Daily ex Sun, 6:45-7:15 pm, news, 9-10 pm, concert. Mountain.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed. Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFAD, Phoenix, Ariz. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.

KFAE, Pullman, Wash. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7-9 pm, lectures, music, readings. Pacific.

KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Thurs and Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 200 mi. The Electric Shop. Tues, Thurs. Sat. 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. Standard Pub. Co.

KFAQ, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAS, Reno, Nev. 300 mi. Reno Motor Supply Co. Mon, Tues, Thurs, 8-9 pm, music. Pacific.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 9-10 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Daily ex Sun, 9:30-10 am, 3-3:20 pm, markets, news; 8:30 pm, weather. Mon, Fri, 8:30-9 pm, concert. Wed, 8-9 pm. Mountain.

KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW, Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Special programs other days. Pacific.

KFAZ, Reedley, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.

KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buttrey Co. Daily ex Sun, 9:30 am, agriograms, weather. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.

KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:30, concert, news. Sun, 8-9 pm, church service. Pacific.

KFBL, Everett, Wash. Leese Bros.

KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFBV, Colorado Springs, Colo: Clarence O. Ford.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCC, Wallace, Ida. 380 only. 100 mi. Auto Supply Co. Tues, Thurs, Sat, Sun, 7:30-8:30 pm. Sat, Sun, 9:30-10:30 pm, music. Pacific.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Tues, Thurs, Sat, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. 485 only. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCP, Ogden, Utah. Ralph W. Flygare.

KFCQ, Casper, Wyo. Motor Service Stn.

KFCV, Houston, Tex. 360 and 600 also. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.

KFCY, Le Mars, Ia. Western Union College.

KFCZ, Omaha, Neb. Omaha Central H. S.

KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. 485 also. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.

KFDH, Tucson, Ariz. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDO, Bozeman, Mont. H. Everett Cutting.

KFDP, Des Moines, Iowa. 300 mi. Hawkeye Radio & Supply Co. Wed, 8-9:30 pm, music, entertainment. Sat, 9-10:30 pm, music, entertainment. Central.

KFDR, York, Neb. Bullock's.

KFDS, San Francisco, Calif. John D. McKee.

KFDU, Lincoln, Neb. Neb. Radio Elec. Co.

KFDV, Fayetteville, Ark. Gilbreth & Stinson.

KFDX, Shreveport, La. First Baptist Church.

KFEB, Taft, Calif. City of Taft.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music; 6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.

KFEJ, Tacoma, Wash. Guy Greason.

KFEP, Denver, Colo. Radio Equipment Co.

KFEQ, Oak, Neb. J. L. Scroggin.

KFER, Fort Dodge, Ia. Auto Electric Service Co.

KFEV, Douglas, Wyo. 485 also. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.

KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.

KFFE, Pendleton, Ore. 100 mi. Eastern Oregon Radio Co. Daily, 7:30-8 pm, music. Pacific.

KFFO, Hillsboro, Ore. Dr. E. H. Smith.

KFFQ, Colorado Springs, Colo. 250 mi. The Markshieffel Motor Co. Daily, 4-5 pm, concert. Mon, Wed. Fri, 8-9:30 pm, special program. Mountain.

KFGB, Pueblo, Colo. Lowenthal Bros.

KFGF, Mt. Vernon, Wash. 50 mi. Buchanan, Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Sun, 2-3 pm. Pacific.

KFGG, Astoria, Ore. Astoria Budget.

KFHA, Gunnison, Colo. Colorado State Normal School.

KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule

KFHJ, Santa Barbara, Calif. Fallon Company.

KFI, Los Angeles, Calif. 400 only. 1,500 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Tues, Fri, 1:30-2:30 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-10. Pacific.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. No regular schedule.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat special program, 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 and 485 also. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 3:30-4 pm, women's program. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 250 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHD, Colorado Springs, Colo. 485 also. 50 mi. C. F. am, weather. Mon, Wed, Fri, 7-7:30 pm, music, lectures. Mountain.

KHJ, Los Angeles, Calif. 400 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.

KJR, Seattle, Wash. 200 mi. Northwest Radio Service Co. Daily ex Sun 8-9 pm, miscellaneous. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri. 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLS, San Francisco, Calif. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 3:30-4:30 pm, 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.

KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30 pm, news, markets, bedtime story, pm, code, 8:20-9 pm, music. Pacific. church services. Mountain.

KMJ, Fresno, Calif. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. Temporarily discontinued.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 5-6 pm, 7-8, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

Daily ex Sun, 4-5 pm, 8:15-9, concert, news. Sun, 10-11 am, 4-5 pm, 8:15-9, church service. Pacific.

KOG, Los Angeles, Calif. 300 mi. Western Radio Elec. Co. Daily ex Sun, Wed, 5-5:30 pm, code, news. Mon, Fri, 7:40-8:20 pm, music. Wed, 4:30-5

KON, San Diego, Calif. 200 mi. Holzwasser Inc. concert. Thurs, 8-9 pm, concert. Sun, 8-9 pm.

KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 300, 400 and 600 only. 1,500 mi. Hale Bros., Inc. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sat, 3-4:30 pm. Sun, 11-12:30 pm, church services. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. 350 only. 50 mi. Hood River News. Daily ex Sat, Sun, 7 pm, news. Tues, Fri, 7:15-8 pm. Sun, 9-10 pm, entertainment. Pacific.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm, Wed, 8-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Wed, 9-10 pm. Sun, 5:30-7:30 pm, concert. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1 500 mi. St. Louis Post Dispatch. Daily ex Sun, 9 10 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Thurs, 11:30 pm, concerts. Central.

KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 5:15-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather reports. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, 2-4 pm, 5-6, concert, news. Pacific.

KUS, Los Angeles, Calif. 300 mi. City Dye Wks. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed. Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KXS, Los Angeles, Calif. Braun Corp.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:25 am, 10, 1:20 pm, 2:15, 2:30, markets; 3 (3:30 ex Mon, Wed, Fri), 4, 4:15, 4:30, 5, news, sports (6:30 Mon only, news, reports, sports), 6:50, bedtime stories; 8-9, music; 9, news, sports; 9:05, special. Sun, 11 am, 3:30 pm, 7, church services. Central.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. 485 also. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 710 only. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3, (Tues. only) Dept. Interior; 3:25-4:40, 5:05-5:20, markets, weather; 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:40 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 only. 1,500 mi. International Tel. & Telg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAI, Dayton, O. McCook Field, U. S. Army.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. F— 2:30-4:30 pm, and Sat, 8:15-10:15 pm, Cincinnati Symph. Orchestra concert. Central.

(NOTE—The second part of the station schedule list will appear next week.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

Book Reviews

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Revolutionary Theories in Wireless. By Frank E. Summers. A treatise in the how and why of Radio and science. A practical result of years of careful study and research by the author. Non-technical, written so you can understand it. Price, $2.50.

How to Make Radio Receiving Sets. This booklet describes ten different receiving sets and amplifiers which have been constructed in the research department of the Federal Telephone and Telegraph Company of Buffalo, N. Y. The booklet is fully illustrated. It is free to all who ask for it by writing the firm mentioned.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

ADJUSTABLE COIL MOUNTINGS FOR FLEWELLING CIRCUIT

Triple Coil Mounting.....$5.00 List
Double Coil Mountings.....3.50 List

A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in.

Licensed under U. S. De Forest Pat. 1365170

Dealers write for special discounts

ASTORLOID MFG. CO., Inc. 416 Marcy Ave. Brooklyn, N. Y.

GOV'T RADIO STORAGE BATTERIES

New Signal Corps Edison 3 cell type BB-4, $4.50; Single cells for W. D.-11 tubes, $1.50; 60 A. H. for W. D.-11 tubes, $5.25; 6 volts Edison, $7.75; Edison "B" battery single elements, 4c ea.; double, 10c.

Genuine Peanut Tubes

Wonderful Det. and Amplifier. Smallest tube made (aeroplane style), 1 V., ¼ amp., ½" dia. x 2½" long. A real pocket set tube. Just a few at $9.50. Fully guaranteed.

Reinartz Coils and Parts

Double green silk on polished Bakelite spider, $1.95; Reinartz plate circuit chokes (triple adjustable), $1.70; Spec. Reinartz A. F. Transformer with diagram, $3.35; Complete set Reinartz tuner and detector parts, $10.65; Tuner, Det. and 2 Stage, $17.95. Two stage outfit, $8.35.

Hi-Power Amplifying Transformers

Best! Loudest! No burn-outs. $2.65 with special diagram.

Flewelling .006 Condensers and Parts

.006 Bakelite-Ruby Mica-Copper Cond. & N.P. Binding Posts, Set (3), $2.30. Variable Leaks, 75c; Special Flew. A. F. Transformers with Diag., $3.45; Spider Coils, green silk on Bakelite, $1.75 each.

Specials

Hi-Power Loud Speaker and Pr. Baldwin Phones, $10.90. 20 ohm Rheo. for 201-A or W. D.-11 tubes $1.60; Spec. Reflex Trans. and Diag. that really works, $3.65; Vernier attachment for any Var. Condenser, 95c; Variable Grid Cond., .00025 or .0005 max., 45c; Armstrong Super, new 3-tube outfit, owner sacrificing; Owner must sell 2300 mile record 20 Watt Transmitter. Radio Freq. .003 Iron and Matls. for R. F. Trans. Write for complete list. Include postage with order.

QUALITY RADIO SHOP, RICHMOND, INDIANA

Largest Radio Store in America

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Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90

Consisting of:	Regular Price	Our Price
9x10½ Formica Panel	$1.42	$ 1.20
23-Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, Plain or Bank Wound with Taps	3.00	1.95
1 Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
3 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
8 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½ with hinged top	5.00	2.95
25 ft. Hookup Wire	.20	.10
Regular Price	$19.37	

Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in a schematic form but are drawn so that anyone without any technical knowledge can follow with ease. Our Price **$11.90**

Freund's Wonder Circuit $13.20

KHG, KFI, and KYY received from Chicago on one tube.

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43 Plate Vernier Condenser	7.00	3.45
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CRL Variable Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
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Complete instructions for drilling, assembling and wiring furnished with each order. Written so that anyone without any technical knowledge can understand. Our Price **$13.20**

Complete Parts for Reinartz Circuit

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Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Crystal or any receiving set so that loud speaker or phonograph can be used in place of headset. These parts consist of 1 Formica Panel 7x10 (or other suitable size), 1 High Ratio Thordarson Transformer, 1 Low Ratio Thordarson Transformer, 2 Howard Rheostats, 2 Bakelite Sockets, 3 Jacks, 13 Binding Posts, 1 Baseboard for mounting, and 1 Wiring Diagram with complete instructions for assembling, with template for drilling panel. Complete **$12.45**

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Complete Parts for Flewelling Circuit

Includes 6x14 Formica Panel, 23 Plate Condenser, 3 Micon .006 Condensers, 1 Freshman Variable Grid Leak, 1 Remler Leak, 2 Coil Mount, 2 Honeycomb Coils, 2 Coil Plugs, 1 Socket, 1 Howard Vernier Rheostat, 8 Binding Posts and 1 Diagram to Wire and Construct This Set. Complete **$12.45**

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All American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, March 31, 1923 No. 12

Need for Radio on Aircraft

Ruling in Denmark Forces Radio Equipment on Airplanes

THE air traffic commissioner of Denmark recently rules that all airplanes must be equipped with Radiophones. This is held as an important advance in both aviation and communication in Denmark. It is a progressive step not yet taken in the United States. Although ships of the sea must be so equipped, aircraft do as they please. After many accidents in aerial traffic over sea routes with some loss of life, two aerial navigation lines have voluntarily begun to equip their aircraft with Radio as a safety precaution.

Rear Admiral Moffett, chief of the naval bureau of aeronautics pointed out the necessity of Radio equipment, or at least pigeons on all aircraft, several months ago. All army and naval planes are Radio equipped at least when on long distance trips, and in addition carrier pigeons. The need of legislation for aircraft and aerial navigation is pointed out by many American experts, but a bill now before Congress was caught in the legislative jam and did not pass this session.

Vital Element in Life

The Audience Listening In on Radio Reaches Millions

IN THE last year scientists and engineers outdid themselves. Ten years of ordinary progress was crowded into the short space of twelve months. Turn whichever way you will and Radio greets you. Open your paper tonight, and somewhere within its columns you will find a discussion of Radio and the Radiophone.

The Radiophone is a fact, not a theory. It has already become a vital element in our domestic, industrial, social and political life. Radio provides the biggest show on earth at the present time. The Radio audience numbers millions and consists of people representing every country in the world.

The cast of the Radio show is unlimited; all the world is the stage. World's Series baseball games, play by play, direct from the diamond; prizefights direct from the ringside, blow by blow, mingled with the sound of the gong and outcries of the crowd; football games, direct from the gridiron, yard by yard, backed by college songs and cheers; track meets, lap by lap; and now the latest feature added to the program is opera, aside from the regular stock market quotations, weather reports, timely topics, etc.

About Amateur Operators

Canada Checking Up on Licensed Amateur Stations

CANADA has 1,800 licensed amateur Radio transmitting stations and fifty licensed broadcasting and commercial stations. Every owner of a Radio set in Canada is required to have a license. The rate for a receiving station is $1 a year and licenses are obtained through the postoffices.

In order to check the wavelengths of transmitting stations Radio inspectors are being appointed in every city with a population in excess of 15,000. Twenty-five of these Radio policemen, most of them ex-service men, already have been appointed, to see that amateur transmitters comply with the new regulations which forbid amateur dots and dashes of voices in the air from 7:30 to 10 p. m., the hours reserved for broadcasting stations.

Amateur transmitters in the United States number 17,000 and there are no hours stipulated when these stations cannot send messages. In many instances the amateur gets above the allotted wavelength and causes interference from those trying to hear the concerts.

Many persons believe that the amateur should be heavily restricted by legislation, but it must be remembered that because of the liberal rights granted by the government to the amateur there was a host of self-trained amateurs in this country, second to none in the world, ready to enter the army and navy as Radio operators when the war broke. Great Britain had placed restrictions on her Radio amateurs and the result was a great shortage of operators in war time. A few Marconi operators had to handle the service until others could be trained. Regulations in the United States have been such that encouragement has been given to the amateur to experiment. The result has been that many improvements have come from amateurs experimenting in the attics of their homes.

Condensed

By DIELECTRIC

The American museum expedition was the first one in the history of big scientific explorations to utilize a Radio receiving outfit. With Radio the vast areas are within the touch of civilization, and the hitherto sensation of separation with its tendency to morbidness, is counterbalanced by the reception of broadcast programs.

Not long ago I ventured the assertion that practically the entire world would be able to listen in to a concert from a single station in the near future. Some places were missing from the list of those successful in tuning in WOR, the Station of L. Bamberger and Company, Newark, N. J., when they broadcast a special program recently, but from all accounts a large part of the Radio world heard most of the numbers sung by Miss Bennett. The reception of her voice was singularly true throughout its entire range, which is something to be envied by many of the Radio singers. Not the least comforting feature as regards Edith Bennett is the fact that she is an American girl and received her entire musical training in the United States. Requests for encore numbers will be coming in from European fans if they can be assured of such rendition.

Many instances of isolated communities and of individuals who, because of the peculiarity of their occupation, cannot enjoy the usual social privileges common to the rest of us, have found in Radio receiving sets the secret to pleasures formerly denied them are on record. However, I believe the first time that Radio has altered the dread lot of a leper (banishment from society) is in the case of Mr. Willett, a former state senator of Montana. For a man who has served in a public office to be absolutely cut off from his fellowmen must be a very depressing experience. It is not difficult to imagine the feelings of this man—and his wife, who remains with him—when he can turn to his set and hear from several states various announcements and classes of music. Some financially able Radiophan could greatly enhance the possibility of reducing melancholia among these unfortunate outcasts by donating sets to leper colonies.

The Radio Trust is ever with us, in one form or another, according to those who should be in a position to learn something of the facts. Whether such a thing actually exists or is in process of forming it is advisable for every fan to acquaint himself with as much information on the subject as he can acquire. Radio should never become the exclusive property of a single group, and that includes the manufacture and sale of sets and accessories as well as broadcasting. We are already familiar enough with the results of a monopoly of a very necessary adjunct to an efficient receiving set and such familiarity does not encourage us to see any further monopolistic encroachments. I say we should secure all the information available in order that our correspondence with national representatives may be intelligent. Every fan should make it his business to impress his desires on Congress.

The city of Chicago has not been slow to make innovations either in the material broadcast or in the manner of its transmission. Now we are to have a station in this city which may compare favorably for ornate construction with any anywhere. This "crystal studio" is fortunate in its setting, for one thing, being installed in the Edgewater Beach Hotel and for another, the peculiar construction of the studio itself. It will be possible for those interested in the procedure to witness what takes place in a Radio studio, due to the walls being made of plate glass. This station is not on the air as yet, but when you hear an announcer give the call WJAZ you may know the crystal studio is broadcasting.

We fans (some of us at least) have had access to first-hand information concerning several foreign countries, their mode of living, commercial advantages, presence or lack of progressive institutions, attitude of mind regarding this great country of ours and it has been presented through the popular disseminator—the microphone. On different occasions there have been broadcast "Italian, Russian, Japanese, Mexican Night" programs, consuming most of the evening's allotment of time, presenting some of the foremost artists and public men, with music and addresses calculated to enlarge our knowledge of the world about us. It is quite possible, of course, that some statements to which we listened were polished up for the occasion, nevertheless, such informative features convey facts worthy of attention and tend to acquaint races with each other's motives. It is rather important that we see the other fellow's point of view, not least of all when we turn our sets into transmitters.

Passengers by rail need be without entertainment only so long as the railroad companies fail to provide adequate means of listening to Radio broadcasting. On long journeys one tires of the usual means of diversion ordinarily supplied and wishes for a Radio set placed in one of the cars for the passengers' use. Some trains on a few of the railroads have equipped the dining car with receiving sets and where this has been done it has been greatly appreciated. If you happen to be travelling on the New York limited from West Point, Ga., not only will you be provided with the means of hearing Radio concerts, but the railroads operating in that section will give you a full program during the evening. They have their own broadcasting station maintained for the express purpose of entertaining you. It does more than entertain the passengers, however, for listeners in many States have reported hearing them. I have many times listened to the announcer calling the train number and imagined the group gathered in the diner before the reciver, as the train sped north. Give us more trains equipped for Radio reception.

RADIO INDI-GEST

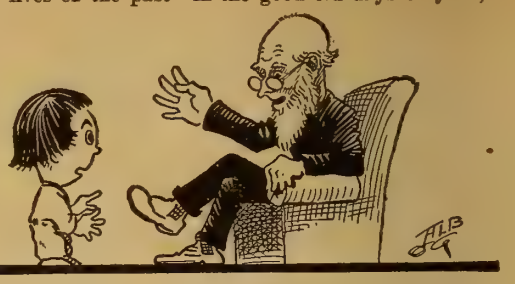
(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

Our Steno Sometimes Says Things at Her's

Dear Indi.—I see where a French engineer claims to have invented a new machine for setting type, which has a special attachment permitting Radio copy to be received direct on the machine. Would like to know if any one has built a typewriter that will write out a letter when you talk at it.—Polly, "Sheba Steno."

Yeh, Marconi and He Were Cousins

You've run 'cross the chap who is sixty years or more,
Who lives of the past—in the good old days of yore;



He's the type of bug who just sits around to buzz
'Bout the great old Radio "ham" he used to was.
—SQUEEGEE.

Marcelled Tonsils Are Also Cute

When "phonographed voices" are sent by radio, the ladies will get the habit of manicuring their voices before having the photos taken.—Brownie.

But Thinka Tha Shieks, Rita

Dear Indigest—The static is said to be heavy in the Desert of Sahara. Radiophans should consider this before planning their summer vacations.—Rita M.

Now You've Gone and Spoiled Our Whole Day

Oh, Indi!—Some time ago a Radio amateur claimed to have reduced milk to an etheral state and sent it by Radio to a distant point and there restored it to its liquid form. What great possibilities suggest themselves for the transportation of—no, the thought is too terrible.—"Oley."

And Insects Have Antennae

Radio news is everywhere,
It's on the press, it's in the air;
It's in the homes and in the zoos,
The latter have their Radio gnus.
—BALD ONE.

A. B. C. Lessons for Radio Beginners

Chapter XIII—Radio Frequency Amplification

By Arthur G. Mohaupt

RADIO frequency amplification is an effective means of increasing the range of a vacuum tube receiving set; that is, it enables a detector circuit to receive signals from distant stations which in themselves would be too weak to operate the detector alone. Radio frequency amplification also makes possible the reception of Radio messages and musical entertainments by means of a loop or other form of indoor antenna.

Adding Stages of Frequency

Although one or two steps of audio-frequency can easily be added to a detector receiving set, the addition of these parts merely strengthens or amplifies the current oscillations after they come from the detector. They do in no manner, however, increase the range of the original receiving. Remarkable changes can be brought about in a receiving set employing two stages of audio frequency amplification, if one step of Radio frequency amplification is substituted for the second stage of audio frequency amplification. In such practice no more tubes are necessary than were initially employed, yet stations can be heard which formerly were entirely out of reach—and all this is accomplished with perfect reproduction and sufficient tone volume to effectively operate a loud speaker.

Operation Must Be First Learned

But simple as it may seem and appear at first thought, the application of Radio frequency amplification should not be attempted until thorough knowledge and skill of operation has been obtained in the use of the plain or regenerative receiver. The three-circuit regenerative receiver is capable of producing remarkable results if the operator knows how to make the proper plate voltage and filament current adjustments in addition to skillfully manipulating the coupler secondary so as to secure the necessary degree of coupling required for tuning in the desired stations and tuning out undesired and interfering stations. Only after the operator is thoroughly satisfied that he understands his set completely and that he is obtaining the best possible results that his outfit is capable of producing, should he direct his thoughts and attention to Radio frequency amplification. The latter at once introduces additional amplications and requires special tuning adjustments which were not needed with the plain detector circuit. However, after its application and operation have once been mastered, Radio frequency amplification is capable of producing surprising results that will

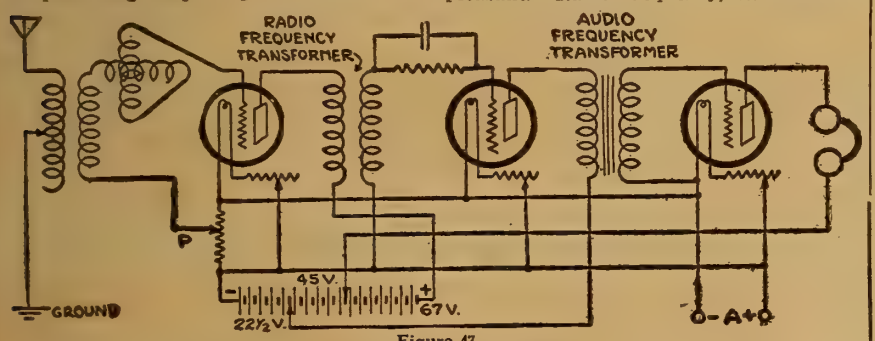


Figure 47

at once induce an incentive to dig deeper into its realm to see if there really is any limit as to what can be accomplished with its assistance.

Principles Underlying Radio Amplification

In order that a three-electrode detector tube can function properly, it is necessary that the potential variations impressed on the grid be of sufficient intensity to affect or influence the migration of the negatively charged electrons from the filament to the plate.

If the incoming oscillations are too weak to produce any appreciable effect upon the flow of current in the plate circuit, no sounds can be produced within the telephone receivers. This would be the case with the signals coming from a far distant station, or if the antenna were indoors or otherwise "shielded" by some intervening object. However, if these faint oscillations could in some way be intensified without distorting them or altering their inherent nature, they would be capable of more effectively acting upon the detector tube and thus rendering it capable of functioning more efficiently.

Operation of Radio Frequency

It is this very effect that is accomplished when Radio frequency amplification is employed. Instead of impressing the received signals directly upon the input circuit of the detector tube, they are first sent through one or more suitably coupled amplifying tubes before they are sent to the detector. As a result the signals are greatly amplified and can hence produce the same effect upon the detector circuit as the signals from a nearby station.

No matter how weak the incoming signals may be to start with, Radio frequency amplification can be introduced to such an extent as is necessary to render them capable of operating the detector to best advantage, and after this audio-frequency amplification can be brought into play to further strengthen the rectified current oscillations and render them capable of operating a loud speaker. Radio frequency amplification is thus not limited to one or two stages as was the case with audio frequency amplification, but any number of steps of Radio frequency amplification can effectively be employed until the received signals are of the necessary intensity to operate the detector.

With an indoor loop aerial with which the induced signals are inherently very weak, Radio frequency amplification if properly designed and applied can be used to strengthen these faint oscillations to such an extent that they can affect the detector with the same efficiency as the signals received from a good outdoor antenna. With an outdoor antenna it is seldom necessary to employ more than one or two stages of Radio frequency in order to give the receiving station the desired range, but with a loop aerial as many as three stages are necessary in order to produce sufficient effects upon the detector.

Advantages of Radio Frequency Amplification

With the use of Radio frequency amplification numerous advantages are gained which are not possible with audio frequency amplification. With the latter all noises, irrespective of their source or nature, are amplified; and if such disturbances are present to any extent, they will soon so seriously interfere that the sounds in the phones will be anything but pleasant. Radio frequency, on the other hand, does not involve the presence of these disturbing tube and battery noises to such an annoying extent; for most of these noises are the results of oscillations of comparatively low frequency, and these cannot be effectively transmitted through an amplifying circuit designed especially for Radio frequency oscilliations.

Also, with Radio frequency a number

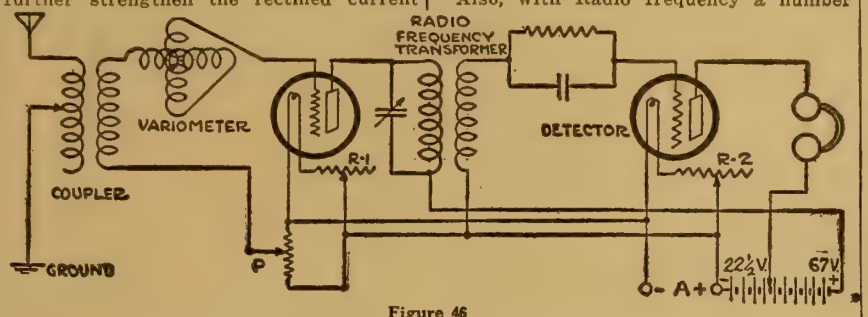


Figure 46

of stages can be effectively used without distorting or seriously impairing the quality of the signals amplified. However, a Radio frequency amplifier cannot be used effectively to amplify "loud" signals, as the amplification would be only comparatively slight and hence would not warrant the application of this auxilliary apparatus.

Another advantageous feature resulting from the use of one or more steps of Radio frequency amplification, is that the selectivity of the receiver is greatly increased, for experience has shown that a difference of only twenty-five meters in the wavelengths transmitted by two different sending stations is sufficient to make it possible to tune in one station and exclude the others. It is true, of course, that such effects can be secured only through skillful and efficient tuning. It is for this reason that it was suggested above that Radio frequency amplification should be dealt with only after the simple receiving circuit has been thoroughly mastered.

Types of Radio Frequency Amplifiers

Radio frequency amplifiers are classified according to the methods of coupling that is used between the successive stages of the amplifier circuit and between the last stage and the detector circuit. The simplest of all is the resistance-coupled type, in which a high resistance of suitable value is connected between the output circuit of one tube and the input circuit of the next tube. This method, however, is satisfactory and efficient only for long wave Radio communication, such as for transoceanic service, and hence is not of interest at this point.

In the inductively coupled type some form of inductance is used between the successive tubes. In some circuits a variometer can be effectively used for this purpose. Then there is also the capacitance method of coupling, but this has thus far not proven satisfactory.

Transformer Coupled Type

Probably the most convenient and most satisfactory type of Radio frequency amplifier is the transformer coupled type. In these the output and input circuits of successive tubes are coupled by means of specially designed Radio frequency trans-

(Continued on page 12)

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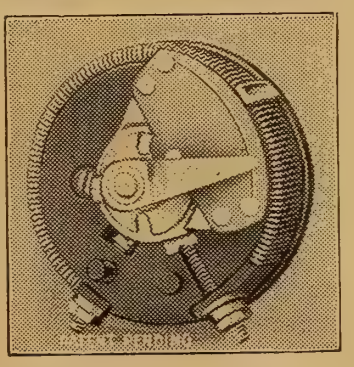

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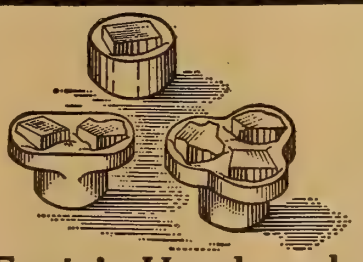

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The illustration shows a hook-up for two stages of audio frequency amplification which has proven very satisfactory in that it cuts down greatly on the distortion often obtained in using this type of amplification. It will be noted that two different audio transformers are used. The first has a 10 to 1 and the second a 3 to 1 ratio. Another peculiarity is in the transformer connections. The diagram shows these clearly. — Fritz Franke, Chicago, Ill.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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123 West Madison St., Chicago, Ill.

A. B. C. LESSONS

(Continued from page 11)

formers. The one disadvantage of this type of coupling is that the transformer must be especially designed for the wave lengths of the signals which it is desired to receive. Practically all modern Radio frequency transformers as used for the reception of broadcast programs are designed for a range of from 300 to 550 meters. For the efficient receiving of wave lengths above and below this band, transformers of slightly different design are necessary. In general, however, well designed Radio frequency transformers can be depended upon to give quite satisfactory and efficient results.

Circuit With One Stage R. F. Amplification

In Figure 46 is shown an interesting circuit in which one stage of Radio frequency and a detector are employed. The tuning circuit at the left consists of a standard variocoupler in the antenna circuit, and a variometer in the grid circuit for tuning this circuit into resonance with the incoming oscillations. The current oscillations in this tuned circuit are impressed upon the grid and filament of a hard amplifier tube. In this tube the oscillations are amplified and then sent into the primary of a Radio frequency transformer. From the secondary of this transformer the oscillations then pass through the grid condenser into the grid and filament of the detector tube, where they undergo rectification and additional amplification. Into the output circuit of the detector tube are connected the head phones in series with the B battery which supplies the necessary plate pressure.

As was stated, the tube used in the Radio frequency amplifying circuit is a "hard" amplifying tube which has its filament heated by the same A battery that supplies current to the filament of the detector tube. For the plate potential of this amplifying tube it is advisable to use a pressure of at least 67 volts in order to obtain most satisfactory results.

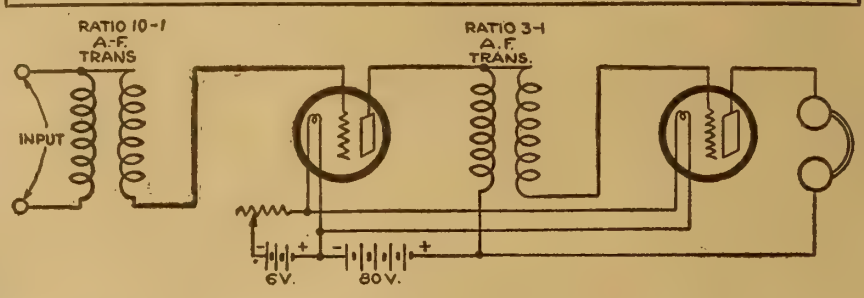
The Potentiometer

Another device used in connection with this amplifying circuit is the potentiometer P in the figure. This potentiometer is a variable resistance usually of about 200 ohms and is connected across the A battery circuit. It also has a third sliding contact which is connected to the tuning circuit of the left. By adjusting this sliding contact the potential of the grid with respect to the filament can be easily varied. Experience has shown that best results are obtained if the grid of the amplifier tube is slightly negative with respect to the filament. Thus with the aid of this potentiometer any degree of negative potential necessary can be supplied to the grid. This is a very important adjustment in all Radio frequency amplifiers.

Radio And Audio Frequency Amplification

In Figure 47 is illustrated another interesting receiver circuit employing one step Radio frequency and one step audio frequency amplification. This circuit if properly tuned is capable of producing very remarkable results. It has a very great range, and at the same time if used with a good antenna can produce signals loud enough to be reproduced in a loud speaker.

CONNECTIONS IN THE CIRCUIT



It will be noticed that the Radio frequency amplifier and detector circuit are the same as shown in Figure 46, but the output circuit of the detector tube feeds directly into one step of audio frequency amplification. Of course, if desired a second step of audio frequency amplification can be added to strengthen the signals still more, but this will seldom be found necessary.

Construction Details

In the construction of receiving sets employing Radio frequency amplification as was illustrated in the above two figures, certain regulations must be observed in order to prevent unpleasant interference between the various component parts. For instance, the variocoupler and variometer, which should be of good quality, should not be mounted closer than four inches apart. In fact, if possible they should be placed at opposite ends of the panel. In arranging the tubes and transformers it is best to allow a space of approximately three inches between the last Radio frequency amplifying tube and the detector tube. Also, if possible, a space of at least four inches should be allowed between the last Redio frequency transformer and the first audio frequency transformer. This is necessary in order to prevent any inductive interference, especially if the transformers are not shielded. If two audio frequency transformers are used, trouble can often be avoided if they are mounted with their cores at right angles to each other.

Close Connected

With the exceptions suggested above, the various parts such as tubes and transformers should be arranged so as to be as close together as possible. In this way the necessary connecting wires will be shorter; and, as is commonly known, the shorter the wires the less danger there is of losses or interference.

To assist in the tuning process it is a good idea to connect a 3-plate or 5-plate variable condenser across the primary of the first Radio frequency transformer. In this way this primary circuit can be tuned into resonance, with the effect that much louder signals will result. In fact, often the adjustment of this little condenser will tune one station out and another in.

Another important element wich plays a vital part in the tuning process is the rheostat controlling the current to the detector tube. For this reason it is best to use a rheostat with a vernier adjustment so that very close settings can be made. The grid leak in the detector tube circuit also needs careful consideration, for if the resistance is too low, it will load up the grid with an excess charge and thus paralyze the tube just when maximum amplification is wanted. Although there are numerous variable grid leaks on the market, the most satisfactory form yet devised is the pencil mark type, for with this the resistance can be easily varied as required. By changing the thickness of the pencil mark between the terminals of the grid leak, the point can readily be determined at which the detector tube will give maximum amplification without paralyzing itself.

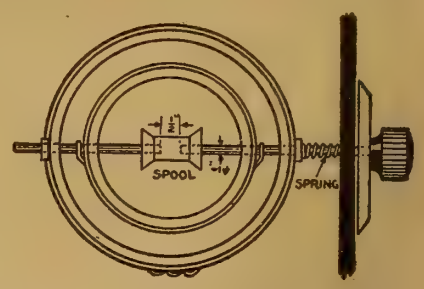
Chapter Fourteen

The next chapter will deal with additional circuits employing two or three stages of Radio frequency amplification. In addition, special information will be given in connection with loop aerials and the types of circuits best adapted for this type of aerial. The chapter will thus form an important addition to the present one, and should not be overlooked by any one desiring a complete knowledge of this all important subject.

Be sure your lightning switch is not covered with ice, otherwise the signals will be extremely weak.

Rotor Shaft That Runs True in Variocoupler

Many amatours would make their own variocouplers if it were not so difficult to get the rotor shafts true. I had this trouble until I hit on the method as shown in the illustration. Procure an empty thread spool and give it a coat of shellac, inside and out. A coat of thick



black enamel may be added to the outside if desired. Wrap the ends of the shafts with one layer of empire cloth, soak it in shellac and push it into the spool while the shellac is still wet. Keep the ends ½ inch apart. The shaft will be true and the dial will not scrape the panel.—Jack Ward, Berkeley, Cal.

Back Panel Mounting for Coils

This way to mount spider web coils is exceedingly efficient and they are controlled by knobs on the panel front. I am using this style mounting on my three-circuit tuner and I get excellent results. —Chas. P. Cothran, Covington, Tenn.

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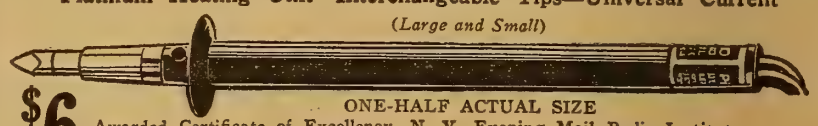

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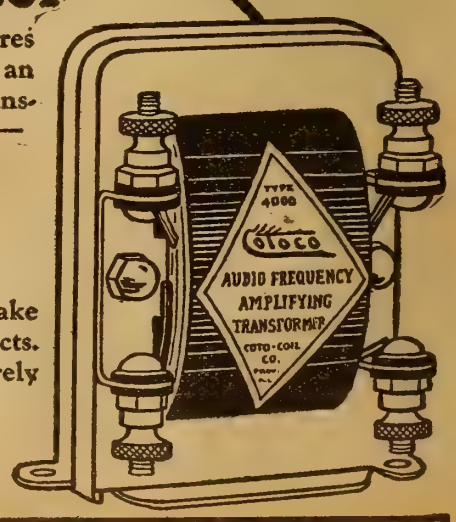

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Loud Tones Produced With Inexpensive Set

The accompanying diagram is that of my receiving outfit. The antenna is one wire 135 feet long and 44 feet high. The leadin is No. 14 gauge wire 40 feet long. This was done to overcome any variableness which might be caused by the swaying of the wire, fading away as it is called.

The variocoupler is the secret of the loudness of the signals. The diagram is self-explanatory. The rotor hooked up in this way is practically a variable condenser with increased signal strength. The 1½-volt filament battery gives it another boost on its way. The stator using the whole coil also gives increased signal strength, and does away with taps and switch which are valueless as far as I have experimented.

Tuning the Set

The variometer is another secret to increase your signals, which will take a little patience to learn how to manipulate it. If once accomplished it takes away that critical adjustment of the rheostat.

Set your condensers, variocoupler and variometer at zero. That means, with the plates on the condensers all the way in. The rotors of the variocoupler and variometer are set in the same position as the stator. Turn on your rheostats until the point just below where the hissing and howling starts. Rotate your variocoupler to about 50 on your dial, then adjust your 43-plate condenser in the primary circuit until the whistling or howling starts. For long distance reception the plates will need to be almost entirely all the way out. Try to bring the station almost in, either with the rofor of the variocoupler or condenser then finish off with the variometer until the maximum signal is obtained. Never rotate your variometer over a quarter of a turn from its first position.

Just experiment with it in the position you may have it before you start to tune, then by turning it back to its first normal position, you may get a surprise in the increase of your signal and how it will eliminate tube noises and static. Do the final adjusting with the variable condenser across the primary of your transformer. This should be used sparingly and most of the time left with the plates all the way in. If you want to use a fixed condenser it must be .006 mfd. capacity.

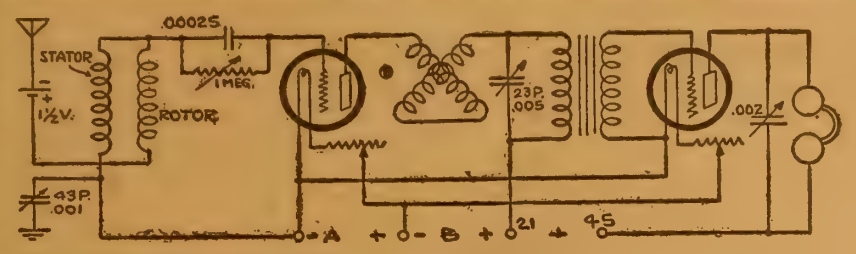
Tune with Condenser

Remember when leaving a station and bringing in a new one to just turn your 43-plate condenser slightly or the variocoupler, either one will give results. As a rule you will need to finish up with the variometer again. I am using a variable grid leak. About 1 megohm is the right capacity, nothing critical about its operation. One thing that must be remembered is that your transformer must be tapped from a 21-volt B battery. This is important.

Body capacity is my worst enemy, but I reduced this to a minimum by taking little strips of nickel plated metal about 1/16 inch thick, ⅜ inch wide and 4 inches long and making a double bend in them at right angles. Small holes were drilled in the ends of each strip for the purpose of screwing on the knobs of the dials. Rubber tubes were slipped over the ends of the strips to keep the fingers from touching the metal parts.—O. P. Klein, Luduc, Alta, Canada.

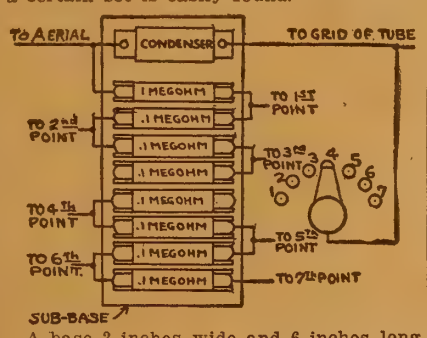
If no solder is handy apply a flux to the joint, then wrap it with several thicknesses of tinfoil and heat the joint with a match. This will make a tight connection that will serve in an emergency.

HOOK-UP USED IN THE SET



Flewelling Variable Grid Leak

In building the Flewelling super circuit I had trouble in adjusting the lead pencil mark variable grid leak, so I set about to make one which resulted in the device illustrated. A very fine adjustment may be had, and by changing the first grid leak tube any resistance that is needed for a certain set is easily found.



A base 2 inches wide and 6 inches long is cut from Formica. On this is mounted the grid leak and grid condenser. This base with its parts can be mounted on the back of the panel as a single unit.

Procure nine pair of grid leaks and condenser mounting clips and one grid leak tube of one megohm, seven of 1/10 megohms and one grid condenser. Mount these on the base and connect up as shown, using a seven-point switch.—A. C. McLellan, Westville, Ind.

Never Dope a Battery

According to the old time horse racers, you can dope any horse, if he is reasonably speedy, so that he can win one race easily. And according to battery men it is possible to dope a storage battery so that it will show a remarkable amount of pep for a while. But, with both the horse and the battery, the dope is really the beginning of the swift, sad finish.

There are various kinds of battery dope being put out with rosy promises of increased battery performance, but they are all alike in one particular; the good they do is temporary, and is far over-balanced by the harm they are sure to work later.

Wooden Panels Made Attractive

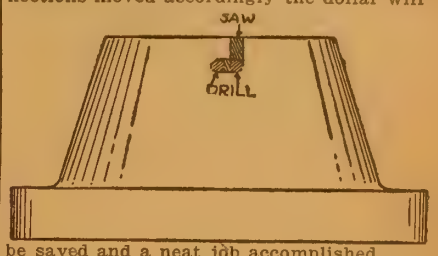
Wooden panels of a Radio box can be rubberized by breaking several old phonograph records into small pieces, putting them in a tin can, and adding one-half pint of denatured alcohol. This will dissolve in a day or two; then apply on the boards with a brush. A very glossy finish can be obtained if the rubber surface is shellacked. One-quarter inch wood is of correct thickness for most small receiving panels. It would be well to dry the material in a warm oven before applying the insulating mixture.

A buzzing noise in the phones may often be traced to a loose connection or a run down battery.

Broken Molded Socket Repaired Like New

Very often a molded socket becomes broken at the small lip which locks the bulb. It is a tedious job to repair one of these and a new socket will cost a dollar—often more—to replace it.

If a new lip or lock is made on the opposite side, or any other side and the connections moved accordingly the dollar will



be saved and a neat job accomplished.

Be careful to have the prongs of the tube set firmly on the springs, then mark the place where the lock pin will be when the tube is fully inserted. Drill a hole at this point the same size as the original, then drill another alongside of it and with a hacksaw cut the vertical slot to this last hole so that the lock pin will slide in freely. Be sure to change the connections befors using the tube.—H. F. Manchester, Atwater, Cal.

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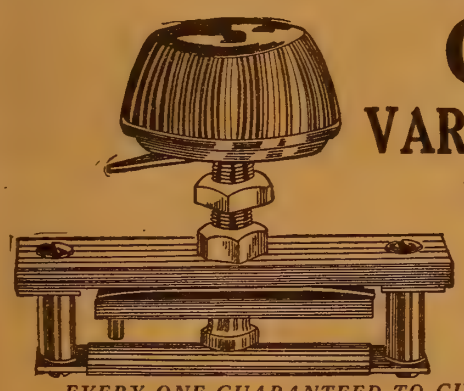

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How to Construct a Flewelling Super Set

The Second Prize Winner in the $100 Flewelling Set Contest

By F. P. Hall

(Editor's Note.—The following article is the second prize manuscript submitted in the $100.00 Flewelling Set Contest conducted by Radio Digest. The first prize set description will appear next week.)

THE writer, as an enthusiastic reader of Radio Digest since the first issue came out in search of the new and novel "hook-ups" usually to be found in there, ran across the first published layout of the now famous Flewelling circuit, cut it out and immediately began work on it.

A supply of fixed condensers was hurriedly procured, and a rough arrangement hurriedly fixed up on a board, and finally stations began to come in; due to the fact that I was using Myers audion tubes,—this type of tube being a pet of the writer, some difficulty was experienced in getting the proper values of condensers and grid-leaks, and considerable experimentation was necessary before the wonderful concert of squeals and shrieks was gotten under control.

Layout For The Cabinet

The front of the receiver consists of a formica panel 6 inches by 7 inches by 3/16 inches, and a 23 plate variable condenser mounted on the back on the left hand side and about 2½ inches down from the top of the panel—the panel being first shielded by shellacking on the back a sheet of thin copper foil and placing under pressure until dry.

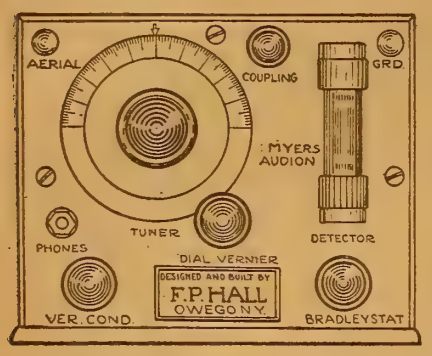
A 4 inch dial was fitted to the shaft of the variable condenser and a small extra knob with a ⅞-inch diameter rubber faucet washer was located at the lower center of the panel, bearing against the 4 inch dial with enough friction to act as a vernier in turning the dial.

Clips For Holding The Tubes

Four clips to hold the Myers tube were obtained and placed at the right upper side of the panel, and directly under the same was fastened a Bradleystat.

At the left and symmetrical with the Bradleystat knob was then drilled a ¼-inch hole, and from the "makings" of a variable condenser purchased at a department store for 30c, a 3-plate vernier variable condenser was constructed and mounted directly under the 23-plate variable and connected thereto by suitable leads. The movable blade in this vernier condenser was cut down with the tin shears to a size of about that of half of a silver dollar, in order to provide sharper tuning control.

The shaft of the vernier condenser extends through the ¼-inch hole in the panel previously described as on the left side, and fitted with an extra knob. This knob has a small screw or saw cut filled in with white lead to designate when the vernier condenser blade is in the "half-in, half-out" position, as to afford maximum tuning control this blade should be placed in this position before tuning with the 4-inch dial.



Phone Jack

A phone jack was next fastened to the panel at the extreme left as this location is best adapted to keep the phonecord out of the way while operating the instrument.

Two black binding-posts were then fitted at the upper corners of the panel, the one at the right making contact with the copper foil shielding only, suitable holes being cut in this shield at the other binding post and also wherever variable condenser shafts, legs, etc., required.

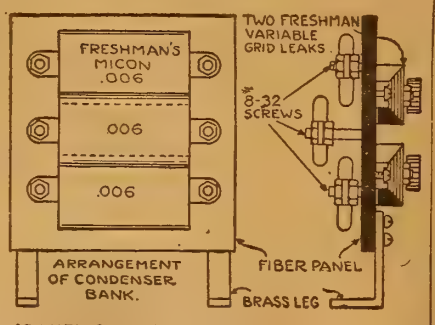
Near the top of the panel, to the right of the dial and not too near the plate terminal of the Myers tube, was drilled a small hole and tapped for an 8-32 screw, into which was placed a long brass screw of this size with the head rounded off on the under side, and fitted on the front of the panel with a small hard rubber knob, which was securely fastened to prevent the knob unscrewing. This knob on the outside of the panel being used for giving a micrometer adjustment in the coupling of the two inductances, as is shown in detail in a sketch submitted herewith.

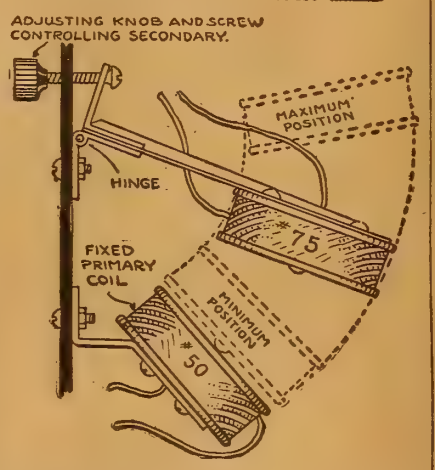
A number of small name plates with the words "Aerial", "Ground", "Phones", etc., were then fastened to the panel in their proper positions with small escutcheon pins. Three holes were then drilled in the sides and top for fastening the panel to the case. These were countersunk and nickel plated oval head screws were fitted.

Mounting for Coils

A couple of wood blocks 2 inches in diameter and 1 inch thick were made to fit the inside of the two Giblin-Remler 50 and a 75 turn coils, and four large fibre disks cut out of 1/16-inch fibre of a size equal to the outside diameter of the two coils were fastened to either side of the wood plugs after the coils had been placed thereon.

A brass strip was screwed to the block holding the 50-turn coil and bent and drilled to fasten to the end plate of the 23-plate variable condenser. A longer brass strip is fastened to the other 75-turn block and a small hinge soldered or riveted to the lower end of the same, as well as fitted to the back of the panel in such a position as to allow this coil to swing into contact with the other coil on the end of the condenser.





At the bottom of this same brass strip and on the opposite side from the coil was soldered a small angle shaped piece of brass strip having a slot to engage the head of the screw threaded through the panel, as previously described, this being the variable coupling arrangement shown in a sketch.

Condenser Bank

The next step to consider was the construction of the condenser bank,—consisting of the three large fixed capacity condensers, of a value of .006 mfd. each. A small hard rubber panel was prepared slightly larger all around than two of these fixed condensers laid side by side with about ¼-inch clearance between them, and three long brass screws were fastened to each side of this hard rubber panel in such a way as to permit two condensers to lay side by side with the third condenser raised above these two by about ¼-inch and held firmly in that position by two nuts on each screw in the ends of the condenser. (See sketch showing detail.)

The condenser panel was mounted on the rear of the front panel at right angles with it, a brass strip supporting it rigidly.

The Grid Leaks

On the reverse side of this small condenser panel two Freshman variable grid leaks were mounted (see sketch), the sealing wax in them being carefully melted out and the grid condensers removed. As the Myers tube requires a grid condenser of .0005 mfd. value, one of this size must be obtained, or can be made with two brass or copper strips about ⅝-inch wide, with an overlap of ¼-inch separated and covered by thin pieces of mica, and fastened securely together.

In order to keep the grid leaks as short as possible, the grid condenser was placed directly between the 23-plate variable condenser and the grid terminal of the tube.

A lead was brought from the grid terminal to the grid leak and from the other terminal, connected to the minus side of the filament or A battery circuit, instead of shunting the grid leak around the grid condenser.

Flexible leads of stranded insulated wire were connected to the outside and inside ends of the 75-turn coil, one lead going to the plate terminal of the tube, and the other to the B battery plus connection.

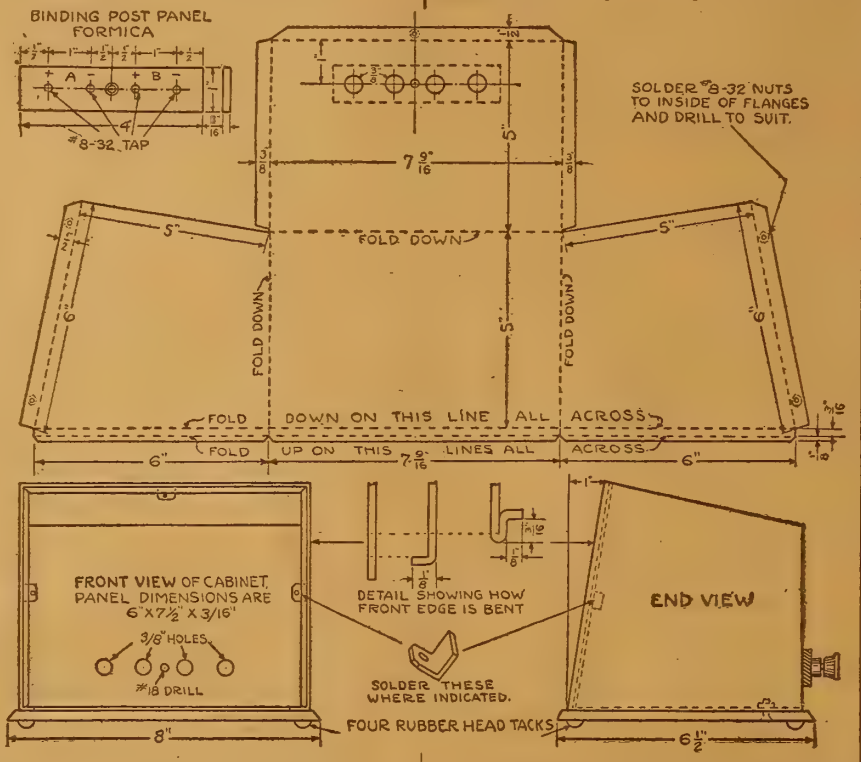
The second variable leak was bridged across the third .006 mfd. condenser which itself bridges the other two, and by sawing slots in the hard rubber buttons or knobs on these two leaks and making corresponding small holes in the case, these can be adjusted from outside the receiver by use a small screw driver.

Leads to the Parts

The other necessary leads were run to connect up the Bradleystat, the 50-turn coil, the condensers and phones. All wiring was of No. 14 wire, covered fully with spaghetti tubing, and all connections soldered and made tight.

Four flexible leads about 9 inch long were arranged to connect with the four

(Continued on page 15)



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1. Special Locking Device to keep the coil in place, thus preventing it from being thrown out of adjustment.
2. Special Adjustable Bearing feature.
3. Special constructed Calibrated Dial, showing the stations tuned.
4. Positive Connections on rear of blocks.
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List Price $5.00

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The reputation gained by the Crown "W D 11" with jobbers, dealers and users is evidence that there is no other transformer giving such reliable service in amplifying without distortion. The Crown "WD 11" is mechanically perfect, ruggedly constructed and priced right. It is a transformer all jobbers and dealers can back to the limit.

Audio Frequency, $5.00
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At your dealer's—otherwise send purchase price and you will be supplied postpaid.

We also manufacture
23 PLATE VERNIER CONDENSER.....$5.50
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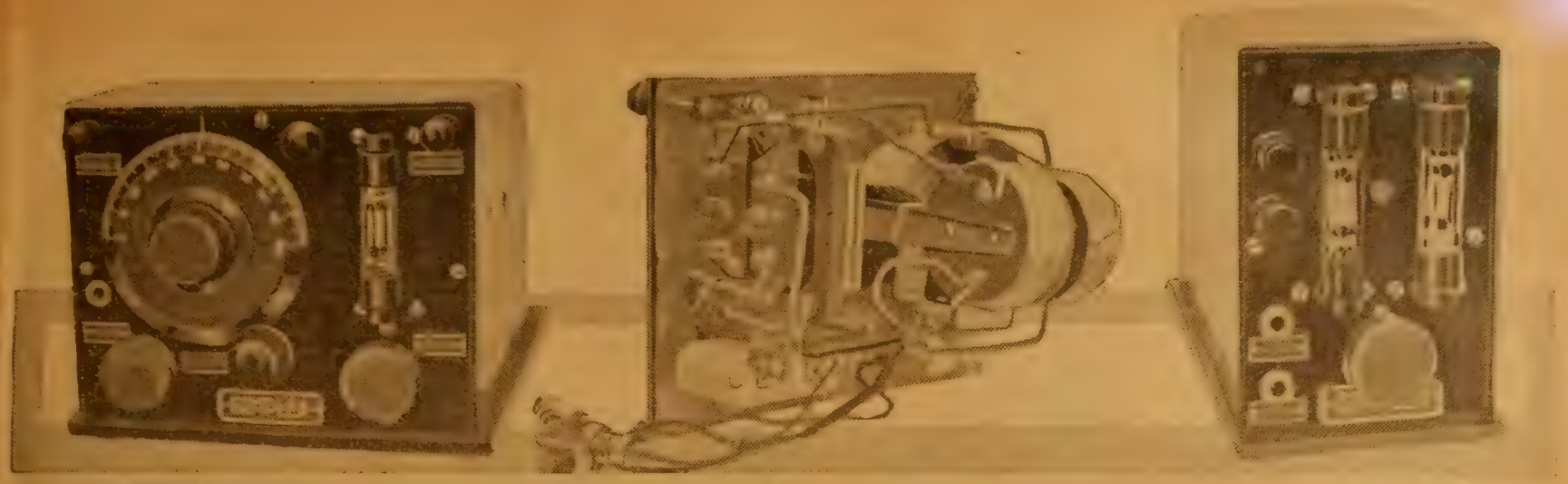
Crown Radio Manufacturing Corporation
78 FIFTH AVENUE NEW YORK CITY



FLEWELLING SET

(Continued from page 14)

binding posts fixed to the back of the case which were supported and insulated from the case by a 1-inch strip of formica fastened thereon. This strip was suitably marked with A+ and —, and B+ and —.

Three oval head nickel plated screws fastened the panel securely in place in the case, with a slight rake or slant of about 1¼ inch in 6-inch height, which makes the operation of the knobs, etc., on the front easier and more convenient than when the front panel is vertical.

Sheet Metal Case

The case itself was made from a sheet of medium weight tin, with the dimensions and layout as given in attached sketch. This was cut out and formed up with the aid of a brake, at a sheet metal shop. After forming, the seams were soldered, and the edges as well as the surplus solder filed down smooth and the corners rounded. Three small brass lugs were soldered to the inside at the center of the top edge and the two sides for tapping later to receive the panel holding-[illegible]

Five 8-32 brass nuts were also soldered to the inside on the flange that extends around the bottom, and the holes were made to permit screws to be placed in the wood bottom to fasten into these nuts and hold the tin case down firmly upon the base.

When the case was finished, filed and smoothed with emery cloth to a final finish, it was then japanned or painted with black enamel, the first coat rubbed down and a second one given. A piece of hard wood about ¼-inch or ⅜-inch thick was cut to the required size and finished smooth and enameled. Four rubber head tacks or bumpers were then fastened to the bottom to act as feet.

Aerial or Ground Connections

As explained in Radio Digest both aerial and ground are not required. You will recall that in the first part of this article I stated that the binding post marked "ground" was attached to the copper shielding and hence to the metal case only, but otherwise has no connection with the wiring. I have found that if a ground connection is made to this binding post, thus grounding the shield, it eliminates the capacity effect and also adds to the loudness and stability of the reception.

In operation the receiver is the acme of simplicity. Just connect the batteries, turn up the filament to a low brilliancy, screw in the coupling knob until you hear the tube grow "mushy", turn the big dial and you meet a number of "squeals".

I find in operating the receiver that the closer the coupling the less B battery is normally required. I get good reception with 45 volts on the plate and sometimes when a distant one refuses to come-in pile on the B battery up to 180 volts, and my, how the tube does sing. With the coupling at about 1 inch between coils and 90 volts on the plate, about everything on the air can be brought in.

Selectivity of Set

The principal advantage of this particular design is the extreme selectivity obtainable. First there is the vernier filament control, second, the dial vernier, then the small vernier condenser, and for a finishing touch the closely controlled coupling knob.

The small size of the vernier condenser blade is also a great advantage, but yet I have had two stations with waves so close that less than a quarter turn of the vernier gave me either.

In general I think this circuit is the greatest ever, and I have tried out a lot of "trick" hook-ups. I think there are great possibilities yet undisclosed with it. I find, for instance, that in using Myers audion tubes, that on account of the changed values of this tube due to its compact construction and low internal capacity and impedance, that the values of the three fixed condensers of .006 mfd. capacity are not critical, the circuit operating fairly well on as low as .001 mfd. for these condenser values, and as the grid condenser is 1/5 the usual size for the regular type of tube, it may be that less than a .006 mfd. is best.

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Wave Length—150 to 3,000 Meters

Why Be Confined

To listening in on nearby stations, when the "All Wave" coupler in your set will enable you to receive broadcast reception from stations thousands of miles distant?

Be Prepared

To receive on the higher wave lengths that have been and will be allotted to broadcasting stations because of their ever increasing number.

THE "ALL WAVE" COUPLER COMBINES

SIMPLICITY OF EFFICIENCY

Price $9.00

ASSEMBLY AND OF RESULT

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Standard 90 Degree Variocoupler, $3.50.

OUR 180 DEGREE VARIOCOUPLER is a masterpiece, suitable for use in any circuit. Most efficient and best constructed Coupler in existence. Price, $4.50.

Our Combination Mounted Variocoupler for table or back panel mounting has all taps connected and soldered, nothing else like it. Price, $8.00.

MOUNTED 3 CIRCUIT TUNER. Exceptional selectivity and sharp tuning makes the most easily constructed and highest efficiency Set known. Price, without Dial, $6.00.

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Our Audio Frequency Transformers are the choice of the leading manufacturers and radio engineers. Guaranteed to give high magnification, less distortion and better all around efficiency. No howling. Price, $4.00.

NEW YORK COIL COMPANY'S Variable Condensers are the standard by which others are judged, containing such features as all metal framework, adjustable bearings and positive electrical contact:

11 Plate.....$1.50 43 Plate.....$3.00
23 Plate..... 2.00 3 Plate..... 1.25

NEW YORK ENTERTAIN-A-PHONE RECEIVING SET No. 2—Complete with detector and two stages of amplification, all in one cabinet. Contains a non-regenerative two circuit hook-up with two stages audio amplification. Results are simply a revelation. It must be operated and heard to be appreciated. Workmanship and design and material of exceptional character throughout. Of unusual interest to the jobber. Price, $50.00, fully guaranteed.

NEW YORK COIL COMPANY, Inc.

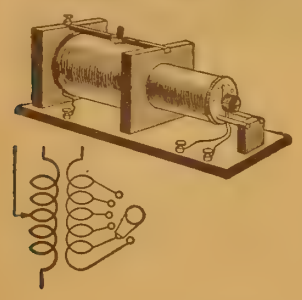
340 Pearl Street New York City, N. Y.

About Radio Parts

THE LOOSE COUPLER

Another form of tuning unit that closely resembles the tuning coil is the loose coupler. However due to its bulky construction it has gradually lost its former popularity.

The resemblance to the tuning coil in



this instrument lies in the fact that its primary winding is adjusted for the proper wavelengths by means of a slider, but here the resemblance ends, as there are two distinct circuits which are inductively coupled. The current flowing in the one creates a constantly varying magnetic field which induces an alternating current in the other secondary winding.

This secondary winding can also be adjusted for wavelength control by means of the tapped switch at one end.

By sliding this secondary in and out of the primary winding the induction in the secondary is controlled.

For different wavelengths there are certain points of resonance, that is the point of coupling, where the current in the secondary reaches its maximum value. In this manner very selective tuning is possible.

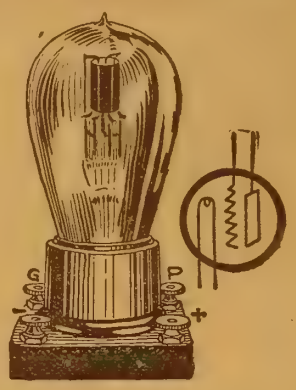
THE VACUUM TUBE

The success of the Radio industry is due to the development of the vacuum tube. Not only because it takes the place of the crystal detector with increased efficiency but also because of its ability to act as an amplifier.

It consists essentially of an evacuated bulb which has four sets of terminals. Two of these terminals are connected to the filament which when heated emits electrons that flow to a second element called the plate. This plate also has an external terminal.

The peculiar property of this flow of electrons or current, which makes it so valuable is the fact that the electrons will flow only from the filament to the plate but not back again. In this manner alternating current when passed through the filament to plate circuit loses all the impulses in one direction and becomes a direct pulsating current.

The third element called the grid also has an external terminal. This grid is the means of controlling the flow of electrons from the filament to the plate. It can retard or even increase the flow depending on the charged condition of the grid. This third element increased the



efficiency of the tube to an unlimited extent and is the biggest development made in Radio.

Renewing Dial Figures

Every amateur wants a neat looking panel, but in time the marks and numbers become darkened and yellow. This makes a panel look bad. A little white paint may be mixed thickly so that it is like a paste and then spread it over the figures on the dial. When dry the surplus may be wiped off with a damp rag, leaving the depressions full of white paint.—W. King Jenkins, San Francisco, Cal.

The use of Radio for the dissemination of information about the collection of waste paper and its importance to the paper industry is the latest step taken by the book paper and board manufacturers of the country towards relieving the present shortage by informing the public that there is a new and active market for this waste.

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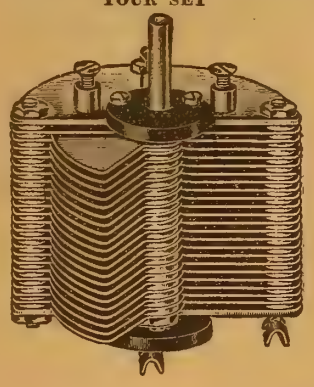

11 PLATE.....$1.25
23 PLATE..... 1.40
43 PLATE..... 1.75

Mail Orders Filled Same Day
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U. V. 201A	5.95
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Mercury 1½ Volt; guaranteed as good as WD. 11. Fits standard socket; consumes ¼ ampere current per hour	5.95

MISCELLANEOUS

$45.00 Magnavox Loud Speaker, Type R3	26.95
25.00 Atlas Loud Speaker	17.95
Mounted Hot Spot Crystals, 35c value	.20
Crystal Detector Stands, 90c value	.40
$2.00 Grewol Enclosed Detector	1.55
Genuine Reinartz Coils, 15 taps, $3.00 value.	1.95
$7.50 Moulded Dayton Variocouplers	4.95
7.25 Moulded Dayton Variometers	4.75
1.10 Dayton Rheostat	.75
1.00 Genuine Dayton Bakelite Dials	.45
.50 Dials 2 and 3 inch	.25
1.00 Erla Sockets	.45
Switch Levers, 50c value (adjustable radius)	.30
10-1 Transformers (well-known) $4.75 value.	3.75
5-1 Transformers (well-known) 4.75 value.	3.75
3-1 Transformers (well-known) 4.50 value.	3.45
Radio Frequency Transformers—$4.50 value	3.45
Genuine Million Point Crystals	.25
Solderall	.20

HONEYCOMB COILS

25 Turns	$0.35	200 Turns	$0.70
35 Turns	.35	250 Turns	.70
50 Turns	.35	750 Turns	.90
75 Turns	.35	1000 Turns	1.15
100 Turns	.45	1250 Turns	1.40
150 Turns	.55	1500 Turns	1.50

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REINARTZ CIRCUIT

EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD phone condenser, 23 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions $10.00

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit $11.00

TWO STAGE AUDIO FREQUENCY AMPLIFIER

EVERY PART COMPLETE

1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 3 Jacks (Double Circuit), 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver..... $11.00

TUNING AND DETECTOR UNIT

and 2 stages of audio-frequency amplification

List Price $35.00 for each unit

Built in Mahogany finished cabinets measuring 7x7x14 inches for Tuner and Detector Unit and 7x7x8 inches for Amplifying Unit.

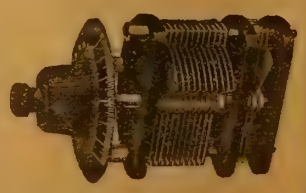
Affords an unusually high range of program selectivity and local stations can easily be tuned out to secure distant ones. Guaranteed to give excellent results, only the very best material being used in its construction.

Special Price .. $21.75 per unit Combination ... $40.00

CONDENSERS

3 Plate Variable; value, $1.75....$1.05
13 Plate Variable; value, $2.50.... 1.20
23 Plate Variable; value, $3.50.... 1.35
43 Plate Variable; value, $4.50.... 1.85

13 Plate VERNIER; value, $5.50.. 3.75
23 Plate VERNIER; value, $6.00.. 4.00
43 Plate VERNIER; value, $6.50.. 4.25



Reinartz Coils Including Mounting Value, $2.50 $1.75

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V. T. SOCKETS Nickeled brass sleeve, composition base; value, $1.00; special at 50c

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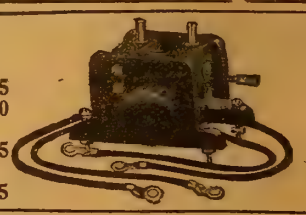
50 turns mounted..$0.95
75 turns mounted.. 1.00
Double Coil Mountings 2.45
Triple Coil Mountings 3.35



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Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Bakelite ends. Equipped with 3-in. Dial..... $1.95
Clapp-Eastham—5 Plate Variable Condenser, Bakelite ends, Dial for vernier $1.15
Clapp-Eastham—39 Plate Variable Condenser, .001 capacity, Glass enclosed for table mountings. Precision made. Equipped with 3-in. dial. Reduced to..... $3.95

VARIOCOUPLER—Celeron Condensite and Litz Wire Wound Secondary; Value $4.50. Special $2.95

Potentiometer with knob; value, $1.75; special at 1.00

Potentiometer with 2⅛" dial; value, $2.15; special at 1.15

BEST QUALITY JACKS, Single Circuit; value, 65c; special at..... .30
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MULTIPLE POINT INDUCTANCE SWITCH with Knob and Dial (15 switch Points)... 1.75

LIGHTNING ARRESTERS approved by underwriters $0.90

THREE-INCH DIALS — Unbreakable — heat resisting composition—high finish; special..$0.30

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RAYMOND VERNIER RHEOSTATS—Value, $1.50; special ..... .95

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Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of $5.00 or over east of the Mississippi River. All others include postage.

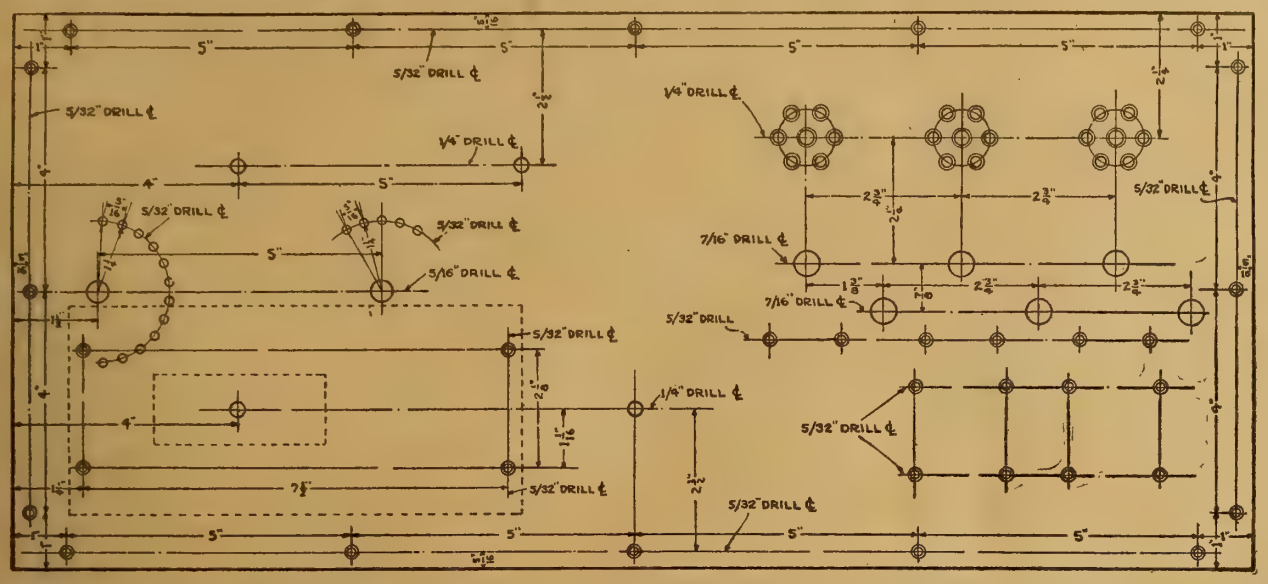
Construction of the Ultra Reinartz Receiver

Part II—The Panel Layout

By H. J. Marx

IN PART I, details for the construction of the special tuning units of the ultra Reinartz Circuit were described. The lay-out of the panel with the comments on the mounting of the various instruments are given in this installment.

The panel required should have overall dimensions of ten by twenty-two inches and should preferably be made of quarter inch stock. This circuit is not sensitive or critical to body capacity effects and leakages, but at the same time, it is highly essential that a good quality of panel material be used. Wooden panels are never practical for assembly of Radio apparatus because of the losses due to leakage on account of the low resistance quality of wood, especially when not thoroughly dried or when covered with a coating of paint. Figure 1 gives the dimensional lay-out for the location of all of the apparatus required for assembly. It will be noticed that no baseboard is used, but in fact, all of the instruments are directly panel mounted even to the Audio frequency transformer. The sixteen countersunk holes running along the outer edges of the panel are for wood screws that hold the panel in place in the cabinet. All binding posts are located in the rear in order to avoid the unsightly appearance of the many leads running to the front of the set.



No. 1—Tuning Unit
No. 2—.0005 Mfd. Vernier Variable Condenser
No. 3—One .001 Mfd. Vernier Variable Condenser
No. 4—One .0015 Mfd. Fixed Condenser
No. 5—One .0025 Mfd. Fixed Condenser
No. 6—Two .00015 Mfd. Fixed Condensers
No. 7—Detector or Soft Tube
No. 8—Two Amplifier or Hard Tubes
No. 9—Two Audio Frequency Transformers
No. 10—One Vernier Rheostat
No. 11—Two Rheostats (Vernier Optional)
No. 12—Tapped Tickler and Choke Coil
No. 13—One .002 Mfd. Fixed Condenser
8 Binding Posts
3 Tube Sockets (Panel Mount)
1 Panel 10 by 22 by ¼ inches
2 Switch Levers
17 Contact Points
3 Double-Circuit Jacks (Optional)
4 Dials

Primary Circuit Control

The primary circuit is controlled entirely by means of the tapped switch in the center of the left end of the panel. This switch consists of twelve taps from the primary winding on the tuning unit. The dimensions for the spacing between contact points may vary somewhat due to the variations in the diameter of the heads of the different contact points that are on the present market. In the same manner, the radius on which the circle is drawn for the location of these points may vary depending upon the length of the lever-on of the switch. Likewise the drilled hole for mounting the switch lever may vary according to the type of instrument used.

Grid Circuit Controls

The grid circuit is controlled by the variation of self-inductive coupling between the rotor and windings of the tuning unit. This control is operated by means of the dial, the location of which is indicated by the lower quarter inch hole, four inches from the left edge of the panel. equipped with vernier control. The fixed (Details of the mounting of this rotor will be covered later.)

The variable grid condenser shown as No. 3 in the hook up diagram in last week's issue is located by the quarter inch hole in the lower half of the exact center of the panel. This condenser has a capacity of .001 Mfds., and can be condenser (No. 4) of .0015 Mfd. capacity is mounted on the back of this variable condenser and will be indicated in a later issue.

Feed Back Control

The three controls that effect the regeneration of feed back in this circuit are located in the upper left quarter of the panel. The two quarter inch holes are for the plate condensers (No. 2) both of which have a capacity of .00005 and should be equipped with vernier control. The one on the left controls the feed back from the antenna circuit to the plate circuit of the detector tube, while the one on the right controls the feed back from the antenna circuit to the plate circuit of the first Audio frequency amplifier tube. The tapped switch located a little below and between the several lines of these two condensers is used to control the amount of turns used in the tickler coil winding on the tuning unit. It will be noticed that not only do these taps control the actual number of turns in this winding, but also because of the spacing between turns, variation in taps will, to a certain extent, vary the distance and therefore the coupling between this tickler winding and that of the primary and grid circuits.

The same details apply to the location of the contact point holes and the type of switch lever as described for the primary switch and apply to this tickler switch.

In the upper right-hand corner are indicated three sets of peep-holes for ob-

(Continued on page 18)

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159 N. State St. - CHICAGO

"HOT SPOT" CRYSTALS
GUARANTEED
To Make Your Set Talk Louder
Deep-seated mounting insures the utmost in sensitiveness to Radio impulses. Made of the purest grade of detector crystal, "Hot Spot" is far more efficient than galena, silicon or radiocite.
A Trial Will Convince You
All live jobbers and dealers sell "Hot Spots"
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ALL PARTS NECESSARY
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LISTEN IN ON—Stockton, Calif., or Seattle, Wash.
ORIGINAL BLUE PRINTS
of the Famous MAWHINNEY RECEIVING APPARATUS
A series of 7 blue prints giving in full details all the necessary information, specifications, and method of construction, and assembling of the MAWHINNEY RECEIVING Apparatus. This is the 5-tube receiving set that picked up 5 stations in California, recently written about in Literary Digest and Radio Globe. The Blue Prints tell you in a very simple and clear manner just how to construct a duplicate of MAWHINNEY'S trans-continental receiving set.
If your dealer cannot supply you—Send $2.00 for complete set of prints.
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Everything guaranteed as represented.
Coast to Coast Receiving Apparatus of the Very Best Material
We are including all standard articles of the highest class in the sets herein described. Have a number always on hand, packed for immediate shipment. We use material not found in other sets.
REINARTZ COMPLETE PARTS
Consisting of 7 x 18 panel, 23 plate condenser, 11 plate condenser, Barrchas inductance coil used in Reinartz circuit, 2 dials, one bakelite socket, 3 switch levers, contact points, Freshman variable grid leak, vernier rheostat, 8 binding posts, 25 feet wire, and diagram for construction, for only..... $10.95
FLEWELLING COMPLETE PARTS
Consisting of 6 x 14 panel, one 23 plate condenser, one composition dial, 2 honeycomb coils, one double adjustable coil mount, 3 .006 condensers, one Freshman variable grid leak, one condenser, one vernier rheostat, one bakelite socket, 8 binding posts, 25 feet wire and construction diagram, for only..... $11.95
THIS WEEK'S SPECIAL—3,000 OHM HEADSETS
These phones are unusual bargains, excellent standard make, with patented universal joint, adjustment on receiver, and comfortable band for head. Regular list, $7.50 ..... $3.95
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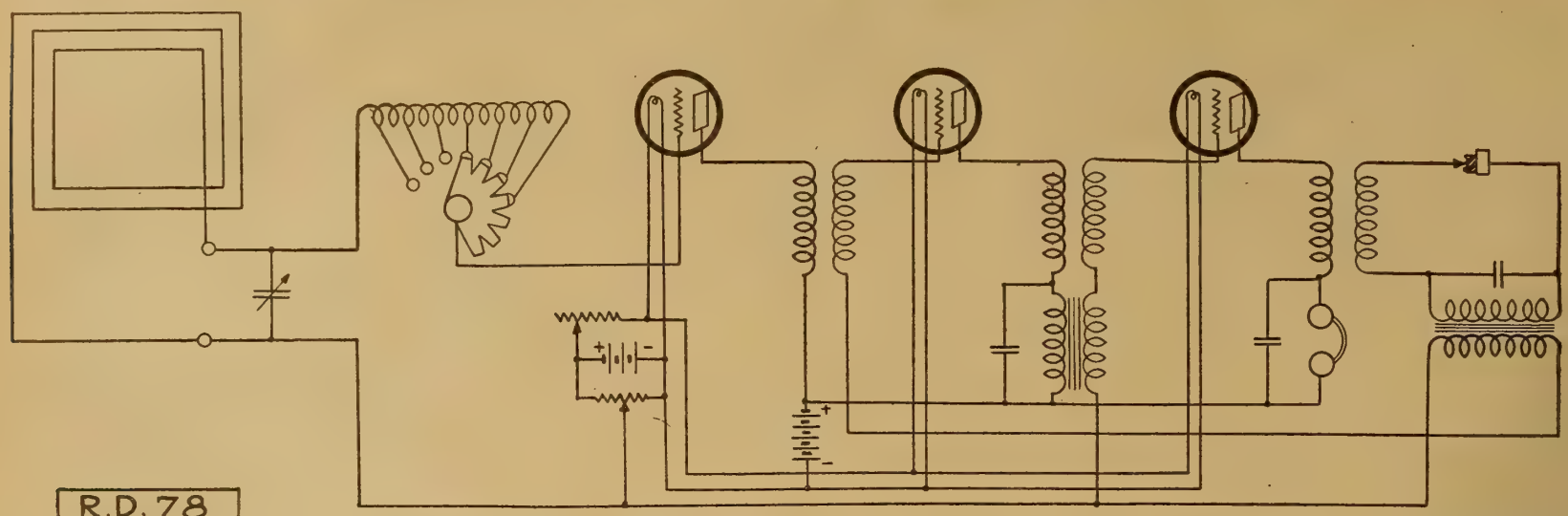
25, 50, 35 and 75 turn coils mounted—regular price, $1.25; our price, 90c ea.
ANNOUNCING THE B-METAL CRYSTAL AND FIXED CRYSTAL DETECTOR
This is the last word in crystals, not a mined mineral but a synthetic crystal sensitive wherever you touch it. The fixed crystal detector needs no adjusting and is set ready for use at all times, encased in glass.
B-Metal crystal packed in individual dust proof container.....50c ea.
B-Metal crystal detector .....$1.00 ea.
NOTICE—The products sold by this company are of the best material obtainable. A trial order will convince you that the slight reduction in price on an article made by one of our competitors will not repay you for the difference in the quality you may get. We guarantee everything exactly as represented and cheerfully answer any correspondence. Kindly send money order whenever possible as this insures quick delivery. We prepay postage on orders East of the Mississippi.
Our new Price List is just off the press. Ask for one when you send your order.
Write us. *The House of Service and Quality*
RADIO
MANUFACTURER'S OUTLET CO.
Moco Products 28 SO. WELLS STREET, CHICAGO, ILL.

SIMPLE FORM OF 3-TUBE REFLEX



R.D. 78

THIS circuit is another one of the reflex type, especially adapted to loop aerials, but is also practical for an outdoor antenna with the addition of an extra tuning unit. It corresponds to three stages of Radio Frequency, detector and two stages of audio frequency.

The tap switch and coil unit shown in the grid circuit is easily constructed. The coil consists of 42 turns of No. 20 gauge double cotton covered wire wound on a 3-inch tube and tapped at every three turns. This then gives the end terminal on the condenser side of the circuit and seven taps to be connected to contact points. Instead of a lever arm switch, the fan type is recommended. This short circuits the unused turns and reduces dead end losses to a minimum. The condenser has 23 plates and a vernier in order to permit maximum selectivity in tuning in distant stations.

The tubes are all amplifier or hard tubes, and a 60-volt plate battery is recommended. As different tubes work on various plate potential values it is best to experiment to see just what plate voltage will give the best results. A power rheostat is used for controlling the filament current of all three tubes at the same time.

It will be noticed that the grid potential of all three tubes is controlled by means of potentiometer across the A battery. The resistance of this instrument should be 400 ohms.

A crystal detector is used for rectification and can be of the fixed adjustment type. Three Radio frequency transformers and two audio frequency transformers are required. The by-pass condensers used across the primaries of the audio frequency transformers and the phones have a fixed capacity of .002 mfd. each.

This hook-up will give satisfactory results for use with a loud speaker.

REINARTZ RECEIVER

(Continued from page 17)

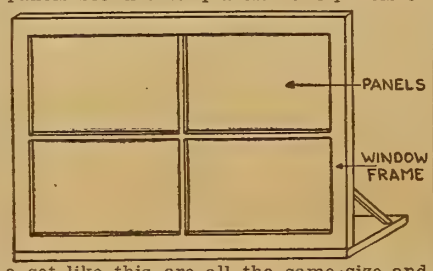
servation of the lighting of the tube filaments. Directly under each one and on the same center lines are indicated the holes for the mounting of three rheostats. In the original set made up, although only the first was required as vernier, for the sake of uniformity of appearance, the same type was used for all three tubes. Two counter-sunk holes under each rheostat location are for the mounting of a panel type of tube socket.

In order to provide sufficient clearance for the rheostats, a spacing block is inserted between the tube socket and the panel. This increases the distance between the tube and the panel and gives plenty of clearance for the movement of the rheostat. The four counter-sunk holes under each of the two tube locations on the right side are for the mounting of the Audio frequency transformers on the panel. The laminated cores are kept in a vernier line in order to avoid magnetic reactions between transformers, although both are of the shielded type. The three holes to the right and a little below the center of the rheostat locations are for the assembly of three double circuit jacks. These jacks are not included in the hook up diagram given in the last issue and the insertion is left to the option of the constructor. They can be omitted or added as desired.

The two countersunk holes below the primary tapped switch and the other two under the second amplifier plate condenser location are for the mounting of the tuning unit. Details of this mounting will be given in the next part of this series.

Novel Panel Set

A panel set can be made from an ordinary window sash having the small panes of glass. The glass is removed and the panels set in their places. The panels on



a set like this are all the same size and are interchangeable. The instruments should be mounted directly on the panels. —Clyde Hansley, Stockton, Cal.

WD-11 Dry Cell Container

With the vogue of the new WD-11 vacuum tube increasing, amateurs are wandering around for means to accommodate these little tubes and accessories to their sets. A Radiophan has this suggestion for taking care of the dry cell used for filament current. A straight-sided aluminum drinking cup was procured at a ten-cent store. A dry cell fits into it nicely. It was secured to the case by two brass flathead wood screws with a fiber washer interposed for insulation purposes.—A. K. Chenoweth, London, O.

FLEWELLING
ALL PARTS NECESSARY
DEALERS: ATTRACTIVE DISCOUNTS
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Enclosed Crystal Detector
Attractive Dealers' Discounts
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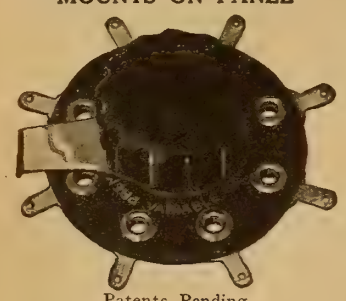
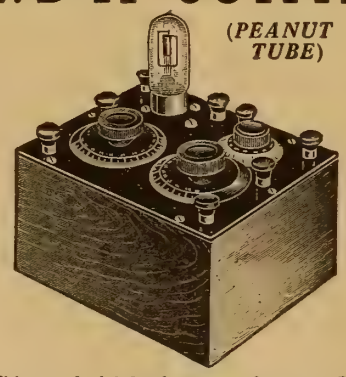
HERE IT IS
Just What You Have Been Looking For
A VARIABLE RESISTANCE THAT MOUNTS ON PANEL



Patents Pending
PRICE $1.50
Real Radio fans, in the building of their sets, will more than appreciate this device, which gives them a variable resistance which is adaptable for use in all Radio hook-ups—in the grid circuit—as amplifier coupling resistance for both radio and audio frequency—"B" battery resistances—antenna shunts—tuned loop circuits—resistance couplers for both radio and audio frequency, and many other places in the radio hook-up that the amateurs' ingenuity will suggest.
Our complete Parts Bulletin on request.
DISTRIBUTORS—Some territory open for live, responsible concerns.
PREMIER ELECTRIC COMPANY
Manufacturers Est. 1905
3802-3810 Ravenswood Ave. Chicago, Ill.

WD-11 OUTFIT
(PEANUT TUBE)



This wonderful dry battery outfit with a range of 600 miles comes to you ready to assemble, panel drilled and marked, mahogany finished box, condenser ready to screw in place. Variocoupler wound complete, rheostat, dials, binding posts, socket, wire, screws and picture diagram for wiring, all at above price.
$13.85 Less Tube

Two-stage Amplifier Box to match the above	$14.15
Variocouplers, $4.00 value	2.85
Variometers, $4.50 value	3.10
Transformers, $4.50 value	3.75
Reinartz tuning coil, $3.00 value	1.85
Rheostat, $1.00 value	.60
Sockets, 50c value	.38
1½" switch lever, 50c value	.30
Baldwin type "C" phones, $12.00 value	9.00
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Postage extra. No personal checks received. Let us quote on your wants.
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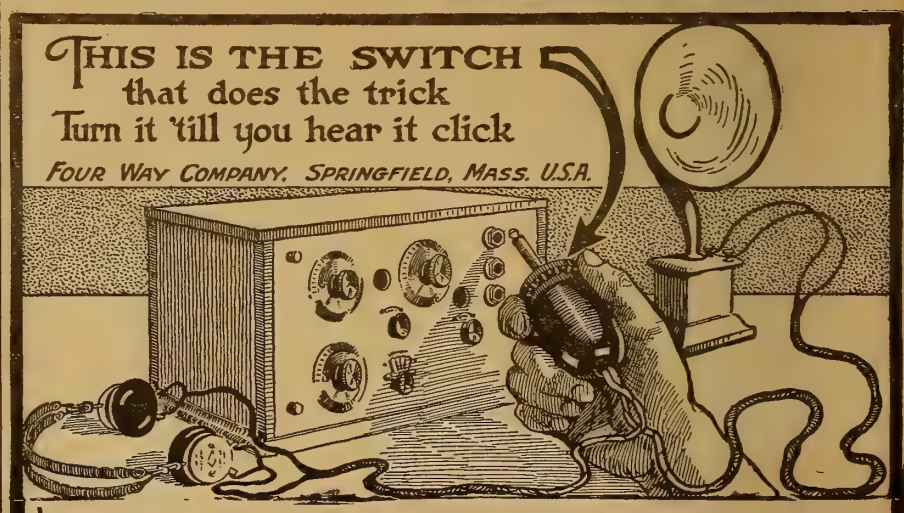

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Turn 1: Head Set
Turn 2: Loud Speaker
Turn 3: Both in Series
Turn 4: Both in Parallel
A switch plug that makes it possible to tune in through head set and switch in loud speaker by turning dial. Two head sets can be readily attached, or one head set and loud speaker. Both can be used at the same time or either one alone.
Four Way Company
Dept. C, Springfield, Mass.
$1.50 Ask your dealer

Questions and Answers

Long and Short Wavelengths

(2064) GMF, Los Angeles, Calif.

Does the Flewelling circuit amplify the short wave lengths more than the longer waves the same as the other super receivers?

Using the proper size coils what is the effective wave length range of this circuit?

Could a peanut tube be used in this circuit? Is a peanut tube so critical that when using it as an amplifying tube venier rheostats need be employed for long distance reception?

A.—Its action of amplification is the same as that of other super circuits in respect to wave lengths. Its effective wave length range is up to about one thousand meters, using proper inductance coils. A peanut tube may be used and is not critical enough to necessitate vernier rheostats for long distance reception.

Condenser Value and Potentiometer

(2133) AS, Oak Park, Ill.

I would like to try out Hook-Up R.D.65. Please advise the value of the variable condenser shunted across the secondary honeycomb coil and the condenser between potentiometer and one lead of the same coil.

A.—With relation to R.D. 65, a variable condenser of .0005 mfd. capacity is shunted across the secondary honeycomb coil, and either .0005 or .001 mfd. capacity between potentiometer and one lead of coil.

Body Capacity

(2150) HCH, Charleston, W. Va.

Please advise me how to eliminate body capacity. I was told to put tin foil on the back of the bakelite. I did this and connected it to the ground. It helped some but still bothers me very much. I have a three-circuit tuner; variocoupler, variable condenser and two variometers. I get very good results otherwise. I would like to ask also about getting the same stations every night. I get stations from the North, East and West of here but nothing from the South.

A.—There is no practical means of reducing body capacity effect other than the method of shielding as suggested. In itself shielding somewhat reduces the efficiency of a set and of two evils it seems sometimes a matter of choosing the lesser.

In the matter of your failure to receive stations to the south of you, while receiving from other directions, if the condition is persistent, it is doubtless due to some intervening obstruction, mineral deposit or electric lines.

Reflex Circuit

(2320) EDC, Tecumseh, Neb.

Where should the .002 mfd. fixed condenser be placed in the reflex circuit shown in Radio Digest of January 6?

Would a UV-201 do as well as the Myers tube installed with proper control?

How many turns of wire should one use on a loop? Would a larger loop (a larger frame) be better?

Received WWJ, WFAA and KSD very clearly on a homemade loose coupler and a crystal detector about two weeks ago.

A.—The .002 mfd. fixed condenser is to be placed in the lead one side of which is connected to variable condenser and input and the other side of which goes to rheostat and negative battery.

A UV-201 tube will serve effectively as suggested.

Winding Phone Coils

(2433) GJ, Springfield, Mo.

I wish you would please publish what size wire to use and how to wind an old pair of phones into about 2,000 or 3,000 ohms.

A.—You should use No. 40 S.C.C. wire and wind each coil full. Care must be exercised to have the polarity of the fixed magnet the same as that of the electric magnet. To determine this use a battery and compass. If with the current flowing through the coil, the electro-magnet attracts the same end of the needle on a pocket compass as the corresponding pole of the fixed magnet, the polarity is correct. This should also be true of the other side of the fixed magnet and its electro-magnet with the exception that they should both attract the opposite ends of the compass needle.

About eight turns of wire on loop will serve. A four-foot frame would be better.

We are pleased to congratulate you upon your DX reception with a crystal detector set.

Another cause of fading is the rapid change in barometric pressure between the receiving station and the transmitter. A dense fog between the two stations may absorb some of the radiated energy.

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Investigate the opportunities offered through taking either our RESIDENCE or HOME STUDY COURSE of radio instruction. Conducted by the RADIO CORPORATION OF AMERICA—no new operators accepted by the Eastern Division of that corporation other than our graduates.

Write for complete information.

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(Formerly Marconi Institute)
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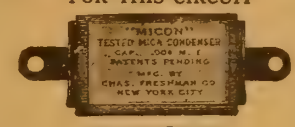
FREE DIAGRAM AT YOUR DEALER
of the FLEWELLING SUPER CIRCUIT
FRESHMAN PRODUCTS—ESPECIALLY ADAPTED FOR THIS CIRCUIT

VARIABLE RESISTANCE LEAK
With .00025 mfd. Micon Condenser Combined $1.00
Without Condenser ..... .75

ANTENELLA

No antenna or aerial needed. Eliminates all the inconveniences in Radio; operates from any light socket. Price only..... $2.00



"MICON"
.006 Mica Condenser..... $1.00
.001 Mica Condenser..... .40

OTHER "MICON" SIZES

Size	Price	Size	Price
.00025	$0.35	.0025	$0.50
.0005	.35	.005	.75
.002	.40	.01	1.50

At your dealer's—otherwise send purchase price and you can be supplied without further charge. A diagram of the Flewelling Super Circuit sent free if your dealer can't supply you.

CHAS. FRESHMAN CO., INC.
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(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

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Framingham ..... .70
Bradleystats 1.85
Roberts (6 ohm standard) ..... .70
General Radio (Any and all resistances) Special Pr.
Radio Corp. ..... Special Pr.
Fada ..... Special Pr.

POTENTIOMETERS:
Radio Corp. PR 536 (200 Ohm) ..... Special Pr.
General Radio (400 Ohm) ..... Special Pr.
Atwater-Kent ..... Special Pr.
Framingham (200 Ohm) 1.10
Paragon (200 Ohm) 1.60
Amsco (150 Ohm) 1.10

SOCKETS:
Regal (all nickeled) ..... .75
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Rameco (Fine quality) ..... .40
Turney (All metal fine finish) ..... .25
De Forest (Moulded) ..... Special Pr.
General Radio ..... Special Pr.
Radio Corp. (UR 542) ..... Special Pr.
Double (Fada) ..... Special Pr.
Triple (Fada) ..... Special Pr.
WD 11 (Rameco) ..... .40
WD 11 (Bell Panel or Base Mtg.) ..... .90

TRANSFORMERS: (Audio Freq.)
Betts & Betts (13 to 1 Ratio) 5.50
Amertrans (Best transformer on market, limited supply) 7.00
Radio Corp. UV 712 ..... Special Pr.

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Murad T-11 (Old standard) 3.80
Radio Corp. UV 1714 ..... Special Pr.

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American Hard Rubber 3-in ..... .75
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(Knockdown for immediate assembly)

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All Standard Tubes in stock at ..... Special Pr.

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Volton 22½ V. Large size 1.55
Volton 45 Volt 1.98

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Brach Indoor Lightning Arrester 1.25
Argus Lightning arrester 1.00
Bus Bar Wire ..... Per ft. .015
Spaghetti (Any color) ..... Per lgt. .08
Reinartz Spider Web Coil 1.75
All De Forest DL Coils at ..... Special Pr.
Deforest Triple Coil Mounting ..... Special Pr.
Single Coil Mounting ..... .45
Double Coil Mounting 2.25
Triple Coil Mounting 3.25

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Radio Illustrated

Jackie Coogan, the youngest movie star, is shown using a crystal set he made all by himself

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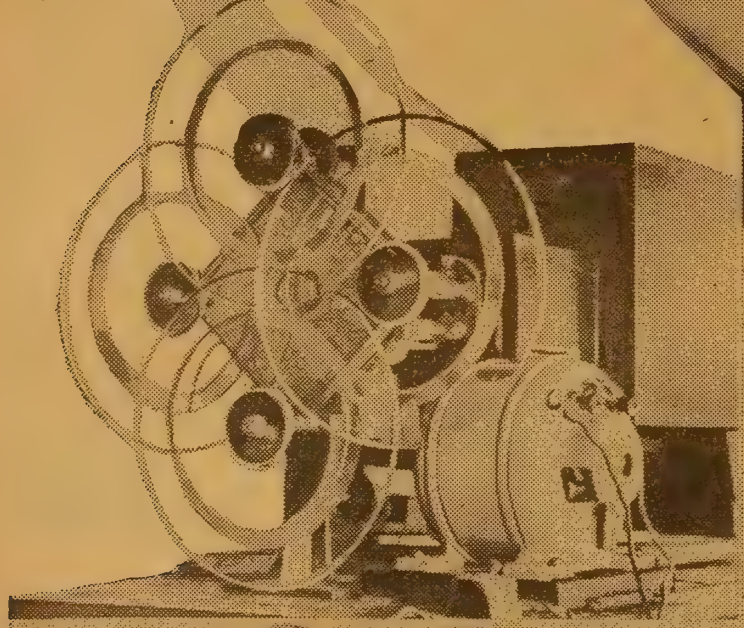

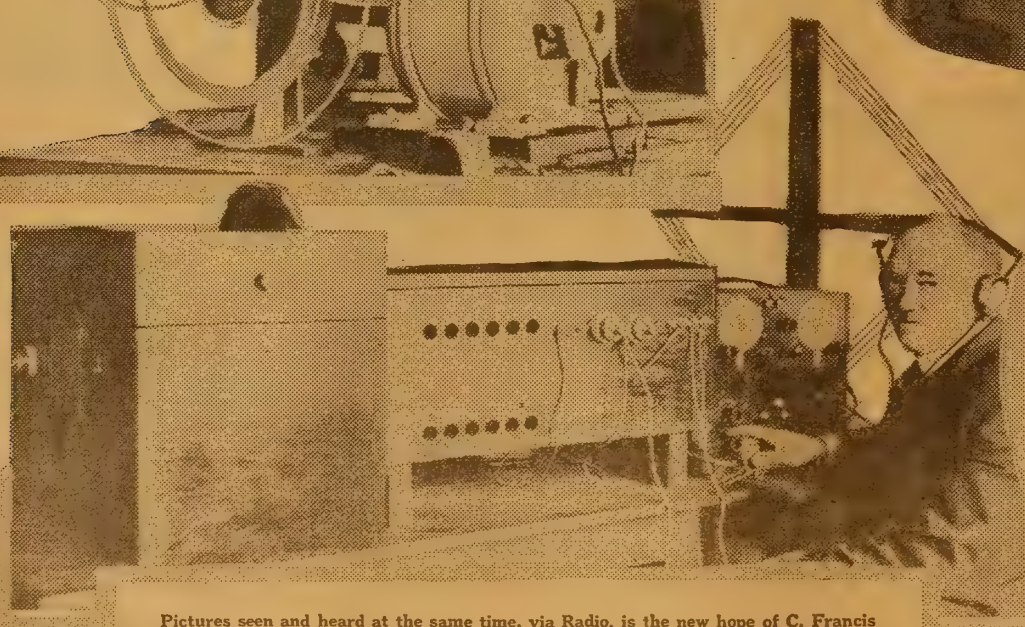

Pictures seen and heard at the same time, via Radio, is the new hope of C. Francis Jenkins, the inventor of the photographic Radio picture transmission. He has already sent and received photographs via Radio and is working on an invention that will not only show the event in stills, but will show the action on screens in picture houses throughout the United States. Mr. Jenkins asserts that while his idea seems beyond the realm of possibility, it is very practical in theme. In tests already made, pictures have been sent for short distances of ten or fifteen miles, but plans are being formulated for transmitting photographs via Radio over distances of a hundred miles or more. Insert above is the principal unit of the transmitter, showing the circular disk prism which forms the key to the Radio problem of sending photographs via Radio © Newsreel

The amateur receiving set contest now in progress at the Radio Fair at the Hotel Imperial, New York City, has drawn entries from all parts of the country among which are many unusuals. Above is a novel entry in a vacuum tube set with spider web inductances, all mounted on the base of a standard audion socket © Newsreel

APR -3 1923 ©CIB574791

Ultra Reinartz, Flewelling Data; Reflex Q. & A.

Radio Digest

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DO SOULS BROADCAST?

"TOMMY" MEIGHAN, RESTING BETWEEN SCENES, OPENS UP POCKET SET TO ENTERTAIN FRIENDS

Leatrice Joy, Tom Meighan and Director Alfred E. Green out on location. Our film-famed Radiophan, Meighan, likes to carry about his pocket Radio set, much to the enjoyment of the company. Below is Evelyn Freedman, youthful violinist starred many times via KYW, Chicago

MAGICIAN THURSTON SETS UP SPEAKER FROM WHICH STRANGE LANGUAGE COMES

Conan Doyle Says, "Spirit Talk"—Magic Master Believes Some People Human Radio Stations—Offers Love-at-First Sight Illustration—Psychic Communication a Possibility

By S. L. Huntley

CHICAGO.—Howard Thurston, famed man of magic, who broadcast recently a talk on "East Indian Magic" from Station WMAQ of the Daily News, advances the theory in an interview with Radio Digest that the mysterious sounds heard in a sea shell resemble some unknown language. In addition he claims that every human being is a sort of a broadcasting station. In elaborating his startling ideas, Thurston said:

Thurston Tells Story

"One stormy night last December five men sat in a room in a Long Island home. The hour was past midnight. One of the group sat near

(Continued on page 2)

CURE FOR OLD LAW IN HOOVER'S HANDS

CONFERENCE SUBMITS REPORT ON QRM REMEDY

Plants May Get Wave Band from 222 to 545 Meters—Room for All, Belief

By E. E. Plummer

WASHINGTON, D. C.—With the completed report of the second Radio Conference laying before him, Secretary of Commerce Hoover states that he will adopt it as soon as he has conferred with other cabinet members to be sure that it will meet with their approval. He also says that he has received legal advice to the effect that the prescribed changes in wave lengths can be made without an executive order from the president.

The conference report marks a new era for the Radio public. The extensions in broadcast wave bands and definite prescribed wave lengths for the fifty large power phone broadcasters, will make for much less interference. Suitable wave lengths are provided for more than 500 low power stations as well.

Boiled down, the important recom-

(Continued on page 2)

MAKE EXPERIMENT IN MUSTER CALL BY AIR

Seventeen Companies of Infantry Respond Quickly to Broadcast

CLEVELAND, O.—An experiment of using the Radio as a means of mobilizing troops, conducted here by Colonel L. S. Connelly, in command of the 145th Infantry, was pronounced a big success. Within two hours after an "emergency order" was broadcast, he had received replies from all of the eighteen companies with the exception of the one at Akron.

BETTY BLYTHE TALKS ON MOVIES FROM WGR

BUFFALO, N. Y.—The women Radiophans in Buffalo and vicinity were much interested recently when Betty Blythe, motion picture actress, gave a special concert and talk from the Federal Telegraph and Telephone Company's studio, WGR. Miss Blythe gave some good advice to those of the fair sex who have it in their minds that they would like to enter the motion picture business.

SO SOULS BROADCAST?

(Continued from page 1)

a large reproduction of an ordinary sea shell—it alone filled half of the room. 'Just a few minutes now, gentlemen,' I said, 'the sounds are heard best between two and three o'clock.' Four of these men have had their names linked with psychic matters for the past decade, among them, Sir Arthur Conan Doyle."

Weird Sounds Come

"The sounds came. A low but distinct murmur at first, that swelled into a clear flowing babble, weird and mysterious," continued the magician. "Pulsating, rising and falling with accents and articulations—an unknown tongue."

What was it? That is the question that the five men tried to learn and it is the question that Thurston the great is going to try to solve when his present tour is completed and he again returns this summer to his Long Island home.

Mr. Thurston is a Radiophan as well as a magician and a believer in spiritualism. It was a few months ago that he began experimenting with a sea shell as a loud speaker and found that he heard other noises and sounds from this shell that were not brought in by the Radio.

Builds Sea Shell Speaker

From this he grasped the idea of building the large shell that he now has in his home. After many experiments of filling the shell with different amounts of sea water he found a point where the strange sounds were heard loudest between the hours of two and three o'clock in the morning.

It is the belief of some, including Conan Doyle, that it is the voices of spirits that are heard and it only necessary to learn the strange language in which they speak in order to commune with those who have passed on. Some say it is Radio waves from Mars that have been in tune with the natural wave length of the shell. That ether waves produce the weird sounds, is a point that all agree on and one that is highly of interest to Radiophans.

"It is my belief," said Mr. Thurston as I sat in his dressing rorom, following his

(Continued on page 4)

HOOVER CONFERENCE

(Continued from page 1)

mendations of the conference are these:

Previously all broadcasting was concentrated on three wave lengths, 360, 400, and 485 meters. A new field extending from 222 meters to 545 meters can now be created for the purpose. Within that field stations can be assigned individual wave lengths and divided into two classes. The higher power Class A stations corresponding to the present Class B stations can use the wave lengths between 288 meters and 545 meters, while lower power stations (new Class B stations) can use the waves from 222 to 286.

The seemingly small increase in wave bands is in fact quite large. The important phase is that a great many more individual phone station wave lengths exist in the lower wave length ranges than do in the higher. For this technical reason smaller, rather than larger, waves are recommended.

Amateurs and Ships

The report recommends an extension of the amateur wave band from 150 to 222 meters, instead of 200 as now used. All, including special, amateurs will be in that band however. Special amateurs will use from 200 to 222 meters, and spark stations will be confined in the 150-200 meter band.

A recommendation is made that ships on 450 meters keep silent between 7 and 11 P. M. and as soon as possible alter their apparatus to transmit on 600 meters and above. Provision is also made to allow ship telephony on bands much higher than those used by broadcasters.

"The reading of telegrams or letters by broadcasting stations should be permitted," says the report, "so long as the signer is not addressed in person and so long as the text matter is of general interest."

Another recommendation is that simultaneous rebroadcasting (relaying) be permitted as a service only on a broadcasting wave length, and with the authorization of the original broadcaster and of the Department of Commerce.

Digest Aids in Report

The new regulations recommended are based on a plan submitted by the Radio inspectors, and include elements from other plans submitted by representatives of the Associated Manufacturers of Electrical Supplies, the National Radio Chamber of Commerce, the Institute of Radio Engineers, the American Newspaper broadcasting stations, and Radio Digest Illustrated.

It is the unanimous opinion of the conference that the Secretary of Commerce in licensing stations has the authority under the present law to regulate hours and wave lengths of operation of stations, and to revoke or withhold licenses of stations when such action is necessary to prevent interference detrimental to the public good.

The conference also urged that the fullest co-operation be given by those who operate broadcasting stations and by the public with the Department of Commerce in the co-operative adjustment of local broadcasting problems in order to realize the fullest possibilities of the recommendations outlined.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440			11:30-12:30			11:30-12:30	
CKAC, Montreal, Que.	410		6:00-10:30		6:00-10:30		6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	400	6:00- 8:00		6:00- 8:00		6:00- 8:00		5:00- 5:30
KFI, Los Angeles, Calif.	467	5:00- 9:00	5:00-12:30	5:00- 9:00	5:00- 9:00	5:00-12:30	5:00- 9:00	6:00- 8:00
KGW, Portland, Ore.	491	6:00-10:00		6:00- 7:00		6:00-10:00		5:00- 6:00
KHJ, Los Angeles, Calif.	400	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	
KPO, San Francisco, Calif.	400		6:00- 8:00				6:00- 8:00	
KSD, St. Louis, Mo.	545	8:00-11:30	8:00-10:00	8:00-10:00		8:00-11:30	8:00-10:00	
KYW, Chicago, Ill.	536	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:00	6:45- 7:40	7:00- 8:40	5:45- 7:40	7:00- 8:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00-11:00	5:30- 6:00	7:30- 8:00	8:00-11:00	8:30-10:30
WGI, Medford, Mass.	360		8:30-10:00	7:00- 8:30	9:30-11:00	9:30-11:00	8:00- 9:30	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30
WGR, Buffalo, N. Y.	400	7:00- 9:00		7:00- 9:00		7:00- 9:00		
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	360		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	400	7:15- 8:30						
WHB, Kansas City, Mo.	400		8:00-10:00		8:00-10:00			8:00-10:00
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	
WJAX, Cleveland, O.	390		6:00- 7:30		7:15- 9:30			
WJZ, Newark, N. J.	360	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30
WKAQ, San Juan, P. R.	360				7:30- 9:30		7:30- 9:30	
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00			
WMAQ, Chicago, Ill.	400		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00- 9:30		8:00- 9:30	8:00- 9:30	8:00- 9:30	12:30- 2:00
WOAI, San Antonio, Texas	360		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	8:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00			6:50- 9:10			
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	400		6:30- 9:00	6:30- 9:00	6:30- 9:00	6:30- 9:00		

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

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Looking Ahead

More About the Ultra Reinartz Receiver—In the next issue H. J. Marx will give complete details for the final assembly, instructions for making connections, and how to tune the popular improved Reinartz Receiver. Part III of this series will be found on Page 17. Read it.

E. T. Flewelling Again Next Issue—Mr. Flewelling will in Part X of his series tell more about the simplified "flivver" Receiver. The Digest is the only place you can read articles by E. T. Flewelling.

Arthur G. Mohaupt in His Chapter XV for Radio Beginners will give much information on the construction and operation of loop antennae. Read Chapter XIV on page 11 of this issue.

Receiving Records Contest—This popular DX fan feature will appepar in full in the April 14th issue. Records for all stations will be revised to date.

Part III of the Only Sure Fire and Complete Broadcasting Program Directory—Buy the next issue to complete your list of stations and get the State, City-Statiton Index.

The Fourth Prize Flewelling Set, designed by A. R. Miller, Spring Valley, Minnesota, will be described by Mr. Miller in nthe April 14 issue. Order it at your newsstand today.

Looking Still Further Ahead—The Digest can promise detail for the construction of a cheap and efficient reflex panel set. This sest will be described by H. J. Marx following the conclusion of the Ultra Reinartz Set series. And another card we have up our sleeve to show our readers most any issue now is a complete weekly series of advance programs, including every broadcasting station in North America with 500 watts antenna input or more. With the innovation of this costly new service, the Digest hopes to permit its readers to pick an especially interesting program that they may desire to hear, and then listen in for that station on the night when the selected program will be on the air.

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BROADCASTERS TO HELP BAG BANDITS

CANADA WILL NOT IMPOSE TAX ON SETS

Mounted Police Plan to Prevent Border Raids with Aid of Science

By Jeffrey J. Dingman

CALGARY, ALTA.—Bandits from the United States side of the international boundary line who conduct systematic raids on the prairie provinces of Canada this year for the first time in the history of Canadian criminology will have to reckon with the Radiophone, if suggestions being made to the governments of Manitoba, Saskatchewan and Alberta are acted upon.

Call on Radio for Aid

Attorney-General Craig, of Manitoba, announced in the Legislature last week that information had reached the government that bandits from south of the line will attempt to repeat the exploits which caused a reign of terror in Southern Manitoba, as well as in parts of Saskatchewan and Alberta, last fall. Everything possible is being done, however, to prevent raids on banks and to capture the raiders. It is quite probable that the Radiophone will be employed. This will be the first time that Radio will have been used systematically in the detection of crime in this country.

To Broadcast Descriptions

Canada has taken the lead in commercializing Radio by the establishment of two stations for commercial Radiophone work, between Swan River and The Pas, Manitoba. These stations are now being installed for the Manitoba government, and it has been suggested that descriptions of bands and news of the raids could be broadcast, thus diminishing the danger from marauding bands. That this can be done successfully has been proven, CKCK at Regina having been mainly instrumental in the capture recently of "Doc" Purvis, Canadian National Railway train robber.

Attorney-General Craig stated that the American border is being patrolled closely day and night by large forces of mounted police. Now it has been suggested to the government that each detachment install Radio receiving apparatus, and also that descriptions of suspicious characters arrested and then released for lack of evidence, could be broadcast, so that future misdemeanors might be more easily traced to the proper source, and the work of the police facilitated immensely.

No Tax on Radio

It was also announced in the Legislature that the Manitoba government does not intend to impose a tax on Radio receiving sets. This announcement was made by Hon. F. M. Black, provincial treasurer, in justifying the action of the Manitoba telephone system in taking over the work of broadcasting from the two Winnipeg daily newspapers. Mr. Black said, however, that the telephone systems expected some revenue from rentals.

TEUTON ETHER SERVICE GIVES FINANCIAL DATA

New York Quotations Reach Germans in Ten Minutes

BERLIN.—After four months of experimenting, the Express Service Company (Eildienst Gesellschaft), Berlin, has begun a daily service of financial and commercial news broadcasting to subscribers in various parts of Germany, according to a report to the Department of Commerce from Consul E. V. Richardson, Berlin. This company is financed by German capital and is purely a private undertaking. Having arranged with the National Government for the use of the Radio station at Koenigswusterhausen on a limited basis for a definite period, a regular service of financial news is received from the United States, Switzerland, Sweden, and other countries, via the high power station at Nauen, Germany.

This information is broadcast immediately by Radio telephone to subscribers of the company. These number at present about 800 and are mostly banks and industrial institutions located in some 200 towns and cities. It is expected that New York quotations handled by this service will be available generally to subscribers within ten minutes of their dispatch from New York.

Each subscriber rents from the company the necessary receiving apparatus paying for the service itself an annual fee of 300,000 marks, and for the apparatus an annual rental of approximately 200,000 marks. There are 2½ hour schedules daily, beginning at 9:30 a. m. and 5:00 p. m.

School Has Club

ELMHURST, ILL.—The students of the Elmhurst High School here recently formed a Radio Club and held their first meeting March 14th. Officers were elected and it is the plan of the club to install a powerful receiving set.

LEVIATHAN LIFEBOATS TO CARRY EQUIPMENT

WASHINGTON.—Lifeboats on the Leviathan, America's greatest passenger liner, are being equipped with Radio sets, it was announced today. Should the unfortunate occur and disaster befall the great ship, the survivors will be able to communicate with vessels sent to the rescue. The Radio sets are as powerful as those on the average cargo carriers.

MIDSHIPMEN DRILL IN UNISON TO AIRWAVES

WASHINGTON. — A Radio-controlled drill was a feature of the Annapolis Gymnkhana held recently. The midshipmen in the drill team wore Ku Klux costumes and in their conical helmets were installed small Radio receiving sets. From a sending station on the roof of the gymnasium, instructions were issued to the men in the drill.

ANOTHER BEAUTIFUL CONVERT

"Which way do I turn it?" asked Lila Lee, pretty movie favorite, as she adjusted her headphones on her first adventuring in the air. Now she is an addicted bug. Hope it is not long until we hear her on the air as well as see her on the screen

WSB'S Owls Hold Annual Banquet at Ansley Hotel

Special Microphone Gives Music to "Stay at Homes"

ATLANTA, GA.—The first annual banquet of the Radiowls of Station WSB, an organization made up of fans who listen in each night at 10:45 p. m., was held at the Ansley Hotel Rathskellar, here. A musical program was given during the dinner by Ernest Rogers, Journal reporter-songster, Miss Bonnie Barnhart and Fred Houser, the secretary of the Atlanta Convention Bureau.

Following the dinner dancing was in order to the music of the Ansley hotel orchestra. A special microphone gave the music to the fans who were unable to be present.

The whole entertainment was planned and carried out through the ingenuity of Lambdin Kay, Radio director of WSB.

Tube Set Circular Available

WASHINGTON.—A circular describing how to build a tube set, the third pamphlet on Radio construction to be published by the Bureau of Standards, is now available from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents. Write for Circular 133, "Description and Operation of an Electron-Tube Detector Unit for Simple Radio Receiving Outfits."

Government Scientists Puzzled by "Dead Spot"

Land of Lost Waves Covers Forty Mile Area

WASHINGTON.—Government scientists are trying to determine the cause of "dead spots" between a number of cities in the United States which form an almost impenetrable barrier to the direct exchange of Radio messages.

The most pronounced of these appears to be between here and Baltimore. To get a message to this point, less than forty miles distant, Washington senders are using Chicago and other comparatively remote cities as a relay point. The pleasures of Radio concerts are almost completely lost between the two cities.

Dr. J. H. Dellinger, chief of the Radio division of the bureau of standards, who is trying to fathom the mystery, reports that a similar difficulty exists between Pittsburgh and Cleveland, Hartford and Boston and Providence and Boston. The most plausible theory now advanced, Dr. Dellinger says, is the existence of a Radio activity in these dead spots which so affects certain layers of the atmosphere as to render transmission of waves impossible.

In the case between Washington and Baltimore, theories advanced in other quarters are that the dead spot may be caused by the electric railway line between the cities, by the numerous high-tension cables and conduits between them or by the topography of the country.

MARCONI PROMISES NEW SECRECY SET

FAMOUS WIZARD WORKING ON PRIVACY DEVICE

Claims Solution of Directional Control Sought By All Inventors

LONDON.—Guglielmo Marconi is on the track of Radio directional control. The inventor revealed today that he hoped soon to perfect a device by which Radio messages would be received only by the person for whom they are intended.

This problem, long one of the greatest difficulties in Radio development, has occupied Mr. Marconi's attention for some time, he said, and while declining to divulge his secret, he asserted he was confident he could overcome the obstacle.

Marconi has made numerous experiments to this end already. The chief tests of his device, however, will be made in late April, on his yacht Electra. The yacht is now at Southampton and will leave at an early date for a cruise along the coast of Spain and western Africa.

Is Confident of Success

"The entire matter," he said, "is only in the experimental stage, but I believe it will at least point the way for a successful device of this kind which may be improved later. If successful it will revolutionize Radio telegraphy."

Mr. Marconi explained that the greatest difficulty with regard to Radio is the listening-in by strangers to private communications. Under the new method, it would convert the Radio to a sort of telephone as far as privacy is concerned.

If the new device accomplishes its purpose, it will be possible to send Radio messages from one station to another across the Atlantic without anyone listening in.

Privacy to be Assured.

Both Mr. Marconi and his associates are maintaining a close guard over his new secret, which will be continued until the invention has proved itself. It is understood here, however, that the plan follows somewhat the lines of receiving instruments whereby stations can tell the point of the waves' origin to a small fraction of a second of arc.

The air waves' origin has long been the problem of those seeking a method of directional Radio. If Mr. Marconi succeeds in this, it will mean reducing the sending of Radio messages to the simplicity of telephone calls—and they would be equally private.

First Radio Baby of the Land Is Son of Operator

Proud Father Promises to Have Youngster Broadcast Soon

TACOMA, WASH.—America's first Radio baby! Many children have claimed the title, but here is the real heir.

Born, to Mr. and Mrs. Alvin Stenso, whose marriage ceremony was broadcasted last year from KGB, the Tacoma Ledger-Mullins Electric Company broadcasting station at Tacoma, Washington, a son.

As readers of The Radio Digest will remember, Mr. and Mrs. Stenso were united in the bonds of matrimony in the studio of the Ledger station. The entire wedding party was there but the guests were scattered all over the West with Radio receivers clapped to their ears. The entire service, from the wedding march and the nuptial vows to the benediction and the concluding kiss, was broadcasted and heard by hundreds of thousands of Radiophans for thousands of miles around.

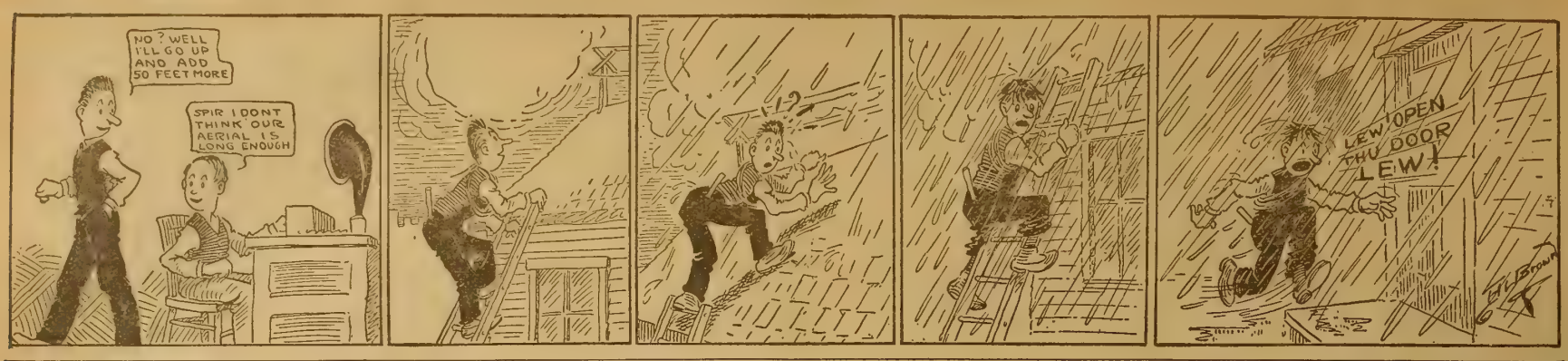
Mr. Stenso at first favored naming his heir apparent Kenneth Gordon Byron Stenso, in order that his initials might be K. G. B., but he was loath to burden the youngster with so many names, so the new head of House of Stenso will go through life with the "handle" Calvin.

KGB plans to have his fond parents bring young Calvin down to the Ledger studio and have him chuckle and coo a bit via Radio shortly. Mr. Stenso the elder is chief operator at KGB.

Spain Declares Ether Will Be Government Monopoly

WASHINGTON, D. C.—Cable advices state that the Spanish Government has declared Radio telephony a State monopoly. Bids for an exclusive concession to exploit Radio telephony in Spain will be invited within 60 days and foreign countries interested will be given an opportunity for submitting proposals. It is stated, however, that Spaniards will be given preference.

The American amateur is now only waiting the installing of proper Radio apparatus in China to bridge the Pacific with his code transmitter.



CFCN BROADCASTS MARITIME CONCERT

OFFER OF PEANUT TUBE MADE TO LISTENERS

Unique Program Attracts Flood of Letters from Western United States and Canada

CALGARY, ALTA.—CFCN, the broadcasting station of the W. W. Grant Radio, Ltd., at Calgary, recently staged a unique affair when W. W. Grant, a native of Halifax, Nova Scotia, broadcast a special "Maritime Concert" to the Maritime Provinces of Canada, 3,000 miles distant. Mrs. W. W. Grant, visiting Mr. Grant's parents at the time, was listening in on CHAC, Halifax, at the opposite end of the 3,000 mile air line. The test was uniformly successful and will be repeated in the near future.

Offer Free Tube

A new peanut tube was offered free to the first five Radiophans of Nova Scotia, New Brunswick, Prince Edward Island and the Dominion of Newfoundland who reported the reception of the first "Maritime Concert," and a fifteen-year-old Halifax Radiophan was the first to answer. He is Robert Doull, the son of Dr. Arthur E. Doull, 34 Street, Halifax. Many other telegraphic communications were received from the Maritime provinces saying CFCN signals had come in QSA, and all Maritime Radiophans expressed their appreciation of this novel concert.

Young Robert expressed his pleasure in the following telegram: "Congratulations to Grant picked up CFCN at ten fifteen Wednesday night."

Here is a telegram from H. Brennen, Chebucto Head, Nova Scotia: "Picked up CFCN shortly after midnight signals very clear."

Young Robert heard CFCN at Calgary on a Marconi Model C regenerative set.

Brings Flood of Letters

"I was trying to tune in for about an hour," the young Radiophan said in a letter, "and at last at ten fifteen I heard odd bits of distorted music, evidently from a piano and then a voice. I distinctly heard the announcer say "CFCN, Calgary, Alberta, Canada." It was not exceptionally clear but I heard it all right. I also heard part of the Maritime Program."

Never before has a Radio feature attracted such a flood of letters and telegrams as this one, communications having been received from all over the middle and western United States and from practically every province in Canada. At the time Mr. Grant had just had the armature on his generator re-wound and was operating on only about three-quarters of the full power. The normal modulating output power of CFCN is 2,000 watts.

Scenes from Pollock's Play Are Broadcast from WNAC

BOSTON, MASS.—Scenes from "The Fool," Channing Pollock's successful play at the Selwyn Theatre, Boston, were broadcast recently by WNAC, the Shepard Stores, by special arrangement. Channing Pollock personally gave a short lecture preceding the play. Of course listeners had to visualize for themselves the personality of the characters and the stage setting, although these were briefly announced, but the plan was highly successful. It is the first time a professional play has been broadcast from a New England station.

Apartment Has Radio

ST. LOUIS, MO.—A new fifty-four apartment building now under construction, here, will be equipped with complete Radio installation. A large central receiving station will be located on the roof with trunk lines to each apartment. In order for a resident of the building to listen in it is only necessary to push a button and they will be immediately connected.

CODE AMATEURS AND LISTENERS POW WOW

LONDON, ONT.—Amateurs and ordinary "listeners in" are getting together here with the idea of forming an association. The objects will be to secure legislation bettering Radio conditions and do away with a certain amount of ill-feeling between the two classes of Radiophans who claim that each is trespassing on the toes of the other.

DO SOULS BROADCAST?

(Continued from page 2)

afternoon performance, "that every person has a Radio plant incorporated in their being. Some are sending stations and some receiving, and there are others that possess the power of both.

"In my performance this afternoon, I said something that was not exactly pleasing to my audience. I at once knew it did not effect them well although they did not make a sound and I did not need to read their faces. This demonstrates my point.

Demonstrates Theory

'Take a case of love at first sight. Two persons of opposite sex meet, neither speaks, they may not resemble the ideals the other has stored in his or her mental art gallery—yet, they are in love. This is a further demonstration.

"I do not mean to say that it is the mental part of the make up of the human body that broadcasts the thought or feeling, it is the spiritual side of one that so functions. I, and I am quite sure you everyone else, has met a person who is distasteful from the time before they even uttered a word, or it may be vice versa, as the case of love at first sight.

"I also think that this power of silent communication is highly developed in animal life, for example, a flock of sea gulls that all fly from a point at once. Of course, I have read and heard of them having a leader and this is some times the case, but if you will study them you will see many instances that they all start in unison.

"Also it is an established fact that a dog listens in, so to speak.

"This is due to what is called instinct but I believe it is silent communication.

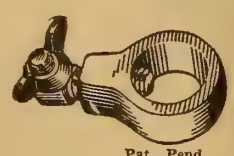
To Continue Research

"How does a carrier pigeon find its way back to its home? Of course the question will arise, from whom or what is the pigeon receiving the waves? This is exactly along the line that I am experimenting.

"It is regretable that I could not carry my experiments to a more definite conclusion before I went out on the road this last time. But I do intend to continue them as soon as I return this summer."

When questioned on what he thought was the cause of the mysterious sounds emitted from the shell, he said, "That is not for me to say. I think it could be any one of the things it is claimed to be by others but just what it is is yet to be proved. I do think the sounds are very similar and are much like a strange tongue. However I have made several world tours and have heard many languages, but it resembles none that I have heard."

HERE IT IS



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Cables Give Away to Ether in Navy

New Station For Bar Harbor to Be Turned into Coastal Plant

WASHINGTON.—Despatches for American Naval Vessels in the Near East are now being transmitted by Radio from Annapolis and are being copied directly by vessels in the vicinity of Constantinople, with excellent results, according to Admiral Ziegemeier, Director of Naval Communications.

Have Direct Relay

Radio is becoming a very formidable competitor with cable service, and as far as the Navy is concerned, cables as almost obsolete. Messages are never routed by cable except to some South American countries, and if a man-o-war is there, they go by Radio. Direct regular Radio circuits are maintained between Washington and San Francisco and San Diego, and it is seldom that a single word is missed. Washington communicates directly with Puget Sound, and Puget Sound and San Francisco communicate every odd hour of the day.

Bar Harbor Is Costal Plant

On the Atlantic Coast, the Navy has seven main Radio stations: Bar Harbor, Me.; Sayville, L. I.; Annapolis, Md.; Arlington, Va.; Cayey, P. R.; Guantanamo, Cuba and Panama, besides a large number of coastal Radio stations. The station at Bar Harbor, Me., receives all official Government messages from Europe, the Pacific and the Fleet in the West Indies transmitting them to Washington over a leased wire. Since the fire at the Bar Harbor station, which destroyed some buildings and barracks there, the Navy has decided to turn this station into a coastal station and receive all trans-Atlantic and trans-continental traffic at Washington.

Federal officers raided a gang of bootleggers in Virginia and heard prices being quoted by means of a Radio set maintained for the purpose.

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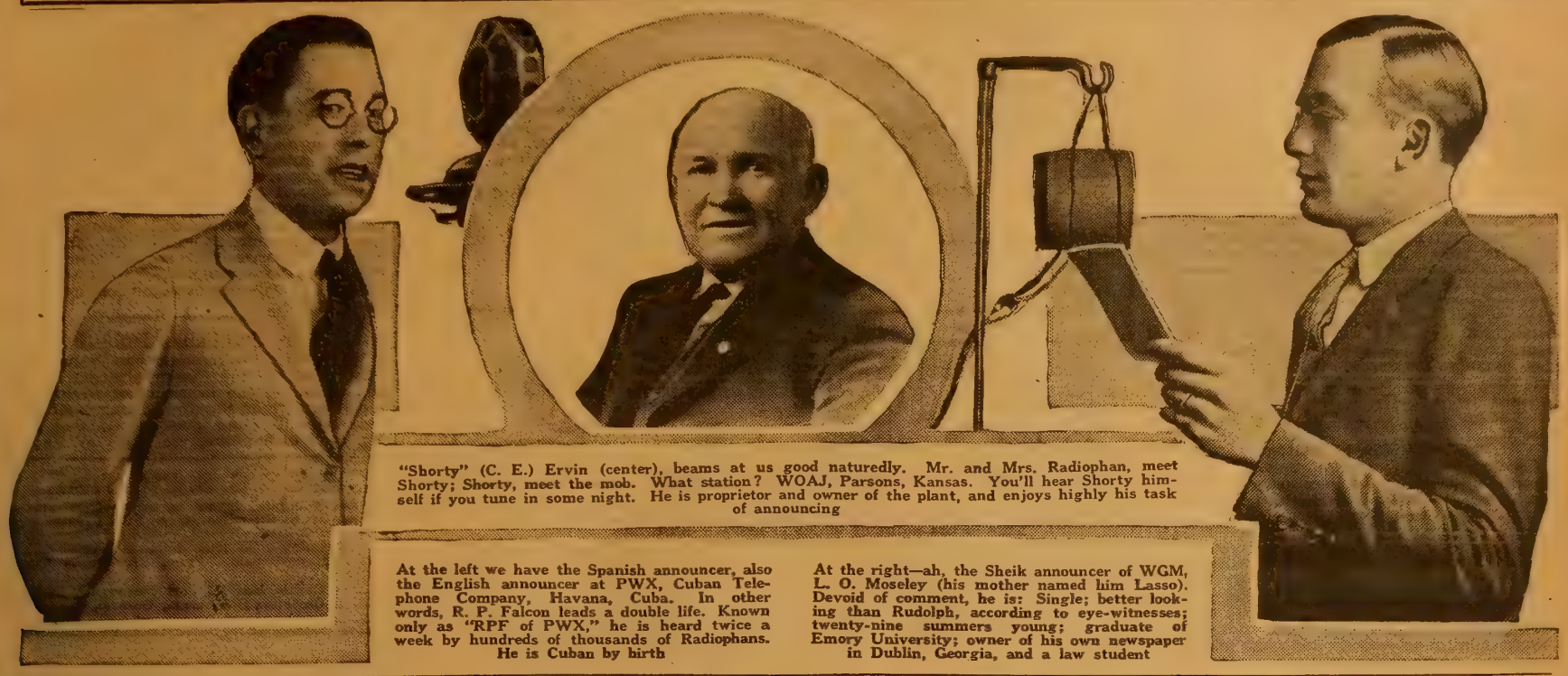
YOU'VE HEARD 'EM? HERE THEY ARE!



"Shorty" (C. E.) Ervin (center), beams at us good naturedly. Mr. and Mrs. Radiophan, meet Shorty; Shorty, meet the mob. What station? WOAJ, Parsons, Kansas. You'll hear Shorty himself if you tune in some night. He is proprietor and owner of the plant, and enjoys highly his task of announcing

At the left we have the Spanish announcer, also the English announcer at PWX, Cuban Telephone Company, Havana, Cuba. In other words, R. P. Falcon leads a double life. Known only as 'RPF of PWX," he is heard twice a week by hundreds of thousands of Radiophans. He is Cuban by birth

At the right—ah, the Sheik announcer of WGM, L. O. Moseley (his mother named him Lasso). Devoid of comment, he is: Single; better looking than Rudolph, according to eye-witnesses; twenty-nine summers young; graduate of Emory University; owner of his own newspaper in Dublin, Georgia, and a law student

SENDS ANNOUNCER STRANGE REQUEST

PROUD FATHER WANTS WIDE WORLD TO KNOW

Mother and Son "Doing Well" Broadcast, Latest Announcement Card

By C. H. Huntley

A proud father recently wrote WGY, the Schenectady broadcasting station of the General Electric Company, requesting the station to announce in the air that an eight-pound boy had been born to to him and that mother and son "are doing well." Probably every father who recalls his feelings on the arrival of the first born will sympathize with this man whose desire was just a modern elaboration of the wish of a brand new father to shout the good news from the housetops.

Think of Station as Human

This request is unusual but every broadcasting station is asked to make announcements of matters just as personal as this one. It is interesting because it illustrates the intimate, personal relationship which the Radio listener feels exists between him and the Radio broadcasting station. To the average listener a broadcasting plant is not an elaborate mechanical outfit consisting of motor generator set, transmitting equipment and antenna; it is human, its voice comes out of the night and enters his home, amusing the children, entertaining the grown-ups, relieving monotony and loneliness.

It is not to be wondered therefore that those in charge of broadcasting stations receive warm, personal letters from writers unknown to them, or that requests are made to broadcast matters which are purely personal.

Many Strange Requests

A correspondent recently asked one station to announce that he, his wife and child were all well. He explained that his parents in a western state have a receiving set and frequently hear this plant and he thought it would be fine for them to hear from their son and his family. The writer ingenuously requested that the announcement be made three successive evenings as his parents might be out one or two evenings but would surely get the message one night out of the three.

Another correspondent asked the aid of Radio to find his eight months old Airedale pup. He said the children missed the puppy and he gave a description of the animal with its license number.

A Cleveland friend of WGY asked that station to co-operate in his plans for a surprise party. The man and wife to be surprised were Radiophans and the writer requested WGY to say "Hello, Mr. and Mrs. Blank" at the precise time that Mr. and Mrs. Blank's friends would enter the front door.

Asked to Repeat

An unselfish youth requested WGY to repeat the first act of one of its Radio dramas because his brother was late getting home and had missed the opening of the play.

Airphone Wig-Wags Location of Rum Runners' Delivery Boats Off Coast

"Lost Motorboat," Ruse Used in Radio Messages Flashed to Confederate on Shore—Coast Guard Chief Thinks Signals Real SOS—Government Investigating

NEW YORK.—Radio messages flashed between the rum fleet off the Jersey Coast and a well-known hotel in Broadway near Times Square in New York set every Coast Guard station on the alert recently. The first message, sent from the big steam yacht Ister, was addressed to a man at the hotel. It said that a motor boat was adrift and was headed for Jones Inlet on Long Island. The man in New York was advised to salvage it.

The service was prompt. A few minutes later the man on Broadway replied that he would set out for Highlands immediately. A third message sent from Times Square to the Ister notified the yacht that three boats were being sent out to different points.

Fleet Can Be Seen

Coast Guard Station 87, at Jones Inlet, picked up the messages, and immediately instructed station masters for miles around to maintain extra watch for the missing motorboat or for any of the three craft dispatched from shore. At No. 87 the rum fleet was not visible, it was said. The fifteen or more ships had withdrawn far beyond the three-mile limit in order more safely to ride out the heavy weather and the storms of the last few days. The fleet was said, however, to be visible to other stations in the daytime through marine glasses.

Coast guard chiefs interpreted the message from the yacht to mean that liquor was aboard the castaway boat. Their theory was that the drifter was one of the flotilla of small craft which has plied between the rum fleet and the shore.

Ister Turns Rum Runner

The steam yacht Ister was formerly the Nahma and was owned by Robert E. Goelet. She was sold, however, and is now under British registry. She came from England in February and lay for awhile off rum row and then left again, presumably for Nassau. She returned a short time ago and took her place with the other ships that make up the wholesale liquor market outside the three mile limit.

The man who exchanged Radio messages with the yacht, "left hurriedly" for Montreal last night, it was said at the hotel. The clerk said the man was expected back soon.

Prohibition officials said they never had heard of the man who sent the Radio messages. They said the customs and coast guard men would attend to the case.

JACKIE HEARS HIS VOICE MILES AWAY

KING OF KIDDOM LISTENS IN ON HIS OWN SPEECH

Pallophotophone Records Broadcast Made in East by Jackie Coogan

LOS ANGELES, CALIF.—Jackie Coogan heard himself talk tonight and was 3,000 miles away from his voice. That sounds strange and might be but for the fact that a new invention has made it possible to perfectly photograph the voice on a motion picture film.

A month ago, when Jackie was in New York, he was invited to give a short talk into the Pallophotophone by the General Electric Company. This film was developed and tonight it was broadcast by Radio from WGY, the General Electric station in that City.

Thousands undoubtedly heard the juvenile movie star's voice but for the benefit of those who did not, here is what he said:

To Hear Himself 3,000 Miles Away

"Dear Friends:

"This is Jackie Coogan talking to you over the Radio by means of the Pallophotophone. I can hardly say a word but this is certainly the most interesting invention that I have ever seen. While I am saying these words, my voice is being photographed on a motion picture film. Then Mr. Hoxie, who invented this machine, will develop and print this film, just as they do with my motion picture films, and he will send it out over the Radio when I get back home in Los Angeles. I am saying these words in New York but I will hear them over my own receiving set when I get back across the continent two or three weeks from today. Isn't that a wonderful thing? I know I shall get quite a thrill from hearing myself talk to myself three thousand miles away from myself.

"I get a lot of fun out of Radio. Here's a little story I heard the other day: A little boy had a Radio set and it wouldn't work. A man told him to open the window. He did and he got (Chile) chilly.

Gets Raise in Salary

"I've just come to New York with my mother and father to have them decide on the stories I'm going to make for my new Metro contract. I've met Marcus Loew and my old friend Big Bill Edwards and a dozen of other folks. I've had a great time and I've made a lot of wonderful new friends. New York is a wonderful city—but oh boy, it's cold. Not the people, but the climate. So I'll be glad when we get back home to dear old California, where all my boy friends are and Butzie, my police dog, and my bicycle and all my other toys and everything. Besides, I start getting a raise when we get home. I used to get $6 a week for working in pictures but my Daddy dear has promised me $10 a week from now on. And I'm going to get a brand new scooter out of my first week's salary."

MAXIM SENDS PORTO RICO PRESS APPEAL

President of A. R. R. L. Relays Message from IAW

HARTFORD, CONN.—The first news despatch ever sent by amateur Radio from the United States to Porto Rico reached its destination and was printed recently in the San Juan Press, according to a copy of this newspaper received by the American Radio Relay League here. The news story was signed by Hiram Percy Maxim, president of the A. R. R. L., and was relayed from his station IAW in this city. The despatch read:

"From Hartford, Conn.

"The San Juan Press, San Juan,

Porto Rico.

"The coldest weather of the winter is freezing the New England states to-night, and is causing a great amount of suffering. The coal strike has caused a shortage of fuel, and the deep snows which block the city streets make the delivery of what little coal there is almost impossible. Rich and poor suffer alike. The temperature to-night as this message is sent is below zero and going down each hour.

"As I sit in my Radio room, with the ice covering all the windows, I marvel at the wonders of Radio, where one man in the frozen north talks to another in the warm tropics. Radio is fast bringing the ends of the world closer and closer together, and the day is not far distant when Porto Rico and New England will be as across the street. I wish it were possible tonight to send some Porto Rico weather across the street to New England.

"HIRAM PERCY MAXIM."

588 Broadcasters Are Listed By Government

WASHINGTON.—In a recent report given out by the government it is shown the United States now has a total of 588 broadcasting plants. California and Texas top the list in having the greatest number while Mississippi has not a single station. Following is the latest list of the number of stations in each state: California, 59; Texas, 36; Ohio, 31; New York, 30; Pennsylvania, 28; Iowa, 26; Missouri, 25; Washington, 24; Illinois, 24; Nebraska, 23; Kansas, 19; Oregon, 16; Indiana, 15; Colorado, 15; Michigan, 14; Minnesota, 14; New Jersey, 13; Wisconsin, 11; Florida, 11; Georgia, 10; Massachusetts, 10; District of Columbia, 9; Oklahoma, 8; Louisiana, 8; Connecticut, 7; Kentucky 7; Arkansas, 6; South Carolina, 6; Alabama, 5; Arizona, 5; Idaho, 5; Maryland, 5; Montana, 5; North Dakota, 5; Tennessee, 5; Utah, 5; Rhode Island, 4; South Dakota, 4; Wyoming, 4; North Carolina, 4; Virginia, 4; Delaware, 3; Hawaii, 3; Maine, 3; Vermont, 3; West Virginia, 3; New Mexico, 2; Nevada, 2; Porto Rico, 2; Alaska, 1; New Hampshire, 1.

The "How" of the Simplified Super Circuit

Part IX—Amplification

By E. T. Flewelling

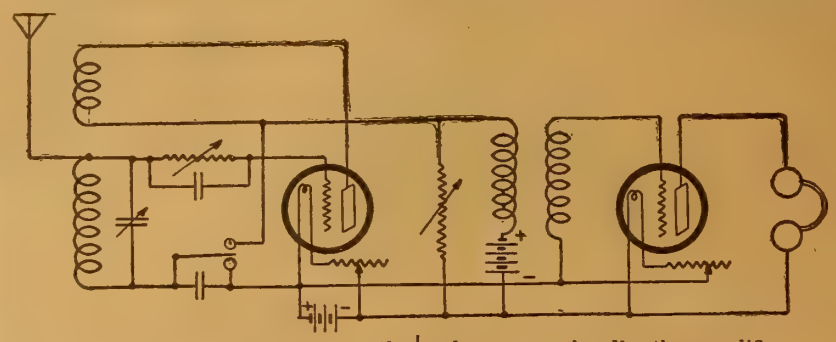
THERE is an important point to be considered regarding the Super set before a person tries the addition of an amplifier. It is the matter of setting the leaks with amplification in mind.

When setting the grid leak to control the pitch of the squeal, do not at any time, set the pitch of the squeal too high. The best way is to set it high and then slowly bring it down. Listen for a single click in the phones. At this point the proper movement of the tickler coil will produce the rushing or tearing sound in the phones. This is the point desired and it will be found that when a station is tuned in the squeal will be properly regulated by the balancing of the tickler coupling and the tuning condenser. It is this balance that sometimes raises the pitch of the squeal so high that we can barely hear it.

Rise and Fall of Voltage

Careful analysis of the Super action shows that while the squeal which is caused by the rapid blocking and freeing of the tube action this action is also indicative of a corresponding rise and fall of voltage in the circuit. This voltage amounts to a surprisingly large value at times. This is entirely stopped by the large voltages that accumulate on the grid and it is only because we can control this action that our tube functions. Bearing this in mind it is easy to see what might happen to the amplifier tube if we allowed these large values of positive and negative voltage to be applied to the grid of the amplifier tube. We will most certainly amplify parts of the rising and falling voltage, but because the amplifier tube will be paralyzed or blocked, part of the time, we will not amplify the signal to any great extent.

We spoke about bringing the pitch of



the squeal down to the point where the click is heard. This is the point at which the Super works best but the voltage changes are at such a value that the amplifier tube is also blocked because the voltage, rising and falling, has also both positive and negative values. This combination being applied to the amplifier grid can have but one result—impossible distortion of the signal with terrific howls and squeals.

Separate B Batteries

There is another point to consider. In the average amplifier the B battery is generally used in common with the detector. There is always a certain amount of coupling back from one circuit to the other and you will find that amplifiers which are built with an eye to tone, quality, etc., are so arranged that everything is done to prevent this coupling back of one circuit on the other because it always results in distortion, and useless noises. To use separate B batteries, one for the detector, and one for the amplifier is but one step in the right direction for any amplifier and because of the large values running through the Flewelling Super circuit it is essential that at least we use separate B batteries.

The Amplifier

If this is done we will be able to operate the amplifier more or less successfully, if our ears will stand for it, because, as the squeal is raised when we tune in the station the circuit becomes more or less stabilzed and there is less trouble due to blocking and coupling back.

Such a circuit shown in the diagram is suitable for the fans who do not care to enter into a complicated circuit to secure maximum amplification. It will be noted that the usual condenser across the primary of the transformer is omitted and replaced by a variable resistance. The condenser is, as a rule, unnecessary, and the resistance serves to cut down a great deal of useless noises. It can be varied to suit the taste.

This leaves the Super circuit undisturbed and one can handle the amplifier as a separate unit.

Tube Connections

A hard tube, of course, is used and the plate voltage is determined by the tube used. That is, use the voltage on the plate of the amplifier tube that gives the best results.

Note particularly the manner in which the connections are made in the tube. The rheostat is placed in the negative lead from the A battery and the return from the grid through the transformer is connected to the battery side of the rheostat. This gives us proper grid biasing due to the drop through the rheostat, for average work and if we wish to push things farther we can use separate biasing or a C battery as we raise the plate voltage. This point applies of course to amplifiers in general but many are not very familiar with amplifiers "in general" and because the point is so important it is best to speak of it.

If we wish to improve on this circuit there are two things that it will be necessary to take care of. First we might improve the circuit to still further cut down the coupling back troubles. Secondly, if maximum amplification is to be obtained we must use some method to eliminate from the amplifier circuit blocking action that is going on in the Super itself. If such steps are taken real amplification is secured and the writer feels that it is well worth the trouble taken. In our talk next week the writer will attempt to describe such a circuit so that the fans may have the opportunity to see for themselves what may be accomplished with but two tubes, one for the detector and one for the amplifier.

Youth Steals Set; Is Jailed

CLEVELAND, O.—Cleveland's champion Radio bug landed in the toils of the law a few days ago, charged with the theft of three Radio outfits. Chester Bobowski, fifteen, holds the record as the result of his arrest and confession of having entered the Holy Name parochial school, from which he removed two outfits valued at $61.

The youthful "bug" wanted more ways to get messages from the air, so he took a $37 Radio set from another party, police say. All of the apparatus was found under a bed at his home.

Warn of Forest Fires

Radio engineers on the Pacific coast have devised a means of testing the air for humidity, static and humidity having close relations. When the humidity becomes low the forests become relatively dry and there is greatest danger of fires. By warning the supervisors and other officials concerned with fire prevention to be prepared for trouble, it is expected that many serious forest fires can be prevented.

8,000 Miles on Hay-Wire Aerial

HARTFORD, CONN.—A report has come in to the headquarters of the American Radio Relay League that E. S. Strout of Waterloo, Ia., an amateur using a small hay-wire aerial, has been heard aboard a ship 100 miles east of Brisbane, Australia, more than 8,000 mile away, thus establishing a new long distance record. Compare this with what was considered a remarkable record ten years ago, of 25 miles from Hartford to Springfield, Mass., via Windsor Locks, Conn.

Sparks Disappear

Passing of the spark transmitter in favor of continuous wave transmission for amateur Radio stations was indicated in the American Radio Relay League traffic report for February. Out of a total of 121,592 messages handled by members of the league 108,713 or 89 per cent, went through the air over the continuous wave route.

Navy Publishes Bulletin

The Navy Department has begun the publication of the Communication Bulletin, issued in the interests of increasing the efficiency of Naval Commumnications, especially through greater rapidity and accuracy in handling messages by Radio.

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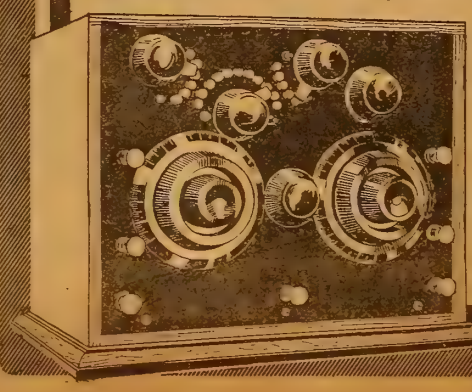

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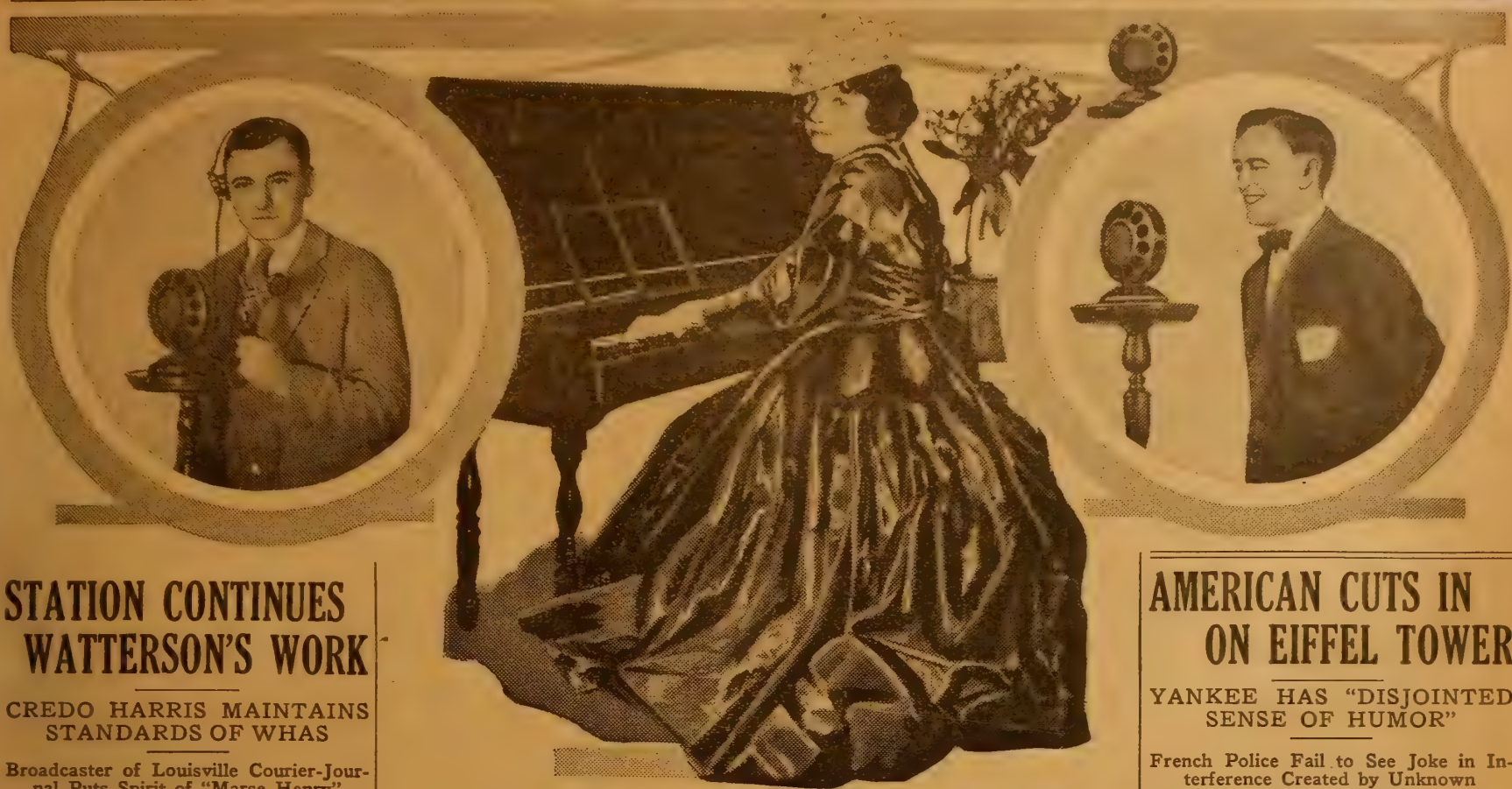

On the right is Credo Harris, director of Station WHAS, whose influence for higher grade programs is felt by Radiophans. At the left is Harold A. Sayler, whose southern accent has pleased many in colder climes. The center photo is of Miss Helen Mitchell, New Albany, Indiana, who gave a recent clavichord recital and was dressed according to the period of the songs. The instrument was loaned by Frank C. Carpenter, Louisville

STATION CONTINUES WATTERSON'S WORK

CREDO HARRIS MAINTAINS STANDARDS OF WHAS

Broadcaster of Louisville Courier-Journal Puts Spirit of "Marse Henry" on the Air

By Vera Brady Shipman

As every home or business concern reflects the countenance of its founders, so does a Radio broadcasting station reflect in its programs its "man behind the gun"—the moving spirit of the local organization.

The Louisville Courier-Journal, WHAS as it is known on the air, has been well known in newspaperdom since the fiery days of its illustrious editor, the late Henry Watterson, "Marse Henry," as he was affectionately known. Southern democracy has been represented faithfully in the halls of fame through the Courier-Journal's eloquent outbursts of patriotism.

WHAS was opened at Louisville in the adjoining building to the newspaper on July 16, last summer. The station operates on 360 meters. At one time a change was contemplated, but at the urgent request of fans, the station remained in the original class.

Meet Credo Harris

When I contemplated visiting Louisville station, and the Digest office notified them of my intention, a prompt card of their Arts Club courtesies was forwarded me.

I was interested to find just what kind of a man was back of WHAS, whose thoughtfulness for small courtesy was so evident. I asked for Credo Harris. Mr. Harris greeted me.

He is a man of poise, a writer, a critic and a man of infinite dreams of what a broadcasting station should accomplish.

Affiliated with the first families of Kentucky (a brother-in-law of the present Lieutenant-Govefnor Ballard, I afterwards learned), Mr. Harris has gained acquiescence of the leaders of the arts in Louisville and has, through their co-operation, kept his programs of WHAS on a footing of unusual distinction.

Use Chimes

And is it not typical of the plan of such a man that the WHAS opening and closing chimes signal is the opening bars of "My Old Kentucky Home," putting the hearers in instant sympathy with southern ideals?

"I feel," said Mr. Harris, "that every broadcasting station owes to its listeners a sense of responsibility of what comes to them through the air. If we give our listeners jazz, we are helping to keep the American pleasures down to the war level. If we give them too scholarly a program they will tune out and leave us 'high and dry' for programs from other stations who give them what they think they want. But the broadcasting opportunity has a duty to its unseen audience, whose emotions (however latent) will respond as well to a Kreissler arrangement of some favorites as to a new jazz release. The public does not want to be 'edicated' but she does want the broadcasting station to realize that her ideals, her desires and her hopes are for fulfillment of a degree better than the mob. And so on every program which goes out from WHAS, there is meant to be some message of depth, some aesthetic flash which touches a heart waiting for the sunrise."

WHAS in carrying out this ideal, adds to its programs each day, brief paragraph talks on bible characters, given by advance students of the several Theological Seminaries located at Louisville, recitals of especial worth and talks on general interest by visitors or representative citizens. A regular system of setting up exercises is now in preparation to be broadcasted each evening for ten minutes, directed by a local physical director. They call it the largest "physical culture class in the world."

WHAS announcer is Harold A. Salleyer, who like Mr. Harris, has the southern accent which is pleasing on the air. The chief operator is J. E. Graft with Fred Harlow as assistant.

A drive around Louisville gave the first-time visitor a splendid idea of the city and its environment. On the Ohio river, the broad driveway along the wharves shows a river traffic to us who are accustomed to the Great Lakes. The house boats, the regular pleasure and cargo trips to and from Cincinnati and down the Mississippi to New Orleans, are picturesque as could be desired.

Louisville's beautiful park, with its natural curves and rows of white-gowned birches, its residences and its city hall, which houses a mayor whose regime is notable in its integrity, Mayor Houston Quin, whom it was my pleasure to interview, has a career outstanding for clean, moral strength.

Favor Better Program

Louisville Arts Club is a charming retreat where members dine in quiet and where visiting artists may be entertained in the spacious reception halls.

And to the first time viistor to Louisville, the spirit of the newspaper broadcasting, the WHAS spirit that better programs make better listeners, will go far in its intended radiation.

AMERICAN CUTS IN ON EIFFEL TOWER

YANKEE HAS "DISJOINTED SENSE OF HUMOR"

French Police Fail to See Joke in Interference Created by Unknown Private Plant

PARIS.—"An American with a disjointed sense of humor," as he is described by the Ministry of Telegraphs and Telephones, is being sought by the French police, at the request of the French Government, on a charge of being responsible for interference with the Eiffel Tower's Radio telephonic broadcasting.

This interference, it is alleged, is carried out through a private Radio telephone station capable of working on a long wave length and has caused havoc with the Government's official Radio transmission during the last few days.

Picks on Entertainment

The supposed practical joker who is the owner of the strong Radio outfit has been systematically "troubling" the Eiffel Tower transmission, but has studiously refrained from interfering while official communications were being sent, contenting himself with disturbing musical selections and similar entertainment features.

Promptly at the stroke of 5 o'clock, one afternoon, while the Eiffel Tower was in the midst of a program of classical music, the meddler, who is officially known as "Zero Radio Telephone Post," broke in with a characteristic interruption.

"Classical music is no good," said the voice, speaking English; "let me give you some real music."

Then a piano was heard giving a ragtime rendition of "Casey Jones."

The police have learned the approximate location of this Radio outfit and they are hunting it in the vicinity of Asnières.

ETHER WAVE CONTROL MAY WIN NEXT WAR

Nations Are Working to Develop Manless War Machines

WASHINGTON.—Radio is being prepared for the next war.

With every advancement in battleship, tank or machine gun construction, governments throughout the world are developing Radio to perfect their military machinery.

Radio tanks have been known for at least three years. Latest reports concern the development of these weapons so as to bring them under Radio control.

According to the plans, no opening would be needed for the operator's vision. He would be entirely encased in armored steel, and would receive his minute directions by Radio from another, but more remote and hidden, tank controlled by an officer. This officer could regulate a platoon of tanks.

But tanks entirely controlled by Radio have been invented. They are devised to be manless. Radio alone, from a safe distance, is planned to drive the tank and man the machine guns.

This is no vague possibility, for it has been put into practice in maneuvering a manless battleship at sea. Firing the guns could have been the next step.

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Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.

WAAF, Chicago, Ill. 485 also. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program at 3 and 4:30 pm. Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Tues, 10-11 pm. Thurs, 8:30-9:30 pm. Sat, 7-8 pm, music. Eastern.

WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 7:30-8 pm, code instruction: 8-9, special program. Eastern.

WAAN, Columbia, Mo. Univ. of Mo.

WAAP, Wichita, Kan. 485 also. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45 am, 10:45, 11:45, 12:45 pm, 1:20, 8, market reports; 8:15-9 pm, music. Central.

WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAB, Syracuse, N. Y. 300 mi. Andrew J. Potter. Daily, 7-8 pm, irregular. Eastern.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Texas. 400 and 485 only. 1,500 mi. Fort Worth Star Telegram. Daily ex Sun, 9:45-10 am, 11-11:30 am, 3-3:30 pm, 3:45-4. Daily ex Sat and Sun, 7:15-8 pm, 9:30-10:30, news, reports, concerts. Sat, 6:30-6:45 pm, bible lesson. Central.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Wed, Fri, 10-11 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central.

WBZ, Springfield, Mass. 422 only. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. Temporarily discontinued.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Rodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Nebr. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Central.

WCAL, Northfield, Minn. 500 mi. Dept. of Physics, St Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAP, Decatur, Ill. Central Radio Service.*

WCAR, San Antonio, Tex. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8:30-10 pm, music, lectures. Mon, Tues, Wed, Thurs, Fri, 5:30-6 pm, code instruction. Central.

WCAT, Rapid City, S. D. 485 only. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Company, Inc. Daily ex Sun, 11:30 am, 2:30 pm, 6:30, reports, music. Tues, Fri, 10-12 pm, concert. Sun, 2-4 pm, music. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 485 also. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAZ, Carthage, Ill. Carthage College.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 485 also. 200 mi. Wm. [illegible] Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Central.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-1:50 pm, industrial reports; 7:45-10 pm, music. Sun, 10:30-12 am, 5-6 pm, church services. Eastern.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Fargo Radio Service Co. Daily ex Sun, 9:30 am. Tues, Thurs, Sat, 7:30-8:15 pm, reports, news, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:15, bedtime story; 9:45, weather. Wed, Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAC, Terre Haute, Ind. 485 also. 75 mi. Baines Electric Service Co. Daily ex Sun, 10:15 am, weather; 12-1 pm, 5-6, music. Central.

WEAD, Atwood, Kan. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. Western Elec. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, O. 375, 485 also. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Central.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 2-2:30 pm, 6:30-7, weather, music, news. Tues, Thur, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAW, Anderson, Ind. 25 mi. Arrow Radio Lab. Mon, Wed, Fri, 7:30-8:30 pm, concert, news, etc. Central.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. 1,500 mi. Will Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAD, Salina, Kan. 250 mi. Watson Weldon Motor Supply Co. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 1:30 pm, reports. Tues, Thur, Fri, 8 pm, concert. Sun, 11 am, church service; 8 pm, concert. Central.

WFAF, Poughkeepsie, N. Y. 200 mi. H. C. Spratley Radio Co. Daily ex Sun, 10-10:30 am, 11:30-11:45, 1:30-2 pm, 4-4:15. Tues, Thurs, Sat, feature program, 8:15-9:15 pm. Eastern.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAN, Hutchinson, Minn. Hutchinson Elec. Service Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAS, Fort Wayne, Ind. United Radio Corp.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri, 11 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAY, Independence, Kan. 500 mi. Daniels Radio Supply Co. Daily ex Sun, 12 m, 4 pm, news. Mon, Tues, Wed, 7:30-8 pm, entertainment. Thur, Fri, 7-8:30 pm. Sat, 7-9 pm, music. Sun, 11 am, church services. Central.

WFAZ, Charleston, S. C. 485 also. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evenings, concert. Wed, Fri, 10:30 pm, dance music. Sun, 3:30 pm, organ recital; 4, church services. Eastern.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAF, Tulsa, Okla. Goller Radio Service.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAT, Lincoln, Nebr. 300 mi. Am. Legion, Dept. of Nebr. Fri, 9 pm, music, announcements, patriotic addresses. Central.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 500 mi. Am. Radio & Research Corp. Daily, 5-6:45 pm, Children's Hour, reports codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm. Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, 9, church services. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 400 mi. Interstate Elec. Co. Mon, Tues, Wed, 8-9 pm, music, talks. Mon, Wed, Sat, 11-12:30 pm. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 370 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 12 m, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 10:30 am, 4:30 pm, 7:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather; 7 pm, lectures, news. Mon, Thurs, 7:20 pm, agriograms, concerts, sports. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 10 am, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily ex Sun, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Central.

WHAD, Milwaukee, Wis. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. Hafer Supply Co.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm, 4:30-5-30, 10-11, Sat. 10-11 am, 2-2-:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:45, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 6 pm, markets, news, weather. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 250 mi. Associated Broadcasters, Inc. Daily ex Sun, 7-8 am; 9:15-10:55, 12:55-1:15 pm, 2:15-2:30, 4:15-5:30, 6:15-7, 7:30-8:30, 10:30-12 m. Tues, Wed, Fri, 7:30-8:30 pm omitted. Sun, 1-3 pm, 5-6; 10:30-12 m. Eastern.

WHX, Des Moines, Ia. 50 mi. Iowa Radio Corp. Daily, 4:30-5:30 pm, music, special. Central.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeCortin. Tues, 9-10:30 pm. Thurs, 12-1 am, music. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 100 mi. Heer Stores Co. Daily ex Sun, 10:30-11, reports, news. Tues, Thur, Sat, 7:30-8:30 pm, music. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 200 mi. School of Engineering. Mon, Tues, Thur, Fri, 10:15-10:30 am; 11:30-11:45, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:15, music; 7:15-7:30, lecture. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Sat, 8-9 pm, concert. Sun, 4:45 pm, vesper services. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. Daily ex Sun, 2:30-3:30 pm. Daily, 1:30-2 pm, 7-7:30. Tues, 7-12 pm. Fri, 7-9:55 pm. Sat, 10:10-12 m. Sun, 2-3:30 pm, concert. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 7:40-8:40 pm, church services. Central.

WJAD, Waco, Tex. 485 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 12:30-1 pm, markets, news, music; 3:30-4, news, music; 6-6:15, sports; 8:45-9:45, concert, news. Sun, 11-12 am, church service; 3:30-4 pm, music; 6-6:15, sports; 8:45-9:45, music. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, church services. Central.

WJAG, Norfolk, Nebr. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star. Daily ex Sun, 9 am, 11:30, 1:30 pm, 3, markets, weather, agriograms. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 200 mi. Capper Publications. Thurs, health talks. Sun, 8 pm, church services. Schedule not regular. Central.

WJAR, Providence, R. I. 485 also. 600 mi. The Outlet Co. Daily ex Sun, 10-11 am, 2-3 pm, 5-6. Fri, 8-10 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Tues, Fri, 7-8 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:30-6 pm, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7-8:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Sun, 5-6 pm, religious stories. Central.

WJH, Washington, D. C. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Radio Corp. and Westinghouse Elec. Co. Daily ex Sun, 9-9:15 am; 12-1:15 pm, 4-4:15, 7-7:30, 8-10:30. Sun, 10:30 am-1 pm, church services; 3-4:30, music. Eastern.

WKAA, Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. Radio Corp. of Porto Rico.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 500 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. WKY Radio Shop (Daily Oklahoman). Daily ex Sun, 12 m, weather; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WL2, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Tues, Wed, Fri, music. Mon, 10:10 pm, concert. Thurs, 9:15 pm, concert. Sat, 8:30, 10:30 pm, concert. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAM, Springfield, O. 100 mi. Morrow Radio Co. Mon, Wed, Fri, 8-9:30 pm, dance music. Central.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAS, Hutchinson, Kan. 485 also. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm, 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

RECEIVING RECORDS? SEND 'EM IN—

By The Contest Editor

HERE we are again with 46 old records beaten and 18 new ones added to the list. Mr. Arthur Chapelle of Woodburn, Oregon seems to hold the record for the most stations received this time. Who have YOU heard this week? See if you can't beat these distances. When you send in your stations be sure to measure them AIRLINE, and submit the distances you measure. Otherwise they are ineligible.

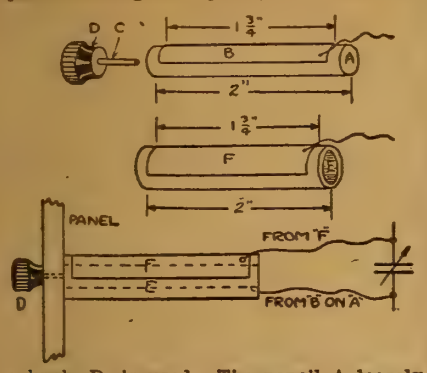
The records for the week appear below:

Station—Miles Away—Who Heard it?

CHCB—2125, Arthur Chapelle, Woodburn, Ore.
DM4—1700, Arthur Chapelle, Woodburn, Ore.
KDZQ—2175, H. S. Olding, New Glasgow, N. S., Can.
KFAD—2125, Mrs. A. S. Mawhinney, New York, N. Y.
KFAW—1325, M. L. Johnson, Atchison, Kans.
KFCC—1175, M. L. Johnson, Atchison, Kans.
KFCL—1300, M. L. Johnson, Atchison, Kans.
KFGH—1425, M. L. Johnson, Atchison, Kans.
KFV—1750, A. L. Ober, North Manchester, Ind.
KFZ—2175, A. A. Acken, Jersey City, N. J.
KGG—1650, Vernon Adams, Joplin, Mo.
KHD—1000, Arthur Chapelle, Woodburn, Ore.
KSD—4600, Walter Lee, Lost Harbor, Alaska.
WAAB—1325, C. H. Vale, Providence, R. I.
WAAF—1850, L. W. Beretta, San Mateo, Calif.
WAAP—1400, Arthur Chapelle, Woodburn, Ore.
WAAW—1300, A. B. Butters, Los Angeles, Calif.
WBAM—1825, H. S. Olding, New Glasgow, N. S., Can.
WBAQ—1200, H. S. Olding, New Glasgow, N. S., Can.
WBZ—2500, Arthur Chapelle, Woodburn, Ore.
WCAS—1450, Arthur Chapelle, Woodburn, Ore.
WCM—2174, H. S. Olding, New Glasgow, N. S., Can.
WCX—2075, L. W. Beretta, San Mateo, Calif.
WEY—1250, Mrs. A. S. Mawhinney, New York, N. Y.
WHAK—2175, Arthur Chapelle, Woodburn, Ore.
WHAM—2225, Arthur Chapelle, Woodburn, Ore.
WHAS—1950, Arthur Chapelle, Woodburn, Ore.
WJAN—1700, Arthur Chapelle, Woodburn, Ore.
WKAL—1850, Arthur Chapelle, Woodburn, Ore.
WKAQ—3850, Arthur Chapelle, Woodburn, Ore.
WLAG—1575, L. W. Beretta, San Mateo, Calif.
WLAL—1525, Arthur Chapelle, Woodburn, Ore.
WLW—2025, L. W. Beretta, San Mateo, Calif.
WMAB—1450, Arthur Chapelle, Woodburn, Ore.
WOAP—1950, L. W. Beretta, San Mateo, Calif.
WOI—1550, L. W. Beretta, San Mateo, Calif.
WOQ—1475, Arthur Chapelle, Woodburn, Ore.
WOR—4800, Jack Costa, Haiku, Maui, T. H.
WPAH—1650, Arthur Chapelle, Woodburn, Ore.
WPAK—1250, Arthur Chapelle, Woodburn, Ore.
WPE—1475, Arthur Chapelle, Woodburn, Ore.
WRW—2350, L. W. Beretta, San Mateo, Calif.
WSY—2050, Arthur Chapelle, Woodburn, Ore.
WTAW—1525, L. W. Beretta, San Mateo, Calif.
WTG—1375, Arthur Chapelle, Woodburn, Ore.
WWAD—1050, M. L. Johnson, Atchison, Kans.
2LO—3175, S. F. Richards, Janesville, Wis.

Vernier Condenser Made from Pencil and Tinfoil

The illustration shows a novel vernier condenser and an interference eliminator. The body A is made of a pencil about 2 inches long with a strip of tinfoil 1¾ inches long laying half way around the pencil. A wire is represented at C, which passes through the panel, and at the end



a knob, D, is used. The pencil A loosely fits into the paper tube E, which also has a piece of tinfoil, F, glued to its outside. By rotating the knob D the two pieces of tinfoil are brought close together or separated as desired. The tinfoil is connected to the regular condenser as shown.—Lester V. Hegman, New York, N. Y.

Useful Hints

If your tuner is wound with bare wire on a threaded core and the wire has worked lose put it in the refrigerator over night, so that the chill will contract the tube. Immediately upon removing it work the wire tight and fasten. As the tube warms it will expand and tighten the wire.

Silk is one of the best materials for keeping the surface of rubber and nickel parts bright.

Rub old and discolored panels with some cheesecloth saturated in household ammonia and finish with a piece of silk dipped in crude oil.—Allen Bartlet, Milwaukee, Wis.

NATIONAL RADIO and SUPPLY CO.

	List Price	Our Price
Switch Points (per doz.)	$ 0.20	$0.10
Switch Levers	.40	.25
Grewol Detector	2.00	1.59
Four in. Dials, ¼ in. Shaft	.50	.25
Binding Posts	.10	.05
W. D. 11 Sockets	.75	.59
Spaghetti Tubing (yd.)	.25	.09
Radio Mans	.50	.25
Baldwin Phones (Type C)	12.00	8.95
Trimm Phones (2400 Ohm)	5.00	3.95

WRITE FOR PRICE LIST

Cash or C. O. D.
Postage to cover shipment must accompany order.

Box 1035 Chicago, Ill.

Largest Radio Store in America

RADIO

BUY HERE FOR LESS

Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90

Consisting of:	Regular Price	Our Price
9x10½ Formica Panel	$1.42	$ 1.20
23-Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, Plain or Bank Wound with Taps	3.00	1.95
1 Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
5 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½ with hinged top	5.00	2.95
25 ft. Hookup Wire	.20	.10
Regular Price	$19.37	

Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in a schematic form but are drawn so that anyone without any technical knowledge can follow with ease. Our Price .. **$11.90**

Freund's Wonder Circuit $13.20

KHG, KFI, and KYY received from Chicago on one tube.

	Regular Price	Our Price
9x10½ Formica Panel	$ 1.42	$ 1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95
Bakelite Dial	.75	.25
Variometer	5.00	1.95
43 Plate Vernier Condenser	7.00	3.45
Remler Bakelite Socket	1.00	.45
8 Binding Posts	.80	.40
CRL Variable Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
Howard Vernier Rheostat	1.50	1.35
Regular Price	$24.32	

Complete instructions for drilling, assembling and wiring furnished with each order. Written so that anyone without any technical knowledge can understand. Our Price **$13.20**

Complete Parts for Reinartz Sets, $11.45

CONSISTING OF	Regular Price	Our Price
7x18 Formica Panel	$1.89	$1.70
Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cuni Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Freshman Variable Grid Leak and Condenser Combined	1.00	.75
8 Binding Posts	.80	.40
25 Feet Tinned Wire	.30	.20
Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$21.69	

Our Price **$11.45**

Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Short Wave Receiver, Crystal, Aultra Audion or any Receiving Set so that Loud Speaker or Phonograph can be used in place of head set.

CONSISTING OF—	Regular Price	Our Price
7x10 Formica Panel or Other Suitable Size	$1.05	$0.89
High Ratio All-American or Thordarson Transformer	4.75	3.95
Low Ratio Thordarson or All-American Transformer	4.50	2.95
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Howard Vernier Rheostat	1.50	1.35
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearny St., San Francisco
Telephone Kearny 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. IV Chicago, Saturday, April 7, 1923 No. 13

Army Teaching by Radio

An Important Part in the Instruction of the Army

RADIO has a very important part in the education of army officers in communication and the instruction in which important subjects has recently been standardized. A definite program of instruction in Radio, as a part of the schooling of all signal corps officers and other officers assigned for training from the regular army, national guard, reserve corps, has been laid down by the board of army officers.

The course for company officers includes approximately 1,300 hours of study for signal corps officers and 1,285 hours for officers of other arms. Courses extend over a period of nine months, commencing in September. Radio telephony and telegraphy covers a period of 180 hours and includes theoretical and practical instruction in the fundamental electrical principles.

Tactical Radio procedure is studied during twenty hours. Advanced studies in Radio are prescribed in the tactical and administrative course for signal corps officers assigned to units larger than divisions. This is also a nine months' course and covers study and instruction periods totaling 1,235 hours. Thus Radio enters into the studies of the army officer and it becomes a part of his daily routine the same as other subjects.

Factor in Everyday Life

A Necessity in Every Home Like the Telephone

RADIO promises soon to become a necessity in every home. Although the science is still young its growth has been tremendous. Already it has been playing an important part in transcontinental and transoceanic communication. Messages and weekend letters are being flashed through the air night and day in almost illimitable numbers, and this traffic is increasing so fast that large Radio concerns have had difficulty in keeping up with it.

The place where the receiving set is already a necessity is the farm. Now, with one of these sets tuned to a large central broadcasting station, the farmer gets first hand information about the weather, about crop movements and prices and about all other matters on which his existence depends. He is brought closer to the city. His evenings heretofore dreary and uninteresting, are made cheerful and profitable through the Radio set. He finds that he can keep the farm hand down on the farm. The girls have less desire to see the big city. And a happier, more prosperous agricultural population is the result.

Out at sea, Radio is not only a necessity, but it is required by law. This is to protect lives of passengers and crews on ships.

By the same token, Radio sets on every train in the country can be imagined—not only as an entertainment but as an actual requirement by law. Many an accident could be prevented by such installation, and it would repay the railroad company in a short time.

As a Base for a Scenario

An Opening for the Play of Imagination

WRITERS of scenarios find much help in Radio. One serial that has become widely known depends almost entirely upon Radio for its action and its plot.

The time is about ripe for Radio as an every day means of communication to be visualized in the movies. Instead of the heroine frantically jiggling the hook as the villain tries to get access to her room, will be shown an aerial on the housetop; then the young lady rushes over to her set and sends the call for the leading man, and in jig time he is on the scene. Millions of feet of costly film will be saved and the whole performance speeded up.

Radio opens a new field for the clever director of the movies. The very mystery of the art itself leaves an opening for the play of the imagination in stimulating the passage of the sound. What a chance the old ghost in the haunted house will now have to raise the old hob and stir things up with the superstitious.

Condensed

By DIELECTRIC

After listening to the broadcasting of an opera, a certain gentleman was so engrossed in the performance that at its conclusion he started to leave his home, thinking he was present at the opera house. Perhaps he did; perhaps not. It speaks well for the broadcasting station capable of transmitting so perfectly as to cause a listener in to forget his whereabouts. Also, it shows how thoroughly this class of music is enjoyed by some of the Radio audience. While listenening to the broadcasting of the drama "The Green Goddess," from Station WGY recently, I pictured the whole thing so vividly that between the acts I had to go out and get a—fresh cigarette. Someone in speaking of these Radio dramas complained of the loss of effect in not being able to see the scenery. Perhaps my imagination is well developed in comparison with this friend, for the scenic effect of the drama mentioned was all that could be desired and a trifle better than is sometimes found upon the stage.

The Germans claim to be experiencing one of the detractions to broadcasted concerts noted by some of us. They protest against the seeming intentional interference from the French station in Eiffel Tower with their broadcasting of that famous, though disliked, song "Deutschland Uber Alles." It may be a coincidence. There have been times when you and I have particularly desired to heard a number from a certain station, and we had listened to the preceding numbers without interference, but just as this interesting feature began a nearer station came crashing in on the same wavelength. That WAS a matter of coincidence, but we used stronger terms in describing it. Not so very long ago Germany was given to understand that the song in question "had words, but they didn't make sense." They appear to have gone "up in the air" over the thing and the French are repeating the lesson through the ether.

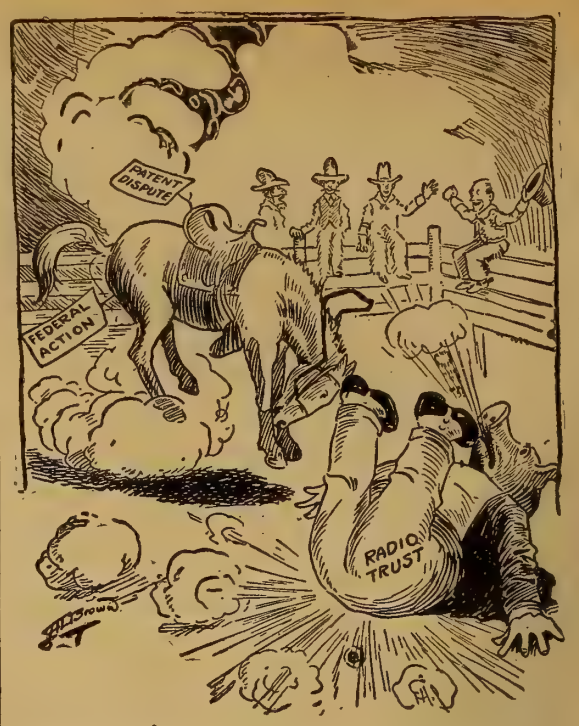
When RADIO DIGEST scooped the Flewelling circuit something was started that made fans all over the country sit up and take notice. It made some other Radio journals hump themselves to catch up with the demand for information on the subject. The "Flivver" has made a place for itself in Radio history, and, as was to be expected, is one of the most talked of and copied sets in existence. Now that the prize contest, conducted by this paper, is settled we can get back to work on DX stuff and try to improve our records against the day when a prize may be offered for the greatest distance obtained with a "Flivver." I know of five fans in my neighborhood constructing these popular sets and when I finish writing this there will be another one on the job.

Dr. Steinmetz almost shattered my ground connection some months ago when he assailed the ether theory. Then "a voice from the South" took up the cry and Mr. Artzinger came along with his banner announcing a substitute: hydrogen ions! All that has passed and we still talk in terms of ether. At present I am trying to convince myself that the Electrical Wizard from Schenectady is correct in his prognosticating the elimination of static in the near future. That old static broadcaster is the most detrimental foe of Radio bacilli. When he's gone forever, then you'll see Radio bugs multiply as never before.

Station WQAM has made friends over a considerable portion of the United States since its first concert. I wonder how many of the Radiophans sojourning in Miami, Florida, for a few months of the year carry their receiving sets with them. It would seem to me pretty hard to leave the set at home, depending on a kind acquaintance to tune in your native cit's broadcasting station for you. Perhaps they are content to listen to the programs from this competent station in their midst. It is evident that the dance music from WQAM is enjoyed by guests in the hotels in that vicinity, for a number of the hotels have receiving sets installed and tune in Tasillo's orchestra for their benefit. That reduces one item of expense, incidentally, for the management may dispense with the services of an orchestra.

What is likely to become one of the most popular of all Radio Clubs is the Radio Broadcasting Club, of San Jose, Cal. This is to become a national organization according to the plans of the promoters. One of the objects of this new club is to establish its own sales organization, whereby members may profit from reduced cost of parts. If you never bought parts for a set you may not appreciate what this will mean to thousands of fans. In purchasing a complete set one is liable to remain ignorant of the ofttimes excessive cost of certain units. Yet the owner of a receiving set is generally dissatisfied until he has experimented in building a set for himself, and to such the R. B. C. will have a decided appeal.

Broadcasting of the forecast from the Weather Bureau has occupied a regular place on the daily program of stations all over this country, providing a much appreciated service in quarters where impending weather changes could be taken into account in planning certain business operations. The certainty of forecast and the earlier it can be given are of prime importance to its worth. From the report of a station to be established in the Arctic zone, financed by the Norwegian government, we may look for an increase in both of these two essentials and place greater credence in what the "weather man" has to say. The starting point for either good or bad weather appears to be in the Arctic region, hence our interest in having a Radio station there. The observer should be supplied with some variety of sand which may effectually prevent any such storm as swept over the country a few weeks ago.



RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

We'd Lots Rather Seeum

Dear Indi—I see where a set of bells is being cast at Troy (N. Y.) for a manufacturer in Cincinnati. Radio tests already made show that these chimes can be heard in the Sandwich Islands. The next step is to arrange things so that the belles of the Sandwich Islands can be heard on the Atlantic coast.—POLLY.

They Thought It Was a Tin Cabinet

Sir Indigest—A Montana news item says, "Forty boys taking Radio." An automobile owner in New Jersey is wondering whether they can be connected with the fan who took his Radio—and the "car"(?) that he had it installed in—JIMSIE III.

Radio

What is it that's all the rage
And sets the world all ablaze
And every one has the craze?
Radio!

What is it when you're alone,
You listen quietly on the phone
To music of the sweetest tone?
Radio!

What is it that fills the air
With music, song and speech so clear
And brings to all who listen, Cheer?
Radio!

What is it that's most erratic,
Full of noises, squeals and static
That drives the listener nearly frantic?
Radio!

Alas, what is it makes you rash
To spend all your spare cash
And sends your bank account to smash?
Radio!

—E. H. P.

Aw Shux—You Gawan

Dear Indi—I see Mr. Pearl, a member of the Institute of Radio Engineers, broadcasted a lecture on the past, present and future of Radio. Mr. Pearl's words were without doubt, jewels of thought.—LILLIAN G.

Sure, You Win the Cut Glass Antenna

Dear Indi.—Here is a cortical titillation I broadcast spontaneously the other night. My girl says to me, says she, "Why do you call mother Radio?"

I says, says I, " 'Cause she is allus listening in!"—just like that.

How's that for a snappy comeback? Would like to know if you offer a prize for good ones like this?

—SPIDER WEBB.

Judging by Our Steno-'S Failure

Indigest—Radio should go a long way in the cure of the one who talks too much. The Radiophan will eventually get the habit of being a good listener.—ISADORE

Next week, "The Radio Tramp," by Walt Drummond, will appear in Indi-gest. This poem is probably, so far, the only Radio epic written. Watch next week!—Indi.

A. B. C. Lessons for Radio Beginners

Chapter XIV—Radio Frequency Amplification

By Arthur G. Mohaupt

RADIO frequency amplification, as the name suggests, is the process of amplifying the signals received at a receiving station while they are at a Radio frequency. This method of amplification is employed when it is desired to reach out to far distant stations from which the signals would ordinarily be too faint and weak to efficiently operate the detector tube.

Radio frequency amplification is thus employed ahead of the detector tube, and may consist of one, two or three stages depending upon the amount it is desired to amplify the oscillations before they are sent into the detector tube for rectification. Two stages of Radio frequency amplification will generally be sufficient, and it is seldom necessary to use more than three. When more than three stages of Radio frequency amplification are employed, the tuning process becomes rather complex due to the adjustments that are necessary.

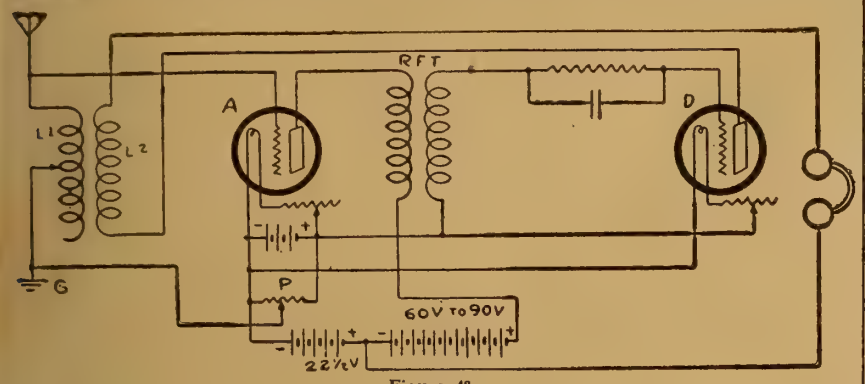


Figure 48

Two Stages Radio Frequency

By means of one or two stages of Radio frequency amplification it is not only possible to effectively receive more distant stations, but the amplification process does not involve the unpleasant introduction of numerous extraneous noises which become so prominent when audio frequency is employed. The reason for this is that these noises practically always occur at an audio frequency, and are thus very slightly, practically not at all amplified in the amplification circuits which are designed primarily for Radio frequency oscillations. Another advantage gained is that by tuning the Radio frequency amplifying circuits the receiving circuit can be rendered more selective, that is, it is possible to more efficiently tune in a desired station without experiencing as much serious interference from other stations operating at or nearly at the same wave length.

R.F. With Regenerative Circuits

A very efficient receiving circuit employing the regenerative feed back principle is that in which a standard variocoupler is employed with the rotor or secondary connected into the plate circuit of the detector tube. The primary is connected into the antenna circuit with the variable contact to the ground terminal. The current pulsations set up in the plate circuit in flowing through the coupler secondary reinforce the oscillations in the primary, and thus cause an increased variable potential to be impressed upon the grid of the detector tube. This, in turn, further intensifies the current oscillations in the plate circuit.

Radio frequency amplification can be added to great advantage to this circuit, and the received signals will as a result not only come in louder but stations at much greater distances can be reached. This circuit arrangement is illustrated in Figure 48. The Radio frequency circuit, it can be seen is very similar to the plain detector circuit ordinarily employed.

The Antenna Condenser

The condenser C-1 in the antenna circuit is of the 43-plate type and is used in connection with the primary L1 of the variocoupler for tuning the antenna circuit to the frequency of the incoming oscillations. The potential variations thus set up across the "active turns" of the coupler primary are then impressed across the grid and filament of the Radio frequency amplifier tube. This tube acts as a relay by causing electrical oscillations of greater intensity to be set up in the plate circuit. These are sent through the Radio frequency transformer where they are stepped up to a higher potential, and from the secondary are impressed upon the input circuit of the detector tube. Here they undergo rectification and further amplification.

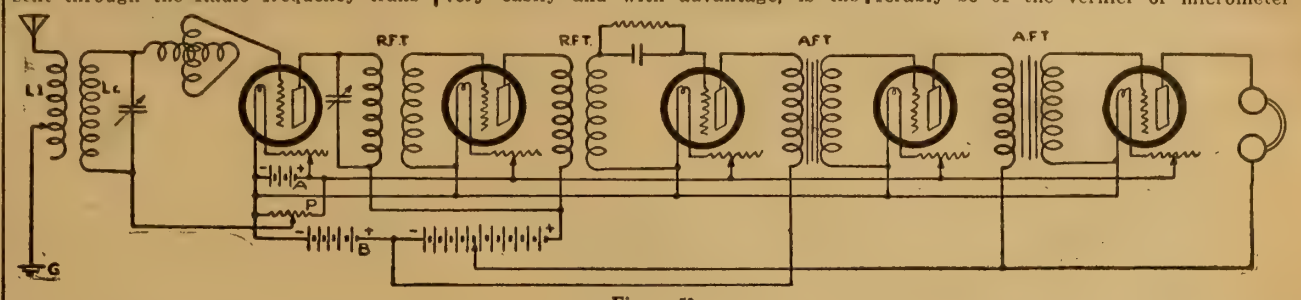


Figure 50

Another regenerative circuit to which Radio frequency amplification can be added very easily and with advantage, is the familiar two-variometer circuit. This circuit, it will be remembered, contains a variocoupler for tuning the antenna circuit, and a variometer in the grid and the plate circuit of the detector tube for tuning these circuits into the resonance with the received oscillations.

By making but a few minor changes and adding another tube and its auxiliary control apparatus, the circuit can readily be arranged to contain one step of Radio frequency amplification ahead of the detector. The modified circuit is illustrated in Figure 49. It can be seen that the tuning circuit on the left is not at all altered, except that the grid leak and condenser have been removed from the grid circuit of the first tube. The entire circuit is thus converted into an amplifier unit, and of course, an amplifier tube must also be substituted for the detector tube formerly used in this circuit. The output or plate circuit of the amplifier tube contains the original variometer, but has one or two more B batteries in series with it, so that higher plate pressure is available, ranging from 45 to 90 volts as may be needed.

The rheostat controlling the filament current of the detector tube should preferably be of the vernier or micrometer type, for with the detector tube of today, containing as it does still small quantities of gas, a delicate adjustment of the filament current is a very important factor in the tuning process.

For the plate circuit of the detector tube a pressure of from 18 to 22½ volts is needed, depending upon the gaseous condition of the tube. In the operation of the set this plate pressure should be varied until the tube functions best. In general, the entire circuit is operated like the corresponding detector circuit.

Two Steps of R.F. Amplification

When it is desired to greatly increase the range of a receiving station, or when an inferior indoor antenna is employed, two stages of Radio frequency amplification can be effectively employed ahead of the detector. A circuit employing two steps of Radio frequency amplification, a detector, and two steps of audio frequency amplification, is illustrated in Fig. 50.

The operation of the circuit is as follows: From the tuning circuit at the left the oscillations are set up in the grid circuit of the first amplifying unit. This

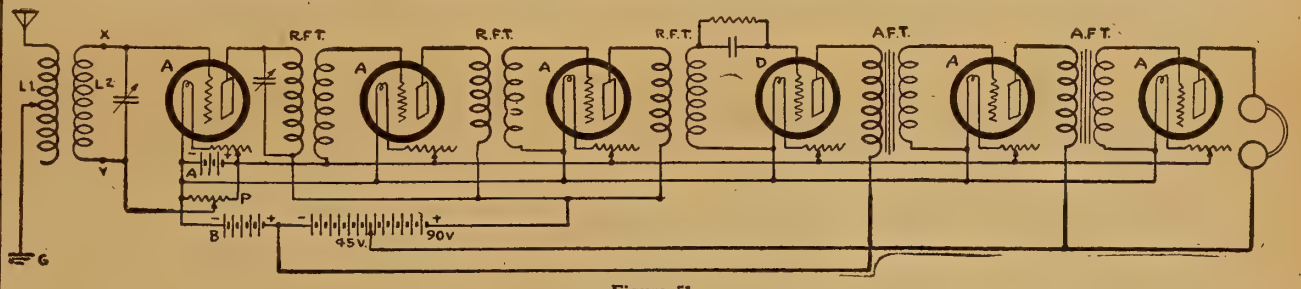


Figure 51

The plate circuit pulsations in flowing through the coupler secondary L2, boos; those in L1 with the result that the regenerative action is brought into play and the signals are further intensified. The pontentiometer P has a resistance of 200 ohms and is employed for obtaining the necessary grid potential. A 90-volt B-battery pressure is necessary in the plate circuit of the amplifier tube, while for the detector tube only from 18 to 22½ volts are necessary.

In general, the circuit is easy to construct, is simple to operate, and gives very good results. If signals of great volume are desired, one or even two stages of audio frequency amplification can further be added to the receiver.

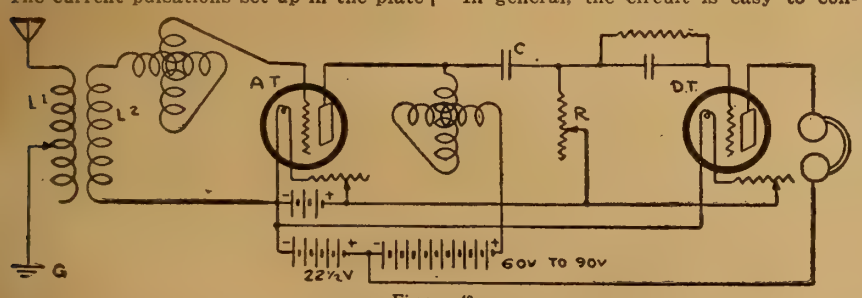


Figure 49

Style of Coupling

To this plate circuit is also coupled the input or grid circuit of the detector tube through the fixed condenser C of about .001 mfd. capacity. This style of coupling the Radio frequency amplifier circuit to the detector unit is often referred to as impedance coupling, since it is a combination of inductance and capacity effects. The resistance unit R is a variable high resistance and should have a range of from one-half to two meghoms in order to suit the individual needs of the particular circuit used.

circuit is tuned into resonance by means of the variometer V. From the output circuit of this first amplifying unit, the

(Continued on page 12)

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Both of these tubes work on 4 volts and consume a minimum filament amperage.
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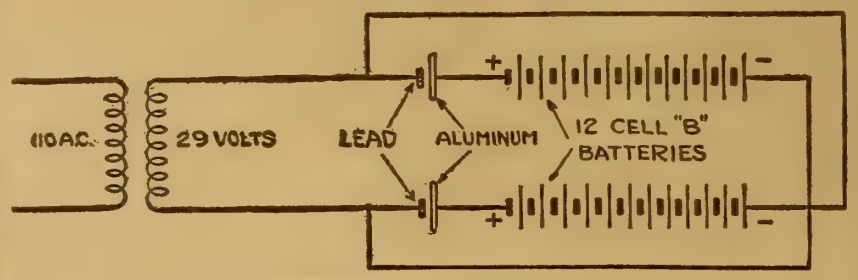
Device Saves Second Half of A. C. Cycle

In using an electrolytic rectifier for charging B batteries with a toy transformer giving a maximum of 29 volts, only one 12-cell battery can be charged. It occurred to me that time could be saved by charging a second battery with the other side of the A. C. current cycle that was not being used. The illustration shows the connections necessary to make this circuit.

The same results can be had with one battery if it were arranged so that it could be opened between the sixth and seventh cell. It not only does the work but seems to be easier on the aluminum plates.—H. J. Linkins, Springfield, Ill.

DOUBLE RECTIFIER CONNECTIONS



WORKSHOP KINKS? EARN A DOLLAR—

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RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

A. B. C. LESSONS

(Continued from page 11)

electrical pulsations are impressed upon the primary of a Radio-frequency amplifying transformer. The primary of this transformer is tuned into resonance by means of a 5-plate or 3-plate variable condenser connected directly across the two primary terminals.

The secondary of the amplifying transformer feeds directly into the grid and filament circuit of the second amplifier unit. In this tube the oscillations are again relayed and amplified and finally impressed across the terminals of a second Radio-frequency transformer. If very sharp tuning is desired, the primary of this second transformer can also be shunted by means of a 3-plate variable condenser. The disadvantage resulting from such practice, however, is that too many controls are introduced, and these make the tuning process too complex.

The secondary of the second Radio frequency transformer then impresses the intensified oscillations upon the grid or input circuit of the detector tube, and from the output circuit of the detector tube the oscillations are further sent through two stages of audio frequency amplification. The result is that a loud speaker can be very effectively operated by means of signals received from very far distant stations.

Circuit Simple to Tune

The circuit as just described is really quite easily constructed and is also rather simple to tune. It will probably be found that the most important adjustment in the tuning process is the condenser connected across the primary of the first Radio frequency transformer. It is also advisable to employ a vernier rheostat for controlling the filament current to the detector tube. The potentiometer P also plays an important role, for with it the first grid circuit is biased to the necessary extent.

For the plate circuit of the detector tube a pressure of from 18 to 22½ volts is necessary, while for the two stages of audio frequency amplification about 45 or 67 volts will be found very effective. For the plate circuits of the Radio-frequency, amplifier units, B-Battery pressure as high as 90 volts can be used to very good advantage. Otherwise the circuit contains nothing extraordinary or of unusual design.

Another condition that will be found to exist is that the condition of the amplifier tubes also is an important factor, and often surprising results can be effected by merely interchanging two or three of the tubes. The writer has also found that with many amplifier tubes the filament current also enters into the tuning process in order to obtain not exactly the loudest but chiefly the clearest signals.

Three Stages of R.F. Amplification

Three stages of Radio-frequency amplification are employed when an indoor loop aerial is employed, for with this form of antenna the amount of energy received from the incoming oscillations is so small that considerable amount of amplification is necessary before the oscillations are sufficiently strong to effectively operate the detector tube. For this reason three stages of Radio-frequency amplification are needed. With a fairly good outdoor anetnna, however, the third stage is superfluous, and involves not only excessive first cost but also greatly increases the drain on the A-battery.

The details of construction and operation of loop aerials will be taken up in the next chapter. At present we will merely consider the receiving circuit that is to be used in connection with this form of aerial.

Three Stages of Radio Frequency

An interesting circuit employing three stages of Radio-frequency amplification, and one that can be used very effectively in conjunction with a lop aerial is illustrated in Fig. 51. Although the tuner at the left is shown as employing a variocoupler (which would be the case with an outdoor antenna), the same arrangement can be used with a loop aerial by omitting the coupler and connecting the terminals of the loop directly across the points XY. The reason for this is that the loop contains the necessary amount of inductance which is otherwise supplied by the coupler. The only adjustment then needed to throw the loop circuit into resonance is the tuning condenser C-2. A 23-plate condenser with a vernier adjustment will generally be found to be very satisfactory for this purpose.

The Radio-frequency amplifier units are very similar to those illustrated in the previous circuit diagram except that a third step is employed before the oscillations finally are impressed upon the input circuit of the detector tube. The operation of the entire circuit is in general quite the same as that of Fig. 50, and the same suggestions given there also apply to this circuit. The circuit can also be expanded somewhat by introducing a variometer into the plate circuit of the detector tube.

Chapter Fifteen

Chapter Fifteen will be devoted to the subject of loop aerials. The principles of operation of this type of aerial, as well as the practical construction of one, will be set forth in great detail. Those interested in this form of Radio reception will find the chapter very interesting and well worth while reading.

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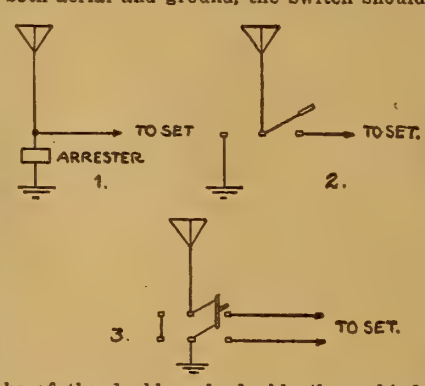
Lightning Protection Hook-Ups

There are two instruments used in the protection of the Radio outfit from lightning—the switch and the arrester. If a switch is to be used, which is the best means, and a single ground employed for both aerial and ground, the switch should

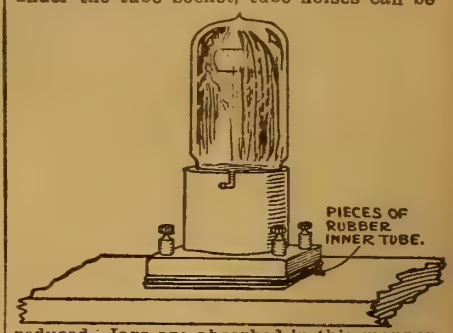


be of the double pole double throw kind. If the latter is the case the ground must be outside of the building. The illustration shows three hook-ups using switch and the arrester. One shows a hook-up for the arrester, one with the switch employing two grounds and one with one ground.—Vernon Hagelin, Geneseo, Ill.

The University of Wisconsin Radio station had one of the first Radiophone broadcasting stations in the U. S.

Rubber Socket Pads Reduce Tube Noises

By placing several layers of soft rubber, which can be cut from old inner tubes, under the tube socket, tube noises can be



reduced. Jars are absorbed in this manner and capacity between the socket and base is reduced.—John F. Dwiggins, Petersburg, Pa.

Grounded Wire Causes Trouble

In a certain section of a village owners of receiving sets were bothered by the interruption of the service. Various reasons were given for the trouble. Many thought it was the instruments in use. Finally it was decided to have the local electric company make an investigation. The trouble was finally found in a grounded wire in a lamp near a corner street. The lamp was one of the new lighting system just installed. Not all the trouble comes from static.—H. C. S.

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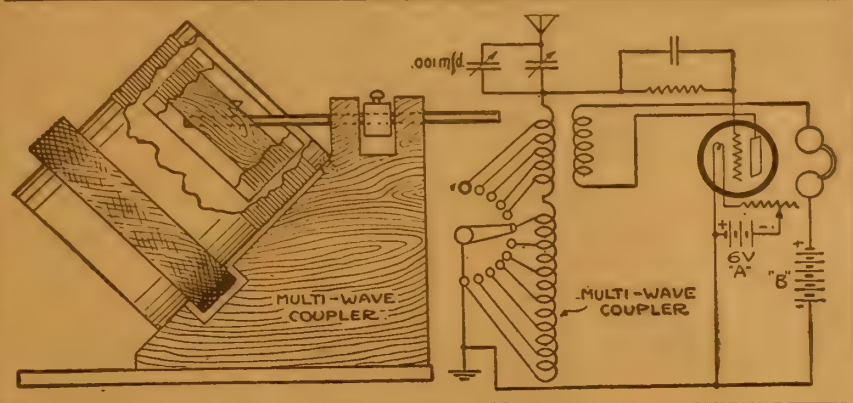
How to Make a Multi-Wave Coupler

Meter Range Increased With New Construction

The multi-wave set shown in the illustration has a range of 180 to 3200 meters. The construction of the coupler is clearly shown. The primary winding is on a 4-inch tube 4¾ inches long. The short wave section is straight wound, with 60 turns of wire, tapped every 10 turns. The long wave winding is wound the same as a duo-lateral coil and consists of 400 turns tapped at every 25 turns.

The secondary, which acts as a tickler, is a 3-inch tube, 1½ inches long, and is wound with 48 turns of wire. The set is equally efficient on long or short waves. I am obtaining very good results, receiving from both coasts and also from Canada and Cuba.—Arthur Klinger, Staunton, Ill.

COUPLER AND HOOK-UP DIAGRAM



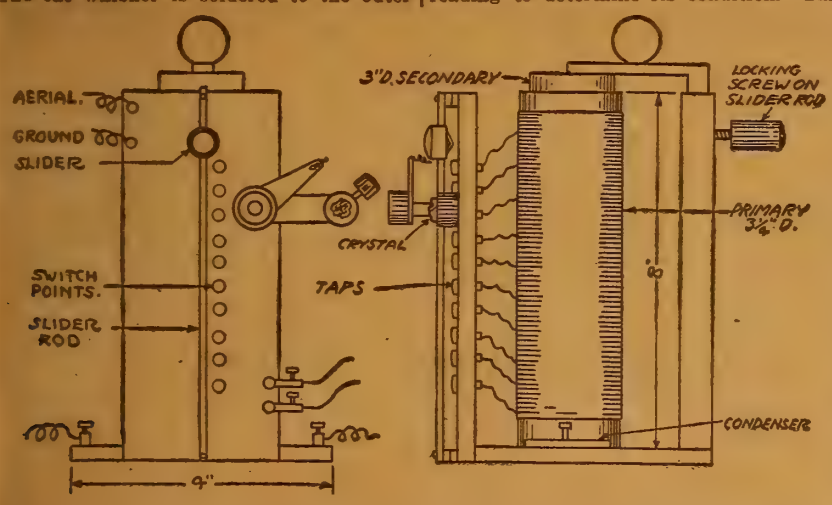
Interference of Receiving Sets

It has been a matter of common experience that two Radio receiving sets in the same building or in adjacent buildings will interfere with each other when tuned to "listen in" on the same transmitting station. This is especially true when the antenna leads or wires run from a common pole. To reduce this consequent effect as much as possible, the antenna wires and the lead-in should be strung as far as possible away from any other antenna system. If possible, the wires should be strung at right angles to any neighboring system.

It is surprising that even the scratching occasioned by making the necessary fine adjustments on the crystal detector, will be audible on adjoining tube receivers, causing much interference and annoyance. —P. J. M. Clute, Schenectady, N. Y.

Vertical Loose Coupler

The vertical loose coupler shown in the illustration has the crystal detector mounted on the side of the panel, which is a great convenience. The crystal cup has a short bolt in the center which slides back and forth in the slot of the bracket to one side of the panel. The knob on the back of the cup serves as a locknut to hold the crystal cup after the adjustment. The cat whisker is soldered to the outer



end of the switch lever which is turned by the knob, thus giving a semicircular swing up and down and lateral adjustments on the slotted bracket.

To get the proper pressure on the crystal it is only necessary to bend the outer end of the switch lever up and down.

This is the best detector idea I have ever tried or seen. I am about 80 miles from Chicago and I have picked up jazz and piano music right along.—Lewis Elithorp, Clinton, Wis.

Possible Cure for Fading

The cause of fading has puzzled many Radio experts for many years but the U. S. Bureau of Standards has taken careful observations on this subject and its possible cure.

In the first place, what is fading? All persons who have ever "tuned" a receiving set are aware of the fact that when the desired station is tuned in perfectly it sometimes fades away gradually but more often very suddenly. They then blame the receiving or sending set, when the trouble is not with either, and cannot be "cured" very easily.

If you have this trouble you will notice that there are large metallic objects near your aerial such as steel-frame buildings, windmill towers, trolley wires, telephone or telegraph wires, and very high soft wood trees. All these objects absorb the weak waves sent out by the broadcasting station and send them to the ground instead of to the receiving set. The waves are not very strong when they leave the transmitter and any loss through absorbtion leaves a small amount of current to be picked up by your detector tube, and consequently very weak signals.

Another cause of fading and weak signals is poor aerial insulators. Porcelain cleats are commonly used on receiving aerials and serve the purpose very well until they become corroded or covered by smoke. Smoke or corrosion is composed chiefly of carbon which is a very good conductor of electric waves. The glazed kind give better results but because of the fact that only three of the four sides are glazed they will not perform their duty any great length of time. The aerial should be stretched very tight so the capacity between it and the ground cannot vary in the least and cause your set to fail to tune in the long distance stations.

Another cause of fading is the rapid change in barometric pressure between the receiving station and the transmitter. A dense fog between the two stations may absorb some of the radiated energy.

Testing the Storage Battery

A voltmeter will always indicate the exact state of charge or discharge of a storage battery. When making a test of this sort, it is advisable to use the battery for a few minutes before taking a voltage reading to determine its condition. This is accomplished by turning the current on the tube filaments. This precaution is necessary, since most storage batteries, even when almost exhausted will show a voltage reading of about 2 volts per cell, if the test is made after the battery has been standing idle for a time. Readings of each cell of the battery should be taken.

When recharging a battery after discharge, its state of charge may be easily determined by connecting the voltmeter across the terminals of each cell in succession, while the battery is being charged at a normal charging rate. A completely recharged cell should show a voltage reading of 2.5 to 2.7 volts.

A battery that is being used and is completely discharged will show a reading of about 1.8 volts. By discharge is meant that the battery should not be used any longer until after it has been recharged, since although the battery will continue to supply current until the voltage per cell drops to zero, such procedure will generally in permanent damage to the battery.—P. J. M. Clute, Schenectady, N. Y.

Regulation of Filament Current

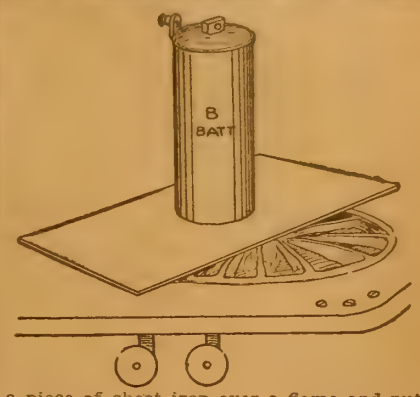
When the filament current of a vacuum tube is too high, its life will be materially shortened. Even a very small excess of current will reduce the life of the tube twenty-five per cent.

It is quite unsatisfactory to endeavor to regulate the current by observing the brightness of the filament, for while this is often done, it is quite uncertain, inasmuch as what one person may consider the proper brightness, another person would consider either too low or too high. Although ammeters are sometimes used, the makers of vacuum tubes announce that the best results from the tubes are secured when the filament current is regulated by using a voltmeter.

If the voltage at which the tube should be operated is not printed on the tube itself or on its container, the voltmeter should be connected across the filament circuit at the socket, and the rheostat adjusted so that the voltage reading is as low as possible at the time the receiver is giving the loudest reproduction. This voltage at which the tube will operate the best should be marked on the base of the tube for future reference.—P. J. M. Clute, Schenectady, N. Y.

Lengthen Dry Cell Life By Heat on Gas Range

There are a large number of Radiophans who have B batteries made up of two-cell flashlight batteries. I use the following method for renewing these batteries and have considerable success with it. Place



a piece of sheet iron over a flame and put the batteries on it one or two at a time and allow them to heat until the wax on the top bubbles. This is well worth trying for it will reduce your B battery cost.—Clyde Hensley, Stockton, Cal.

A three-plate vernier condenser should be connected in shunt to a larger one and not in series.

REINARTZ CIRCUIT!

New Ultra Circuit Coupler and Diag. $4.75, built to specifications, page 13, of March 24th Radio Digest, and Ruby Mica-Copper-Bakelite mounted Condensers, N. P. binding posts, .00015, 50c; .0015, 60c; .0025, 70c. Reinartz coil, doub. green silk-Bakelite Spider $1.95. Reinartz plate circuit chokes (triple adjustable) $1.70. Complete set Reinartz tuner and detector parts $10.65. Tuner, Det. and 2 Stage $17.95. Two Stage Outfit $8.35.

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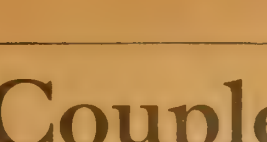

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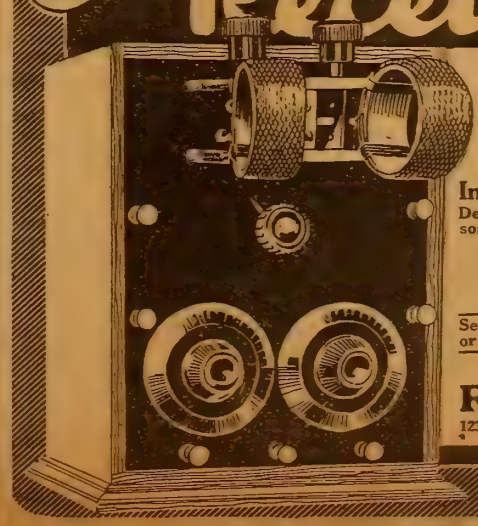
How to Make a Flewelling Receiver



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How to Construct a Flewelling Super Set

The First Prize Winner in the $100 Flewelling Set Contest

By Lawrence M. Blakey

(Editor's Note.—The following article is the first prize manuscript submitted in the $100.00 Flewelling Set Contest conducted by Radio Digest.)

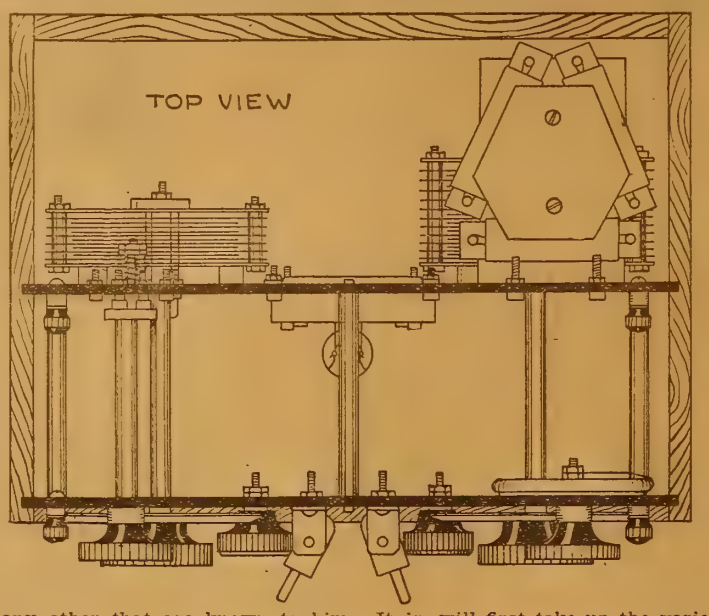
WHILE the world in general may still be ignorant of the fact that Major Armstrong developed, a few years ago, the now famous regenerative circuit, as used in Radio receiving sets, and which was named after him, it is certain that the Radio world is well aware of the fact. The Radio world is also aware of the fact that this noted inventor later startled Radio enthusiasts with the announcement of the development of what are now known as the "Armstrong Super-Regenerative" circuits. These proved a great success for the inventor, but others of less experience and patience found them to be practically an absolute failure, each of the three systems being too critical of adjustment.

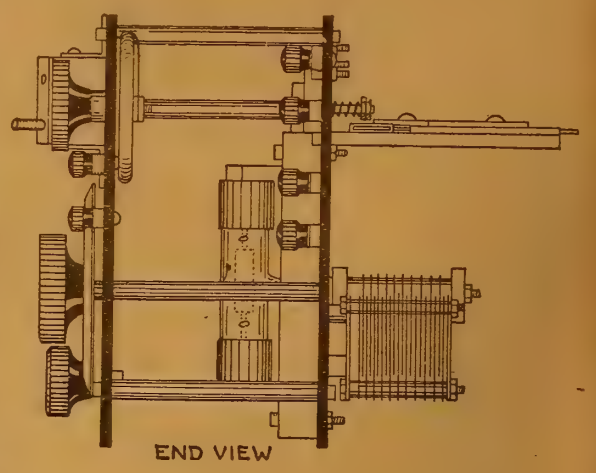
This, however, showed that the audion, or vacuum tube, could be made to perform wonders, and it only remained for our friend, Edmund T. Flewelling, of Wakefield, Mass., to bring out a circuit with these super-regenerative qualities, minus the critical disadvantages of the Armstrong circuits, and at the same time reducing the number of pieces of apparatus necessary for such a set.

It, therefore, is the purpose of this article to describe in a non-technical and comprehensive manner the design, construction and operation of such a set.

Design

In designing a Radio set of any description, a number of things should be taken into consideration, a few of which are listed below. It will be found that most of these are self-explanatory and no further description will be given, as the object of this list is simply to get the builder's mind directed along the proper channels in order to better understand what follows:





List of Requirements

1. Sensitiveness as a receiver or capability of picking up distant stations.
2. Maximum output from minimum input, or a design for efficiency.
3. Simplicity and ease of operation over the average or required range of wave lengths.
4. Selectivity, making it possible to receive clearly one of several stations operating on nearly the same wave length.
5. Cheapness of construction without loss in efficiency—accomplished by the reduction of expensive apparatus.
6. Freedom from body capacity effects, which is necessary to enable accurate tuning.
7. Designed for expansion, so that in the future a more powerful receiver can be made by means of additions without alterations.
8. A set capable of being converted into a portable receiver on desired occasions.
9. A circuit adaptable to surrounding conditions, such as available ground and aerial connections.
10. Clarity of received signals without undue distortion.
11. Compactness of units (without crowding, which would reduce efficient operation, howling, etc.), thereby saving space and reducing cost of construction.
12. Neatness of construction and set so that it may be presented on any occasion.

After the prospective builder has read over this list, he is at a loss as to what circuit will answer these requirements, and after picking out his circuit, which will be the best method of assembling the instruments of this circuit. Briefly, in the mind of the author, the Flewelling circuit comes nearer answering all of these than any other that are known to him. It is true, of course, that this does not answer all twelve, either, but in the few exceptions the design of the assembly will counterbalance the faults in the circuit. For instance, as will be explained later, the Flewelling circuit falls down completely in coming up to requirement No. 6. In fact, body effects are very noticeable in this circuit, due to its extreme sensitiveness and "super" characteristics. However, this can be overcome by proper construction and assembly.

Experiments Made First

Before the actual construction of this set was undertaken by the writer, some experiments with the circuit were performed, in order to better determine the peculiarities of it and thereby enable better assembly of the various parts. As these may be of general interest to the reader, a few of the results obtained will be given at this time.

Excellent results were obtained in these preliminary tests and many undesirable features found, one of which was the effect caused by bringing the hands within a few inches of the wiring in order to tune the set. It was almost impossible to put the hands on the condenser knobs without completely losing a station, and served to demonstrate the absolute necessity of some kind of non-conductor for this purpose. This is what was meant by No. 6 in the list of requirements.

Another noticeable requirement was the necessity of verniers on the two condensers. While verniers might be advantageous if placed on the coupling adjustments, they are not necessary if vernier condensers are used, due to the fact that fine adjustments can be made with these condenser verniers which will compensate for the rougher adjustments of coupling, or the tickler.

Materials and Construction Design

Since this was to be a Radio flivver set and we could not afford an expensive set, yet desired something more than a crystal receiver, that would reach out, the writer decided to build it as cheaply as possible without lowering the efficiency noticeably by using inferior apparatus. With this idea in view in this article, we will first take up the various increments which go to make up the whole set and discuss the advantages, disadvantages and the best design of each.

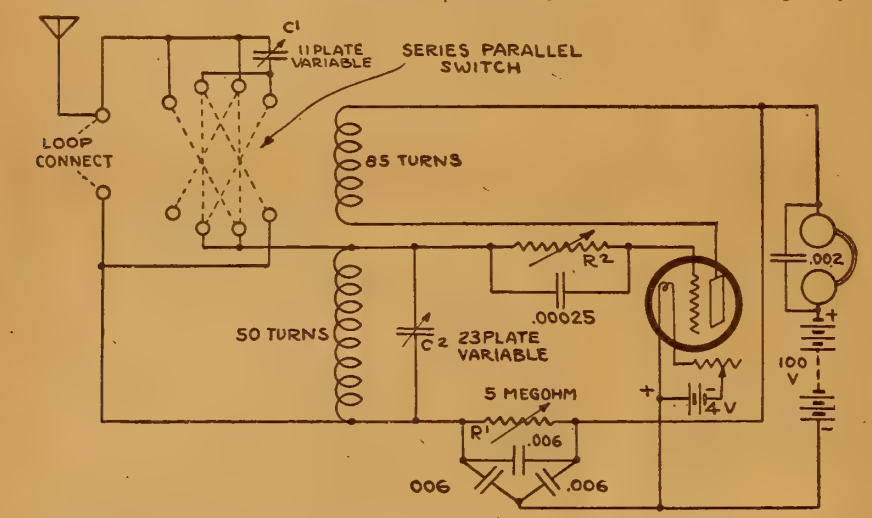
Referring to the circuit diagram, we will first take up the variable condensers. Much has been said by various manufacturers as to the absolute necessity of having a good, reliable condenser. While this is entirely true, it has led many readers to believe they must pay enormous sums for good instruments. Of course, the more expensive ones are more desirable from a constructive point due to balancing, verniers, etc., but for the proper functioning of these instruments, these things are not essential. The writer used variables which cost him $1.25 and $1.35 respectively, and no better results could be desired than these instruments have produced.

While discusing condensers it seems desirable that the various fixed units be taken up next. When this circuit was first introduced, it was almost impossible to secure condensers of the .006 mfd. size. These have been placed on the market recently, however, for the benefit of those who care to purchase them, and most of them seem to be excellent for the purpose for which they are intended.

Mica Condensers Best

It is highly desirable that mica condensers be used for this size, but since paper condensers are much cheaper, they may be used with very good results. The ped, they have a tendency to pop and crackle in the receiver, which is very annoying, and at times even throws the set out of adjustment for some certain station. This is due to the variation of the chief disadvantage of these condensers lies in the fact that it is hard to make good contacts. Also, unless tightly wrap-

(Continued on page 15)



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Attention: Mr. Arthur Pudlin.

Dear Sir:-

I wish to acknowledge receipt of samples of variable resistances that you sent me last week for test purposes.

I have had great difficulty in securing a variable resistance foruse in the Flewelling Circuit or any other radio circuit for that matter, that was not subject to change with changing atmospheric conditions, even the pencil mark type being subject to this criticism. I am glad to report that the type which you sent me is so far the only type that I have seen or tested that meets all of the requirements.

I wish to thank you for your kindness in forwarding these resistances. I would have no hesitancy in recommending the use of these resistances in my circuit or any other radio circuit using a variable resistance. I am

Very truly yours,

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so far the only one that meets all the requirements

If you can not buy same at your Dealers write to the Manufacturer

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capacity which is caused by the varying charge placed upon the tinfoil sheets. As this charge varies, the attraction or repulsion between the plates vary, which in turn causes a vibration within the condenser which results in the variation of the capacity. This can be overcome to a great extent by placing these three condensers as shown in the elevation sketch of the assembled set. Here the condensers are mounted in triangular form on a fiber support and securely held in place by the six-sided fiber fastening placed on top of them. This is screwed down tightly enough that it keeps the tinfoil sheets pressed firmly against the separating dielectric, thereby eliminating electrical vibration. In this manner little trouble is experienced.

All other capacities are indicated on the circuit diagram and may be purchased at the local dealers.

Variable Resistances

The variable resistances R_1 and R_2 will be next in the order of the discussion. R_1 is not at all critical and is of very low value, though good results may be obtained over a large range. It seems that about one-fourth megohm is about right for this. This, being non-critical, can be of the pencil mark or ink type and is placed on the front of the rear panel between two switch points, these in turn passing through the panel and connecting to the .006 mfd. condenser.

R_2 is rather critical for best results and it is advisable that a variable grid of some standard make be used. One with a knob adjustment and not the pencil mark kind are the ones required. However, one constructed as follows is giving excellent results on the set under discussion. It, too, is mounted on the front of the rear panel, and may be seen in the photograph, though the sketch does not show it. This consists of an india ink mark on the panel, about 4 inches long and ⅛ inch wide, placed in semicircular form and varied by means of a knob and lever arm, the arm being about 1¼ inches long. At one end, a switch point passing through the panel makes connection with the ink mark, the other end being open. This is shunted across the .00025 mfd. condenser as indicated in the circuit diagram. The exact value of this depends entirely upon the make of the tube used, the value of the high voltage or B battery potential, and the amount of current flowing in the filament circuit. The value, while rather large, can be determined only by experiment; therefore the necessity for the variable leak of this character.

The rheostat may be of any reliable make and need not be a vernier, as hard tubes are used and the ordinary variation is fine enough for practically all purposes.

Series-Parallel Switch

It was found advisable in preliminary tests to use a series-parallel switch for the first condenser, which gives an added range in wavelength, and in view of the fact that this set is built with the idea that as longer wave lengths are assigned (which is sure to be the case in a very short time) more capacity will be needed as larger coils are used. Then by switching this into the parallel position, it is adding capacity to the other condenser.

Also, as various aerials may be used, the condenser may be required to function either as a series or parallel unit. In operation, if the condenser is used in series, it decreases the natural wave length of the aerial, therefore this position should be used on long aerials. For aerials of the proper length for the set, the condenser may be turned to the "out" position, and for short aerials where longer wave lengths are required and the other condenser cannot supply this, the parallel position is used, thereby increasing the wavelength of the antenna circuit.

Eliminating Body Capacity

Since it was absolutely essential that body capacity effects be eliminated in some way in order to obtain efficient operation, it was considered best to use some kind of insulating rod or handle. In order to produce a neat-looking set, it became necessary for these to extend from the dials and knobs back through the panel. This required the use of some means for mounting the instruments farther back, so it was considered advisable to use a second panel, of the same size, fastening them together in such a way as to make them self-supporting and independent of any cabinet mounting. This also increases accessibility in case of repairs and in the original construction. The method is clearly shown in the sketches and photographs.

Just how far back this second panel should be to insure maximum diminution of capacity effects without being farther than necessary, was the next question. Since it was decided to mount the honeycomb coils on the front panel, the rear panel need be no farther back than these coils would be from the hands while working the verniers, which were placed low on the panel for this reason. That, therefore, will be left for the individual builder to decide, but should this same layout be used, this was found to be approximately 3½ inches.

A Myers tube was used in this set and there was found plenty of room on the front of the back panel to mount the tube, it being within 1½ inches of the panel when mounted.

Panels and Panel Material

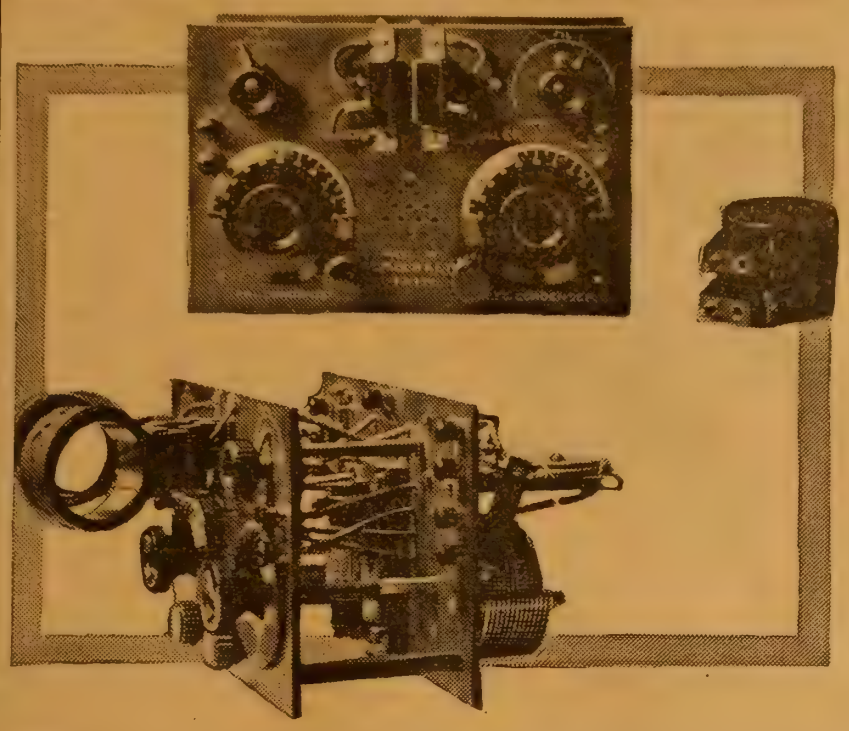
This leads us the choice of the panels to be used, and it was found that the minimum size panel that could be used successfully was 6 by 9 inches, and these cost $1.25 each. Since it is advisable that formica, or some other good panel material, be used instead of wood, this presents another expense problem, since two of these are required. A short search, however, revealed a store that carried regular formica panels, polished and unpolished, so two unpolished ones of the right size were purchased, at a total cost of $1.00. By using emery cloth and sandpaper, the panels were grained along their longest dimension, thus producing the dull finish now used by a large number of leading Radio manufacturers today. The panels were then laid out, drilled and engraved. As space will not permit, and as the average builder will probably not care to do his own engraving, this process will not be discussed at this time, though with a little practice almost any one can engrave their own panels satisfactorily.

The coil mountings are both of the swivel type, it having been found in the preliminary tests that a full 180 degree coupling is advantageous in many cases. The photographs illustrate these mountings in place on the front panel.

The coils are two De Forest coils of 50 and 100 turns, the tickler being the larger of the two. However, after a little experimenting, it was found that 85 turns worked better, and so the 100-turn coil was reduced to this size.

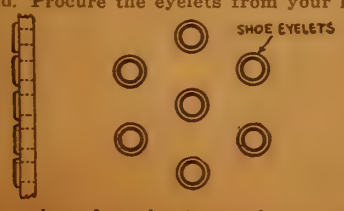
Another feature in the design of this set is in constructing it in such a manner that an amplifier unit may be added, both audio and Radio frequency, should the builder ever get that ambitious, and we are sure many will. This accounts for the fact that the A and B battery binding posts are placed at each side of the panel. At present, only one set on the writer's panel is in use, no connection having been made through, for at present no Radio frequency amplifiers have been developed, to our knowledge, but that, too, is only a matter of time.

COMPACT ARRANGEMENT OF SET



Eyelets Make Good Bezels

Drill the holes necessary and of a size to take the body part of a shoe eyelet. Five or seven holes are most generally used. Procure the eyelets from your local



shoemaker of a color to match your panel—in most cases black. Insert these in the holes with finished part out, or on the front. This will improve the appearance greatly.—Lloyd Dearolph, McDonald, Pa.

Hand Capacity on Dials Reduced to a Minimum

When using metal dials that are not insulated from the shaft, they may be used to advantage in reducing hand capacity.

On the condenser, if used in parallel with the inductance or in series with the ground lead, the rotating side of the condenser should be on the grounded side.

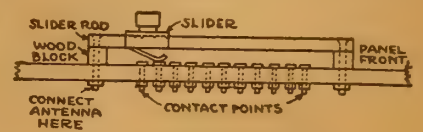
On the variocoupler, use pigtail connections, but instead of following the ordinary custom of fastening wire to the shaft then pigtail to the shaft, bore a hole on each side of the rotor and sink a couple of brass screws, bring out the wire to these screws and then pigtail to the screws, soldering the whole to insure perfect connection. The shaft should now be again pigtailed, this time to the ground circuit.

If the dials are not the metal type, they may be easily grounded by giving them a couple of coats of aluminum paint.

On a set thusly shielded, I have found it impossible to detect the slightest trace of the annoying "hand capacity effect."—E. A. Johnstone, Pocatello, Idaho.

Straight Line Switch Contacts

In building my Radio outfit I had a lot of trouble in getting a good tight connection with the regular switch arms. They were always coming loose, so I finally thought of the method shown in the illustration. Instead of using a switch arm a slider and a slider rod takes its place.



As the contact points are placed in a straight line it is very easy to make. I now have no trouble in loose connections.—William M. Funk, Phoenixville, Pa.

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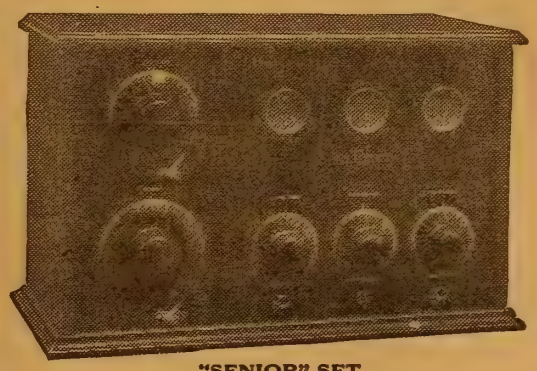
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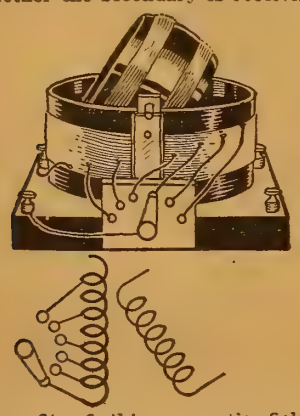
About Radio Parts

The Variocoupler

The variocoupler closely resembles the loose coupler in many respects. In the loose coupler the primary winding has a slider for tuning adjustments; in the variocoupler the adjustments on the primary are usually controlled by means of taps and a switch. The taps are numerous to provide for as much range in adjustment as possible. Occasionally the primary is furnished with a double contact switch, one to give rough adjustments, the other to give finer adjustments, that is to say, the one has taps perhaps for every 10 turns, while the other further subdivides one of these taps with a separate contact on each turn. The tuning is first adjusted on the contacts with 10 turns then is finely adjusted per turn through the other.

In the loose coupler the inductance effect is controlled by sliding the secondary winding in and out of the primary winding but the variocoupler has no sliding adjustment between the coils; it operates under a different mechanical adjustment. In this instance the secondary winding is rotated about its shaft on the inside of the end of the primary tube, then the secondary will receive the full inductive effect when the cores or insides of the tubes are in line; in this way the variations of coupling are controlled.

The current flowing through the primary creates a magnetic field in the core of the primary; this magnetic field in turn induces a current in the secondary but the strength of this current varies depending on whether the secondary is receiving the

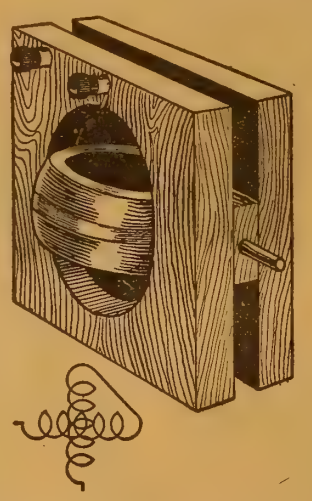


full benefit of this magnetic field. In turning the secondary around the number of lines of magnetic force that flow through the core of the secondary winding are decreased, therefore decreasing the strength of the induced current.

For short wave work the variocoupler makes a neat compact unit for panel mounting while the loose coupler is rather bulky and not as neatly adapted to this use. If it is necessary to increase the sizes for larger wave lengths it will be found that the loose coupler may be expanded with less difficulty. The variocoupler becomes too bulky for practicable purposes. Of course loading coils may be added but even here it will be found that the loose coupler responds more readily to longer wave lengths.

The Variometer

The variometer as a rule is one of the persistent curiosities of Radio apparatus. Most amateurs have not tried to analyze fully its operation or its theory, yet it is actually a very simple device. It consists of two coils connected in series, the one turning inside the other. The same effect and control of the induction is utilized as before but instead of two separate circuits there is only one. The coils of a variometer should both contain the same length and size of wire so that the induced current is the same as the initial current. The initial current then goes through both coils but in addition there is the effect of the induced current in both coils of the



series. Note here that we write of the effect of the induced current! This induced current may add to the initial current or it may subtract. If the current flows through both coils in the same direction the magnetic fields assist each other and the self induction of the variometer is at a maximum. If the inner coil is rotated so that the current flows through the coils in opposite directions the magnetic fields oppose each other and the self induction is at a minimum. The self induction of the variometer therefore depends on the relative positions of the coils; by the rotation of the inner coil a continuous variation of inductance may be obtained.

Connecting Headsets

For best results when using more than one pair of telephone receivers on the same receiving set, they should have about the same resistance and should preferably be of the same type and manufacture. The pairs of headsets should be connected in series, similar to the way the two receivers composing a headset are connected. If two or more sets of receivers are connected in series the energy delivered to the output terminals of the receiving set is divided between the several sets of receivers, depending upon the various resistances of the sets. Thus, it is apparent that matched headsets are advisable.—P. J. M. Clute, Schenectady, N. Y.

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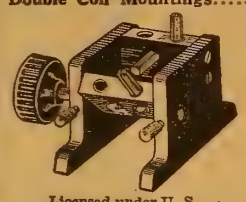

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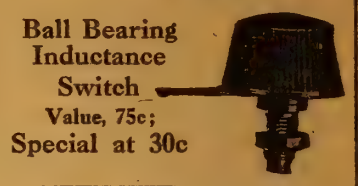

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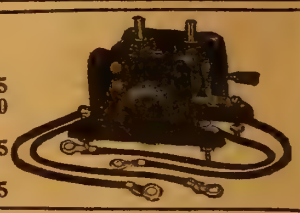

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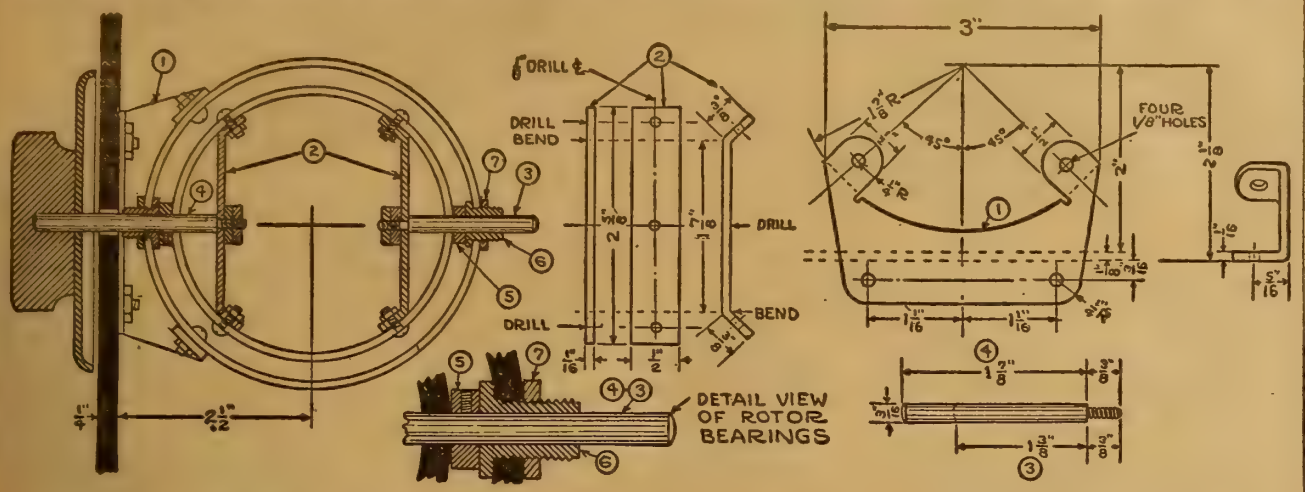
Construction of the Ultra Reinartz Receiver

Part III—Tuning Unit Details and Mounting

By H. J. Marx

IT is quite obvious that the efficiency of the Ultra Reinartz Receiver is centered in the tuning unit. Because of this its construction has been analyzed to the fullest details. The parts required for the mounting of the unit on the panel and also for the assembly of the rotor of the secondary circuit are easily made up and in some cases were selected from the usual miscellaneous collection of odds and ends (usually called junk) that will accumulate in the hands of every Radiophan.



Unit Support

The support used for mounting the unit on the panel is shown as number one in the illustrations. Two of the patterns shown are cut from 1/4-inch sheet brass. The cutting is best accomplished with a scroll saw and retouched with a file afterwards.

The 1/8-inch holes can be drilled after the bending operation in order to assure proper locations. In bending the turns should be made sharp as possible and at right angles. If the brass is very hard and brittle, it would be advisable to heat it to a red heat and then bend it while hot in order to avoid cracking at the bend. The lugs on the inside of the circular segement should be bent down until the inner face is flush with the curved edge of the support. That is the reason the inside edge of each lug is slotted back 1/8 inch as shown, and in this way provides bending clearance. Do not use sheet iron or steel for these pieces, due to their reaction in the magnetic field of the tuning unit.

Rotor Shafts and Supports

The rotor shafts are supported and fastened to the rotor tube by means of the two supports indicated and detailed as number 2 in the illustration. These also are made of 1/4-inch sheet brass stock, bent and drilled as indicated. If possible it is best to slightly curve the lug on each end of these supports to fit the contour of the inside of the tubing. Small 6-32 machine screws and nuts (brass) can be used to fasten these to the rotor tube.

The shafts, numbers 3 and 4, are both of 1/4-inch brass rod but the one used on the panel side is 1/2 inch longer to accommodate the dial. The end is turned down 3/8 inch from the end and a 6-32 thread is cut back to the shoulder. In assembling, the shaft is first pulled tight to the support, with one nut and then locked in place with a second nut. Considerable care should be taken in this assembly so that the shaft alignment will be continuous or the rotation of the rotor will be eccentric.

Shaft Bearings

The bearings for the shaft as indicated by the numerals 6 and 7 were taken from two switch levers that were found in the odds and ends. They had been drilled for a 1/4-inch shaft. If the ones on hand happen to be 1/4 inch—then 1/4 inch brass rods can be substituted for the shafts. The length is not very important except on the panel side. There, any excess can usually be accounted for by a few strokes of a file.

The spacer collars indicated by the number 5 were also found in the odds and ends. Here likewise it may be necessary to file off the sides slightly in order to get the proper thickness. The exact dimensions cannot be given as they will depend on the thickness of the flanges on the shaft bearings.

Assembly

The rotor should be assembled in the tuning unit before the whole is mounted on the panel. The shaft supports are fastened in the rotor and the bearings are attached to the large tube. The rotor is then held in position inside and the shaft inserted from the outside, at the same time slipping the spacing collar in position. The shaft nut can then be turned down in place loosely. The same operation is now repeated for the other side. The shaft nuts can then be tightened and the locknuts added. If the spacing collars have set screws they should be tightened, as it will prevent them from turning and wearing against the rotor tube. It must not be overlooked that the shafts and rotor are to act as one unit and rotate together. A poor job will mean a loose rotor and impractical tuning.

Connections

Before the locking nuts are fastened on the rotor shafts—the ends of the rotor winding should first be looped around the shaft—one end to each shaft. In this way the two shafts are used to carry the circuit from the rotor and pigtail connections are avoided. The end of the grid winding on the unit can be looped under the front bearing nut before it is tightened down. A terminal lug can be inserted over the rear bearing and the grid lead can easily be soldered to it, when the unit is mounted into place.

After the tuning unit has been completely assembled, the panel supports can be attached by means of short 6-32 machine screws and nuts. Then the location of the rotor shaft should be checked on the panel. If satisfactory the unit can be secured to the panel with four 1/2 inch long countersunk head 6-32 machine screws.

Tuning Record Simplifies Set

Users of Radiophone receivers will find that if they keep a record of tuning adjustments from day to day, it will help them in bringing in the same stations on subsequent occasions. The record consists of a blank with one duled space for the station, another column for the location of the station, distance, or mileage from the receiving station; the wave length of the station; a column for the antenna condenser, another for the taps, one for the tickler and one for the vernier rheostat, in the order named.

By reference to this record, it will be a comparatively easy matter to determine what adjustment is the best for bringing in any particular station desired. A little study of the conditions surrounding a particular set, such as metal roofs or steel structures near by whether on a hill or in a hollow and such matters, will help, with a study of the daily chart kept, to solve many of the difficulties experienced in bringing in a station, and help to calibrate the receiving set to the approximate wave length point for any station.—F. N. Hollingsworth, Boston, Mass.

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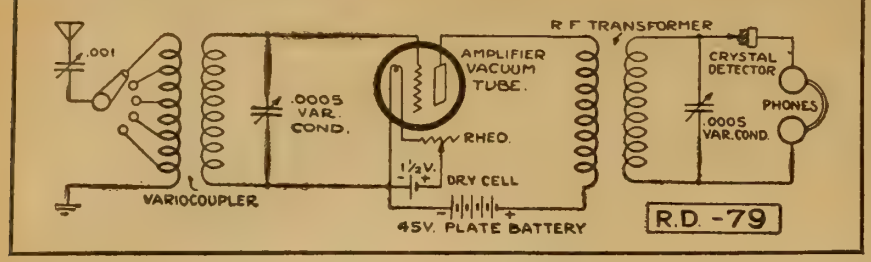

FOLLOWING the plan of alternating the R. D. diagrams with both simple and more complicated types of circuits, the one shown this week illustrates a simple method of adding a stage of Radio fregency to a crystal detector set. It must be realized that the crystal detector has the untold advantage of rectifying the received current with no distortion. Its weakness lies in the fact that weak currents are unable to pass through. If, therefore, a stage of Radio frequency amplification is added to it, this primary difficulty is overcome.

In hook up R. D. 79 it is assumed that the crytal detector circuit uses a variocoupler and a 23-plate variable condenser as the tuning unit. The additional parts then are another condenser, the amplifier vacuum tube, the socket, the rheostat, transformer and necessary batteries. The 43-plate or .001 Mfd. variable condenser is used in series in the antenna circuit. The one variable condenser tunes the secondary circuit of the tube. The other variable condenser tunes the secondary circuit of the transformer for what may be called the crystal and phone circuit. Forty-five to 60 volts can be used in the plate circuit of the amplifier tube.

Book Reviews

Amateur Radio Call Book. In this book there will be found a complete list of all amateur, special amateur and Radiophone broadcasting stations. Just the book to have near you when listening in on stations and new call letters are heard. There is a large two-color map included, also how to construct and operate a honeycomb coil set, detector and two stage amplifier. Price, $1.00.

Getting Acquainted With Radio Receivers. By Paul Godley. Describes the necessary parts. How to put an aerial, tuning, regeneration, loud speakers, dry cell tubes, connecting the receiver, operation, faults and their remedies. Price, 25 cents.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to made Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Letters of a Radio Engineer to His Son. By John Mills. A series of interesting letters written to a boy. Each letter is full and complete and the most advanced student can skip over some of the letters and get just the information he desires. Price, $2.00.

Radio Communication. By John Mills. The fundamental principles and methods upon which recent developments are based are emphasized. The vacuum tube is treated in a simple, fundamental and up-to-date manner. Present methods and tendencies of the art are explained in a chapter which is non-mathematical. Price, $2.00.

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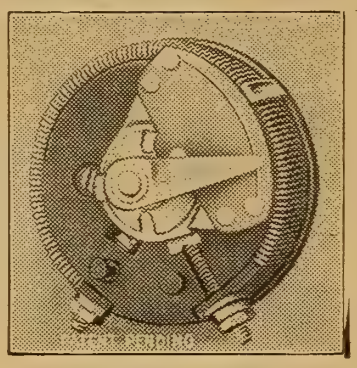

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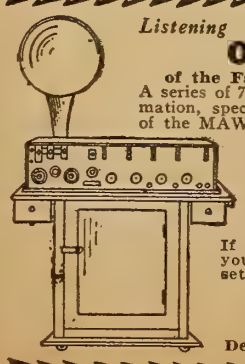

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Radio Parts Made from Old Storage Batteries

There are many uses for the parts taken from a storage battery that are a great help to the Radio amateur. The material for constructing the apparatus which I am going to describe can be procured for a few cents from a local garage.

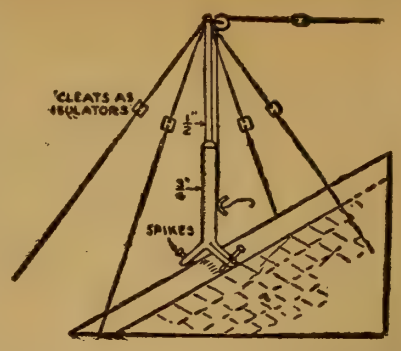
Everyone knows that the sides of a battery jar can be used for making panels and dials but what are you going to do with the remaining part after all four sides have been cut away? This part has the form of a box with small pieces separating it into five small sections. It can be used to hold several sizes of nails or screws. A cover for this tray can be made out of the narrow side of the jar by fastening it with small hinges. I have three of these trays made up exactly as described which I use to hold screws and nuts of different sizes and threads. You can even reserve one for your table and use it for an ash tray. It can be polished by rubbing the surfaces with oil.

Dials can also be made with these parts. The knobs that cover the holes for pouring the electrolite in the jars can be used for the knobs. These knobs are hollow so that a screw can be fastened in one by pouring the melted material of phonograph records in around the shaft. The dials are cut out of the sides of a jar with a fret saw.

Next comes the making of condensers. The forms for making small phone condensers can be easily cut from the narrow sides of the jar. A grid condenser can be made by taking 2 pieces of tinfoil 1 inch wide and 5 inches long, and 3 pieces of waxed paper 1½ inches wide and 6 inches long. Place a piece of tinfoil between the pie pieces of paper and wind the whole on one of the forms mentioned. A binding post must be placed at each end of the form in holes which have been drilled through it so that direct connection to the tinfoil can be made with thin copper or tinfoil. This constitutes a good grid condenser whose capacity is .00025 mfd. Other capacities can be calculated.—Eugene Schmidt, Utica, N. Y.

Antenna Pole Roof Support

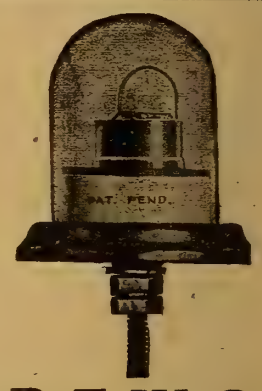
In erecting a pole for an aerial on top of a barn or house it is sometimes necessary to mount it without cutting a hole in the roof. One way to do this is to use a ¾-inch pipe for the base by cutting one end of the pipe and spreading the parts to fit the angle of the roof at the ridge. Two nails may be necessary for anchoring it to the ridge boards. A pipe reducer can be used to bring the pipe down to ½ inch.



An efficient 15 or 20-foot pole can be made rigid with but one set of guy wires.—Charles L. Marshall, Atchison, Kan.

If distortion is noted in the amplifier, this may be overcome by using power tubes which will stand very high plate voltages.

A variometer makes a good variocoupler if the stator is unsoldered from the rotor.



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Questions and Answers

Loop Aerial

(2784) EDC, Tecumseh, Neb.

Wrote you some time ago concerning some information on the Reflex circuit shown in the January 6 number of Radio Digest. Have my set completed now, but so far have had but little luck with it. I am inclosing book-up, which while altered considerably in appearance, is exactly in every way the same as the one printed in the January 6 issue. Would you be so kind as to check over the hook-up? I have used the best materials obtainable here in my outfit and am very anxious to make it "work" on a loop. How large and how many turns of wire on loop for the reception of broadcasts on 485 meters or less? The plate voltage? Are the fixed condensers of the proper capacities? Are they properly placed?

A.—Noting your difficulties in operation of Reflex circuit appearing in Radio Digest and sketch submitted will advise that so executed it should function with satisfactory results, your experience to the contrary. It is impossible to determine where your trouble lies without a personal inspection of set. Some slight discrepancy is acting as a deterrent and when remedied will remove your trouble.

For loop aerial use eight turns of No. 18 wire on a 3-foot square frame. This should be effective.

Use about forty-five volts on the plate.

Fixed condensers as indicated are of right capacity and properly placed.

Three-Tube Reflex

(2815) WHP, Brooklyn, N. Y.

In the Radio Digest of January 27 you published an artcile on Reflex circuits under the heading of "The By-Pass Condenser in the Reflex Circuit;" also three different hook-ups.

As I have used a two-tube Reflex circuit published by you for some time with the finest of results, I decided to build the three-tube and crystal-detector circuit with jacks as published by you in Figure 3 in the above issue, but I cannot understand how these jacks work as you have them in your drawing. I can see where the first A.F. jack might work all right, but where are the connections for the second jack? When the plug is inserted and the body of the jack having no connection, there is but one connection for the plug. Should the body of this jack be connected up as the first jack?

I have built this set, but I do not get any difference in volume between the first and second jack, although the volume is good and very clear it is not enough louder than my two-tube Reflex to warrant using the extra lamp, and I do not think it works as well on my loop aerial as my old set.

Being unable to get a 10 milhenry choke coil I used a five hundred-turn honeycomb coil, and in place of the 50,000-ohm resistance I got the smallest I could, which was one-tenth of a megohm. Perhaps these values being wrong have upset the whole works.

I would be pleased if you would explain the operation of the jacks as you have them drawn in this circuit and would like to have you give me any other information that would enable me to get out of my trouble, and if you have a blueprint of this circuit kindly mail me one and I will send you a check for same and also for your trouble.

A.—Answering your inquiry with reference to three-tube Reflex circuit appearing in Radio Digest, will advise that in the connection of the jacks the prong which is connected to positive B and the .002 condenser should be connected to the body of jack. Diagram is missing in that detail.

It is not our belief that the substitution of appartus differing from specifications will affect functioning of the circuit materially.

Connection of jacks described should afford sufficient volume.

WD-11 Not Suitable

(2666) WJC, Johnstown, Pa.

I am now interested in the Reflex circuits published in December 30, January 6 and January 20, 1923, and your answers to a few questions will be much appreciated. Is the tube WD-11 suitable in Reflex? With an outdoor aerial which is best, loose coupler, variocoupler or H. C. coils? How to connect up this aerial circuit in that case? Can another tube be used instead of crystal? If a crystal is better is there a type that will keep its adjustment? Can a potentiometer be used on a 1½ volt cell?

A.—Referring to Reflex circuit appearing in December 23 issue, will advise that a WD-11 tube is not suited to this type of receiver.

Use a variocoupler with the out-of-door aerial. Manner of connecting antenna is shown in the diagrams.

It is necessary to use a crystal detector in Reflex circuit and it cannot be replaced with a tube, as suggested. Dutec or Million Point detectors should not lose their adjustment.

A potentiometer can be used on a 1½ volt cell.

Reflex Apparatus

(2597) LGG, Philadelphia, Pa.

In the diagram No. 1 calling for two tubes, two A. F. transformers, two R. F. transformers and a crystal detector, what apparatus did you find to work the best? Ratio of Radio transformers and make? Ratio of audio transformers and make? Type of tubes? (Have on hand U. V. 200-201). Dielectric in fixed condensors mica or paper? In circuit No. 2 what is the high, variable resistance of 600 to 2,000 ohms used in plate circuit?

A.—Answering your inquiries with reference to Reflex circuit appearing in Radio Digest will advise that any standard apparatus of rugged construction will serve effectively.

Transformers should be of three or four to one ratio.

U.V. 201 tube is highly desirable. Hard tubes are used.

Use mica dielectric in condensers.

A graphite variable resistance of six hundred to two thousand ohms is indicated for plate circuit.

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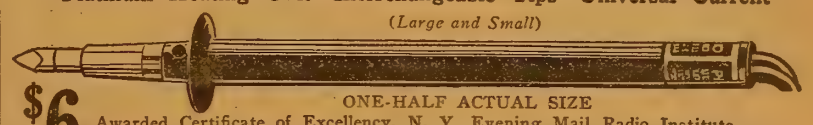

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Radio Illustrated

Rosalie Deneve, of New York, on one of the largest reproductions of a Radio set ever put on exhibition. It was a big feature at the recent Radio show, Hotel Pennsylvania, New York
© U. & U.

Photo shows Miss Gladys Ward trying out the newest type of Super-Regenerative Radio set at the Hotel Imperial, N. Y. This set has caused much favorable comment and praise from Radiophans
© K. & H.

Scouts Allan Burtchell, Fred Frick and Philip Liflander getting into touch with "headquarters" while spending a recent week-end at Kanohwahke Lakes in the Palisades Interstate Park
©Knickerbocker

Lester Picker, invalid for life, due to a fall from his aerial mast, operates his station, 6AJH, from the bedside
© P. & A.

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MAY 12 '23

Week's Advance Broadcast Programs—Page 4

Radio Digest

EVERY WEEK Illustrated TEN CENTS

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RADIO HELPS DEAF HEAR

HOOVER OKEHS NEW BROADCAST RULINGS

MODIFIES CONFERENCE RECOMMENDATIONS FOR TIME

Applications for Two New Broadcast Classes Necessary—Amateurs Get 150-220 Meter Band

By Carl H. Butman

WASHINGTON.—Secretary of Commerce Hoover announced April 2 that he had accepted the recommendations of the second Radio Conference with modifications and that all broadcasting stations now operating may continue to do so on wave lengths of 360 and on 400 meters temporarily, filing applications for transfer to the two new special classes if they desire to do so.

The new classes will comprise: Class A, stations under 500 watts in power, similar to the present general class, to which "distinctive" wave lengths lying between 222 and 300 meters will be assigned "so far as is possible"; and Class B stations rated between 500 and 1,000 watts, especially qualified for long distance and efficient service, which may be assigned wave lengths between 300 and 345 meters and between 375 and 545 meters. There are thirty Class B stations today, which will be given special waves within these two bands, although they may continue to operate on 400 until the new plan can be put into effect. Most B stations will receive exclusive waves except where there are several plants in one locality, in which event they will have to divide their hours.

Modifies Conference Program

Judging from his final report on the recommendations of the Radio conference, Secretary

(Continued on page 2)

Miss Jean Barry, comely and talented Barry portion of the Pantages vaudeville team, White & Barry. With Miss White, Miss Barry recently appeared on a program at KGB, The Tacoma Ledger-Mullins Electric Company Station at Tacoma, Washington. She sings attractively but her forte is piano work

Miss Bessie Brown, a favorite entertainer from Station KSD
Lewis Smith Photo

Voliva Will Teach "Flat World" Theory from Zion

New Plant to Tell the World—It Is Flat

ZION, ILL.—Two steel towers will be erected on a hill near the Zion tabernacle to serve as antenna towers for the new Zion Radio broadcasting station from which the teachings of Voliva, his theories of flat worlds, fixed stars and oysterless existence will be broadcast. This location will place the antenna 230 feet above the level of the lake.

The location was decided upon following a conference with F. S. Bernhardt, engineer in charge of installation. A building will be erected immediately underneath the antenna and will contain on operating room, generating room, reception room and studio. The station will broadcast on 400 meters wave length and will be in operation early in May.

CHILD TESTS HOLD HOPES FOR OTHERS

O. M. Pittinger, Supt. Indiana Schools for Deaf, Finds Airphone Success

Kiddies Hear First Music

Amplified Sounds Awaken Latent Sense—Score in Trial—Nearly All Respond

By Felix F. Bruner

INDIANAPOLIS, IND.—"The partially deaf may regain hearing through Radio," says O. M. Pittinger, superintendent of the Indiana Schools for the Deaf. In an interview with the Digest Mr. Pittinger said: "Although I believe it is highly possible to restore hearing to those having latent hearing, I do not think it probable that the totally deaf person can be made to hear through any treatment.

"Radio may become valuable in this connection as constant listening to intensified sound waves coming through the receivers should develop hearing. Children who are thought deaf have not really developed their talent for hearing, and I think Radio will aid them to again form the lost habit of detecting sound waves. In my recent tests at the Indiana State School for the Deaf I have found that some of the children who were considered past hearing, were able to distinguish between words and music.

Many Hear for First Time

"I am very pleased with the results of these tests, and it is my plan to continue the work with Radio. I expect to accomplish what has been hitherto considered the impossible."

In the experiments that recently took place a surprising number of the children of the school were able to really hear for the first time that they could remember. While many that could hear the music

(Continued on page 2)

WESTINGHOUSE FAILS IN RADIOCRAFT FIGHT

NEW YORK.—The Westinghouse Electric and Manufacturing Com- has been denied a preliminary injunction in its suit against the Deforest Radio Telephone and Telegraph Company and the Radiocraft Company, a subsidiary. The Westinghouse Company is suing for alleged infringements of the Armstrong license grant held by the Radiocraft Company. It is said that Westinghouse is merely after publicity.

RADIO HELPS DEAF HEAR

(Continued from page 1)

were unable to hear the announcements, the tests were thought highly successful.

Future tests are to be made with the aid of a highly amplified loud speaker and it is thought the intensified sound waves will be audible to even a greater number of the children.

A score of the children, some of them rated entirely deaf and others almost completely deaf, responded to the recent experiment, many being able to hear fairly clearly.

Case of Isabelle Schaible

Isabelle Schaible, a pupil, heard music for the first time. Others were able to hear and distinguish between speaking and music, but Isabelle responded more completely than the others.

She sat with a Radio headset over her ears. Her face almost shouted in her excitement. The strains of a dance orchestra were being received from a local station.

Instructors, pupils and visitors crowded about and watched her. She started beating time to the music with her foot. Any doubt that she was hearing was dispelled.

Isabelle, whose home is at Lafayette, Ind., has been deaf from childhood. Instructors rated her "completely deaf." She could distinguish nothing when the set received a concert from Detroit. But when the loud tones of a local dance orchestra came through the phones she immediately responded, signaling with her hands to an instructor that she heard music.

When the music stopped and an announcer started talking she signalled she could not hear a sound, although persons with normal hearing listening in on other sets could hear perfectly.

Few Fail to Respond

A score of pupils, whose hearing was in all stages to complete deafness, submitted to the experiment. Only four or five did not respond. A number considered deaf could distinguish between speaking and music.

The first two pupils with whom the experiment was tried were Gertrude McKnight of Carmel, Ind., and Mary Monfreda of Indianapolis. When the phones were placed to their ears their faces brightened. They expressed the opinion it was "fine" and could distinguish between speaking and music.

Leon Heinrich, South Bend, Ind., an advanced pupil, put the receivers to his ears. His face was a study for a moment.

"I can hear something like a street car," he said.

Instructors expressed the opinion he had felt the vibrations of a street car and the vibrations of the headset felt the same.

Compare to Talking Machine

On the second test, when an Indianapolis station was broadcasting, Leon accurately and repeatedly distinguished between music and talking. He has been deaf since he was five years old.

Many of the children declared they were listening to a phonograph when the music was being played. It was explained that while some possibly had sufficient hearing to distinguish phonograph music, others had recognized the vibrations of the Radio music as similar to those of the phonograph.

Intense interest in the experiment was expressed by instructors and pupils alike. They gathered around the receiving set and whenever any one succeeded in hearing there were smiles and congratulations.

HOOVER OKEHS NEW LAW

(Continued from page 1)

Hoover did not think it expedient to undertake so broad a program of reconstruction, and has compromised on the committee's plan. This he terms a step in ideal development of measures for prevention of interference in public broadcasting. It is evident that limited personnel and funds come into the question of a general revision of broadcasting regulations and the assignment of exclusive waves, while some difficulties present themselves in those bands used by shipping.

In order to provide a systematic assignment of wave lengths to the various stations broadcasting without hardship, the commerce department proposes to cooperate with the individual stations within the broad confines of the recommendations of the conference.

Classes Under New Rules

The "co-operative" regulations follow:

"Class A will include those stations equipped to use power not exceeding 500 watts. In this class it is proposed that the Radio inspectors, in co-operation with the station owners, shall assign distinctive wave lengths to each station so far as is possible in the area from 222 to 300 meters. No station will be required to change from 360 unless it is so desired.

"Class B will include those stations equipped to use from 500 to 1,000 watts. In this class it is proposed to similarly offer to license these stations on special wave lengths from 300 to 345 and from 375 to 545 meters, having regard to the maintenance of some ship work on 450 meters as outlined above and again no station will be required to change from 360 unless it so desires.

"Class C will comprise all stations now licensed for 360 meters. In this class no new licenses will be issued for stations on 360 meters until the plan is entirely real-

(Continued in fourth column)

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	300	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	5:00- 5:30
KFI, Los Angeles, Calif.	400	5:00- 9:00	5:00-12:30	5:00- 9:00	5:00- 9:00	5:00-12:30	5:00- 9:00	6:00- 8:00
KGW, Portland, Ore.	400	6:00-10:00	.....	6:00- 7:00	.....	6:00-10:00	.....	5:00- 6:00
KHJ, Los Angeles, Calif.	400	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	4:45- 7:30	.....
KPO, San Francisco, Calif.	400	.....	6:00- 8:00	.....	.....	.....	6:00- 8:00	.....
KSD, St. Louis, Mo.	400	8:00-11:30	8:00-10:00	8:00-10:00	.....	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	400	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:00	6:45- 7:40	7:00- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	.....
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00-11:00	5:30- 6:00	7:30- 8:00	8:00-11:00	8:30-10:30
WGI, Medford, Mass.	360	.....	8:30-10:00	7:00- 8:30	9:30-11:00	9:30-11:00	8:00- 9:30	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30
WGR, Buffalo, N. Y.	400	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	360	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	400	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	400	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	400	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, Newark, N. J.	360	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30	7:00- 9:30
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00	.....	.....	.....
WMAQ, Chicago, Ill.	400	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	400	8:00- 9:30	8:00- 9:30	....	8:00- 9:30	8:00- 9:30	8:00- 9:30	12:30- 2:00
WOAI, San Antonio, Texas.	360	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	8:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	400	.....	6:30- 9:00	6:30- 9:00	6:30- 9:00	6:30- 9:00	.....	.....

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

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A Cheap Single Tube Reflex—that will bring the local ones in on a loop, and run circles around a regenerative set—will be desecribed in the next series by H. J Marx, beginning next week.

E. T. Flewelling Has More to Tell—Read what he has to say in the eleventh article of his series, to appear next week.

A New Beginners Series—by a nationally-known Radio writer—will start in an early issue. Tell your novice friends to watch for this attractive feature.

Advance Programs of the Leading Plants—furnished for you so you can sit in the easy chair and enjoy a program you have selected. Fifteen plants' advance programs are on pages 4 and 6 this week; more next issue.

A. B. C. Lessons for Beginners—Chapter XVI next week will be devoted to a discussion of Reflex Amplification by Mr. Mohaupt. Read his article on Loop Antennae on page 11, this issue.

Part I of Your "Telephone Book" Again Next Issue—Keep your Radiophone directory up-to-date every week by the only means easily available, that of buying your weekly copy of the Digest.

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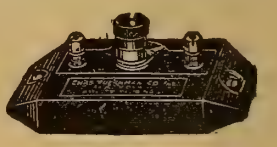

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NAVY TRANSMITS 15,768,308 WORDS

SIXTEEN DISTINCT USERS WITH NAVY LARGEST

No Transfer of Funds or Reimbursements Are Received for Traffic—Savings Are Actual

WASHINGTON.—During the first quarter of the fiscal year 1923, the Naval Communication Service transmitted about four and one-half million words by Radio, the Navy's part of which was three million, some of which necessarily was administrative, in connection with the Communication Service. It is surprising that the next largest user was the Department of Agriculture with nearly half a million words.

Handle 15,768,308 Words

In the calendar year, the Navy handled a total of 15,768,308 words for the Government through its shore stations. Of this total, 10,884,217 were Naval orders and despatches. The balance, nearly five million words, was for other departments, both the Agricultural and War Department filing over a million words each. All told, 16 different bureaus used the Navy Radio service, including the White House and the House of Representatives.

Based on commercial rates, the Communication Service for the year ending June 30, 1922, handled for the Navy $2,721,000 worth of business and $1,040,667 for other Government Departments.

Makes Offer to Other Departments

The Navy receives no transfer of funds or re-imbursements for the work performed for other Government Departments, yet the savings are actual. The Navy has these necessary facilities and offers them to other departments' use for official business. During the fiscal year 1922, the commercial work handled amounted to $277,122.42. This was actual cash turned into the U. S. Treasury. Thus the total Government and Commercial traffic amounted to a little over four million dollars, earnings and savings.

RECEIVING SETS ARE USED ON HOUSEBOATS

Owners Laugh at Landlords and Coal Barons

BOSTON MASS.—Several houseboat owners have been beating the coal and the landlord during the past winter by establishing winter quarters on their houseboats, tied up at the L Street Bridge, South Boston. Two of them have added Radio sets to their snug quarters and have had a good time all winter, listening to the broadcasts from various stations and laughing at the landlord profiteers. John Powers, owner of the "City Point," formerly a motor boat ferry used between South Boston and Castle Island, and converted into a houseboat, and Charles Nordwell, owner of another houseboat, installed their Radio sets just as if they lived in a city dwelling, but instead of using steampipes or waterpipes for grounds, they merely dropped the ground wires overboard. With the coming of warm weather, they will lift anchor and move out into the bay, going back and forth from shore by rowboat or power launch, and using their Radio sets at night on the water instead of going to the movies.

Dr. Stefan Grotowski Opens WEAF Polish Night Program

NEW YORK.—The Polish Night Program broadcast through WEAF on the evening of April 2, was arranged by the Polish Bureau of Information of New York. Prominent Polish citizens and officials and musical talent of the highest order cooperated to acquaint the Radio audience with the culture and art of Poland. Dr. Stefan Grotowski, Polish Consul General in New York opened the program with a brief talk on Poland since the war.

WDAP AND WOC HAVE FIRST STATION SONGS

THERE are two station songs so far, WDAP, the Drake Hotel Chicago song, and the first, WOC, Davenport, Iowa. The Drake song is composed by Jack Nelson, program director of WDAP. The official WOC song is a published ballad entitled "Station WOC of Davenport, Iowa—Where the West Begins." Words and music were written by Nat Ozmon, a song writer of Moline, Ill.

CANADA TELLS FANS OF MAIL PROCEDURE

LONDON, ONT.—Messages giving practical pointers regarding the procedure followed in the dispatch of mails and kindred topics are being broadcast by the post office department at Ottawa as a means of informing the public on matters of general interest. The messages contain helpful hints regarding mails sent to centers within the Dominion and also to foreign countries.

"J.E.K." OF WOR HERSELF

Above is Miss Jessie E. Koewing, popularly known as "J. E. K.," announcer and program director of Station WOR, of the L. Bamberger Stores, Newark, N. J. You have often heard, "This is Station WOR of, etc., J. E. K. announcing, etc."—that is she. J. E. K. is single, as she says, "That is, I hope I won't be long." She absolutely refuses to give her age, but judging by her photo, we are sure it could not have been very long ago since she was born in Evanston, Ill. Miss Koewing arranges all the WOR programs, directs them and then announces sometimes—otherwise she sits around and does knitting

Morning Albertan Adopts Digest's Word Radiophan

"Fan" Is Too Easily Confused with Baseball Followers

CALGARY, ALTA.—The Morning Albertan at Calgary, owner of CHBC, has adopted the Radio Digest spelling of "Radiophan", after a year's use of "radio fan" this being considered a better term. The usage is also becoming more and more general among Radio editors of daily newspapers throughout Western Canada. Owing to this, it is now impossible to abbreviate to "fan," which although sometimes convenient in writing headlines, is considered to be confusing with followers of motion pictures or baseball.

LISTENING IN BARRED TO HOUSE MEMBERS

Sir W. Joynson-Hicks Ill-favors "Counter Attraction"

LONDON.—The members of the house of commons will not be subjected to the temptation of "listening in" to jazz music or other entertainment features on the Radio telephone, to the detriment of their attention to official business, it was announced by the postmaster general in reply to a suggestion made by a member that receiving apparatus be installed in the house. The member based his suggestion on the desirability of giving the commoners an opportunity of passing on the quality of the post office department's broadcasting.

To this suggestion Sir W. Joynson-Hicks, the postmaster general, replied that he did not think it was his duty to provide "such a counter attraction" in the chamber of the house.

KYW TO BROADCAST PLAYS FROM STAGE

CHICAGO PLANT IS FIRST IN THE FIELD

Arrangements Are Completed to Put North Shore Players' "Bargain Day" on Air

By Robert Stanton

CHICAGO.—Radiophans of the United States will be entertained on the evening of April 17th, with another feature attraction from Westinghouse Station KYW. Since the entire production of Shore Leave was broadcast from Powers theater several months ago, Wilson J. Wetherbee and Walter C. Evans, director and chief engineer respectively, of KYW have endeavored to develop the broadcasting of spoken drama to meet the popular demand of the invisible audience for this form of entertainment. Their efforts have culminated in arranging through the co-operation of Jessie Royce Landis, director of the North Shore Players company, and daughter-in-law of Kenesaw Mountain Landis, barrister and baseball arbiter, a schedule of one-act plays to be produced from time to time in the studio of KYW.

First to Broadcast from Stage

The first of these is entitled Bargain Day, and was arranged and directed under the personal supervision of Mrs. Landis. The part of the harassed husband will be played by Sidney M. Spiegel, Jr., who acted the roll when the play was given in Chicago. The finale lead will be interpreted by Jessie Royce Landis.

Station KYW is now widely known to be the first broadcasting station in America to have broadcast an entire drama directly from the stage of the theater and the aim of the management is to give KYW's audience more plays and to make the station a theater without a stage.

Basketball Game and Concert Cause Friction

Argument Settled by Broadcasting Two Events Alternately

HOUSTON, TEX.—Rice Institute nearly had a row with Texas A. & M. College, during the basketball finals at the city auditorium here. It all happened over Radiophone rights.

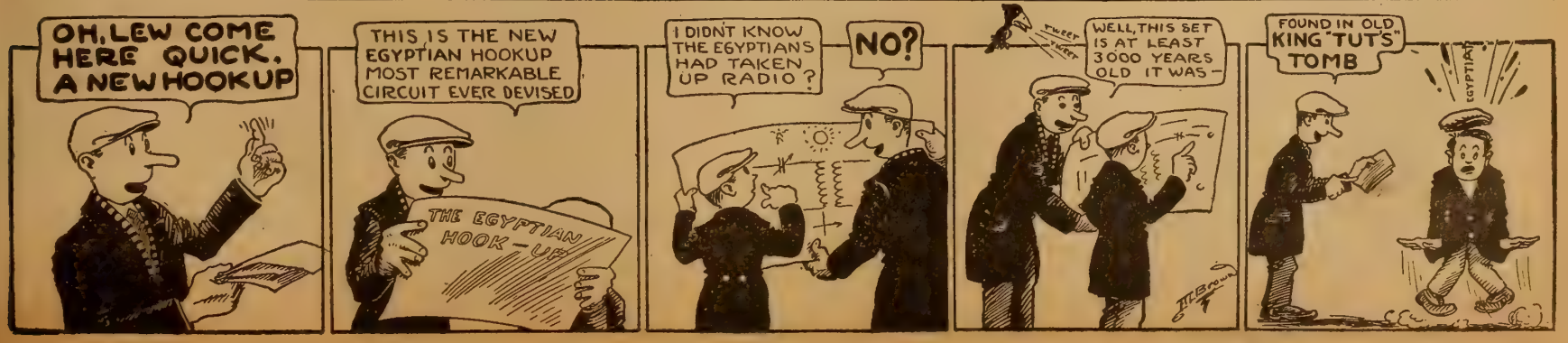
Broadcasting stations in Houston have a schedule whereby The Evening Post furnishes a two hour musical program between 8 and 10 p. m. each Friday night. The basketball games were played during the same hours. Rice Institute station, WRAA, wanted the air; but The Evening Post artists were assembled in the studios each Friday ready to send a concert program from WEAY, Will Horwitz Jr.'s Iris theater station.

The same thing happened three successive weeks. Leo W. Martin, announcer at WEAY, solved the difficulty by having a telephone placed in The Post studio so that while a musical number was going out a reporter could write the basketball play-by-play. The game was flashed between numbers.

Springfield Has Club

SPRINGFIELD, MASS.—A new club was recently organized here to be known as the "Springfield Associated Radiowls." The object of the club is the advancement of Radio as a science and to promote a better spirit of good fellowship between Radiophans. Officers are, H. B. Watkins, president; E. N. Grise, vice president; E. C. Tarleton, secretary and H. F. Oliver, treasurer.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Tut! Tut! Spir's Spoofing Us



The Week's Advance Broadcast Programs

Tuesday, April 10

KDKA, Eastern, **8:30 P. M.,** Concert by F. Feigenbaum, violin; Mrs. F. Feigenbaum, accompanist; Adele Eggers Furniss, soprano; Miss Schaney, accompanist; Brinley Jones, baritone. Program: Soprano solos, "For All Eternity," Mascheroni; "Sing, Smile, Slumber," Gounod. Soprano and violin obligatos, "The Summer Wind," Bischoff, and "Sweet Miss Mary," Neidlinger. Violin solos, "Serenade," Pierne; "Romance," Wienawski; "Sarabande," Bohm. Baritone solos, "The Last Watch," Pinsuti; "I Passed by Your Window," Brahe; "The Wolf," Shield; "There Is No Death," O'Hara, and "Thanks Be to God," Dickson.

KSD, Central, **8:00 P. M.,** Allie Schmidt, soprano; Mrs. Oma Culbertson Prescott and Mrs. A. H. Helbig, pianists.

KYW, Central, **11:30 A. M.,** Table Talk, domestic science, by Mrs. Anna J. Peterson. **8:00 to 9:00 P. M.,** Verna Lyon Boorman, contralto; Sallie Menkes, accompanist; Joseph Izzo, flute; Mrs. W. G. Watson, reader; Pasadena Orchestra Deluxe; Elmer Gray, piano; Charles Elkin, violin and alto sax.; Walter Wagg, cornet; Carl Morris, C melody sax.; Sig. Meyer, banjo; Jack Wrout, drums; Isham Jones and orchestra. Program: 1, Mr. Gallagher and Mr. Sheean, "Flower of Araby," by Pasadena Orchestra Deluxe; 2, "Cradle Song," "Rosalie," by Verna Lyon Boorman; 3, "Berceuse," "Mazurka," by Joseph Izzo; 4, "Baby Blue Eyes," "Sweet Lovin' Mamma," "Dearest," by Pasadena Orchestra Deluxe; 5, "Romance of a Hammock," "The Saleslady," by Mrs. W. G. Watson; 6, Popular Dance Selections, Isham Jones Orchestra; 7, "I Come to Thee," "Teach Me to Pray," by Verna Lyon Boorman; 8, Flute Solo, by Joseph Izzo; 9, "Sonnet on Stewed Prunes," by Mrs. W. G. Watson; 10, "You've Gotta See Your Mamma Every Night," "Funny Blues," "Aunt Hagar's Blues," by Pasadena Orchestra Deluxe.

WBAP, Central, **7:15 to 8 P. M.,** Concert by the Fort Worth High School Glee Club; **9:30 to 10:30 P. M.,** Concert by the Harmony Club of Fort Worth.

WBZ, Eastern, **7:45 P. M.,** "Installation of Bird Gardens," by C. J. Anderson, The Bird Man; **8:00 P. M.,** Concert by Roberts Banjo Club.

WDAP, Central, **10:00 P. M.,** Miss Burdette Cleveland, sopr.; J. E. Stevens, bass; Miss Helen Steen, sopr.; Miss Helen Greim, Jack Chapman's Dance Orchestra.

WGY, Eastern, **7:40 P. M.,** Address, "The World's Greatest Nursery," by Clifford R. Pettis; **7:45 P. M.,** Vaudeville program, Orchestral selection, "March of the Spirits," by The Troubadours; Tenor solo, "Good Night, Little Girl, Good Night," by Earl Emery; Instrumental Trio, "Mighty Lak' a Rose," by H. B. Coggeshall, violin; H. P. Cheney, saxophone; A. O. Conant, piano; Humorous Monologue, "The English Dude," by Maurice G. Randall; Saxophone Duet, "One Sweet Day," by Charlotte Hofeliche and Rudolph Beerle; Mrs. J. S. Beerle, Accompanist; Yodeling Selections, "My Alpine Sweetheart," "Lullaby," by Charles J. Bradt; Piano Duet, "Souvenir of Stephen Foster," by Genevieve Beerle and Rudolph Beerle; Male Quartet, "A Little Close Harmony," by Troy Masonic Quartet, Orville Ackert, 1st tenor; Asa O. Coggeshall, 2nd tenor; Charles W. Mead, baritone; Henry A. Leffingwell, bass; Echoes from old time minstrel end man—shaking the bones and tambourine, by Jack Williams; Humorous Monologue, "The Dude Fireman," by Maurice G. Randall; Novelty solos, "Dishpanola Solo," "Spadeola Solo," by Harry P. Cheney; Male Quartet, "More Close Harmony," by Troy Masonic Quartet; Saxophone Duet, "Sweet Kentucky Sue," by Charlotte Hofeliche and Rudolph Beerle; Bass solo, "In the Garden of My Heart," by Henry A. Leffingwell; Orchestral selection, "1923 March," by The Troubadours.

WHAS, Central, **4:00 to 5:00 P. M.,** Concert by the Alamo Theater orchestra, Three minute biography of Old Testament characters, "Hezekiah;" Piano solos and Tenor solos, Robert Veazy, playing his own accompaniments; Selections by Heyde C. Conrad, playing the Alamo Theater organ; **7:30 to 9:00 P. M.,** Full concert by the Louisville Normal School, Miss Dorothy Park, director; Soprano soloists, Miss Grace Deppe, Miss Helen Ferguson; Violin soloists, Miss Mary Louise Wilde, Miss Ethelreda Wilde, Miss Viola Hawkins, Louis Stabler; Piano soloists, Miss Grace Weiber, Miss Ethel Slote, Miss Dorothy Park; Reading, Miss Ruby Feige; Piano accompanists, Miss Dorothy Park and Miss Grace Deppe; Reading, "An Interesting Historical Episode;" Setting-up exercises.

WJAX, Eastern, **7:30 P. M.,** Concert furnished by the Cleveland News.

WJZ, Eastern, **7:00 P. M.,** "Polaris, Story of an Eskimo Dog," by the author and lecturer, Ernest Harold Baynes. **7:30 P. M.,** Dance music by the Vincent Lopez "Red Cap" Orchestra. **8:30 P. M.,** Program by Stockbridge Stocks, first started by Dorothy Stockbridge. Organization made possible by the fact that all work in connection with their production is done by members of the company in every capacity from stage carpenter to "handsome hero." These members, all amateurs, are composed of writers, artists, lawyers and reporters. Most of the plays given by the Stockbridge Stocks are written especially for them, as is their presentation this evening by Christopher Morley; **9:00 P. M.,** "Broadcasting Broadway," by Bertha Brainard; **9:15 P. M.,** "University of the Air;" "Vision and Purpose in Business," by John G. Jones, Alexander Hamilton Institute; **9:30 P. M.,** Concert by Patricia Boyle, blind pianiste; **9:45 P. M.,** Concert by Ellen Richmond Marshall, young contralto. Miss Marshall's repertory includes English, French, Italian, Russian and German songs; **10:01 P. M.,** Continuation program by Patricia Boyle; **10:15 P. M.,** Continuation program by Ellen Richmond Marshall.

WLW, Central, **10:00 P. M.,** Soprano soloist, Mrs. H. Neale Walters; Piano soloist, Miss Lillian Finn; Reader, Miss Nora Beck; Fluegel horn soloist, Edward Sobarg; Entertainment by the Roger Hill Dance Orchestra; 1, Opening selections by the Roger Hill Dance Orchestra; 2, Vocal solos, 'Twas April, Little Boy Blue, by Mrs. H. Neale Walters; 3, Piano solo, The Love Waltz, by Miss Lillian Finn; 4, Fluegel horn solo, My Heart at Thy Sweet Voice, by Edward Sobarg; 5, Reading of story, "By Courier," by Miss Nora Beck; 6, Selections by dance orchestra, Pack Up Your Sins, Ivy, Dearest and Fate; 7, Vocal solos, Hail, Glorious Morn, One Fleeting Hour, In Sweet September, by Mrs. H. Neale Walters; 8, Piano solo, Butterflies at Play, by Miss Lillian Finn; 9, Fluegel horn solo, selections from "The Bohemian Girl," by Edward Sobarg; 10, Concluding selections by dance orchestra.

WMAQ, Central, **4:35,** Program arranged by the Bush Conservatory of Music; **7:00-8:00,** The Weekly Babson report; Edgar Lee Masters, poet; Robert B. Harshe, director of the Art Institute School of Art, will talk.

WMC, Central, **8:00 P. M.,** Program sponsored by the Beethoven Club of Memphis, Mrs. W. A. Bickford, chairman; **11:00 P. M.,** Midnight Frolic.

WOC, Central, **3:30 P. M.,** Educational talk by F. C. Walker; **5:45 P. M.,** Chimes concert. (No broadcasting on Tuesday evening by agreement of Tri-City Stations.)

WWJ, Eastern, **8:30 P. M.,** The Town Crier; The Detroit News Orchestra; Jimmy Jenkin's Trio; Miss Marie T. Bush, soprano; LeRoy De Turk, pianolog.

IT IS the policy of the Digest to give its readers all the service possible. Therefore, the new department, "This Weeks's Advance Broadcast Programs," has been started. It will eventually contain advance programs for every station having a 500-watt transmitter or its equivalent. Details regarding these stations other than given here, will be found in any three consecutive issues of the Digest in the Broadcasting Station Directory. However, for the convenience of the listeners in, the following data is supplied for the stations whose advance programs are given:

Call Letters	Owner and Location	Wave-Length
KDKA	Westinghouse Co., E. Pittsburgh, Pa.	360
KSD	Post-Dispatch, St. Louis, Mo.	400
KYW	Westinghouse Co., Chicago, Ill.	400
WBAP	Star-Telegram, Ft. Worth, Tex.	400
WBZ	Westinghouse Co., Springfield, Mass.	422
WDAP	Chicago Board of Trade, Chicago, Ill.	390
WGY	General Electric Co., Schenectady, N. Y.	370
WHAS	Courier-Journal and Times, Louisville, Ky.	360
WJAX	Union Trust Co., Cleveland, O.	400
WJZ	Westinghouse Co., and R. C. A., Newark, N. J.	360
WLW	Crosley Mfg. Co., Cincinnati, O.	360
WMAQ	Daily News and Fair Store, Chicago, Ill.	400
WMC	Commercial Appeal, Memphis, Tenn.	400
WOC	Palmer School of Chiropractic, Davenport, Ia.	400
WWJ	News, Detroit, Mich.	400

Wednesday, April 11

KDKA, Eastern, **6:15 P. M.,** Dinner concert by KDKA Little Symphony Orchestra, direction of Victor Saudek; **8:00 P. M.,** Special program broadcasted direct from the Fort Pitt Hotel. Walter Dill Scott of Northwestern University, Evanston, Ill., lecturer; Ruth Bowers Gibson, violin; Adalaine Merrill Biddle, accompanist; **9:15 P. M.,** Concert by Professor Grogan, piano; Mrs. Grogan, harp; Mrs. Delphine Heimert, dramatic soprano; Mrs. Edna Griffey Mars, accompanist, and KDKA Orchestra. Program: Soprano solos, "I Know," "Yesterday and Today," "Song of the Soul," and "From the Land of the Sky Blue Water"; Orchestra, Overture, "Oberon," Popular Hits of the Day; Excerpts from "Robin Hood"; Concert waltz, "Roses from the South"; Themes from "La Tosca," "Madame Butterfly," and "La Boheme," Puccini; and "Evolution of Dixie."

KSD, Central, **8:00 P. M.,** Bellglade Orchestra; **8:30 P. M.,** Helene Hellweg, soprano, N. V. Dixon, baritone, Charles Maehl and Mrs. N. V. Dixon, pianists.

KYW, Central **8:00 to 9:00 P. M.,** Rose Quinn, contralto; Sallie Menkes, accompanist; Milan Lusk, violinist; Eloise Bedlam, pianist, accompanist; Ben Ray and Rudy Patek, concertina; Betty Williams and her Musical Buddies; Betty Williams, piano; Joe Williams, saxophone; Leigh Taylor, saxophone; Isham Jones and orchestra; program, 1, A Dream, The Cradle Song, by Rose Quinn; 2, Cavatina, Souvenir, by Milan Lusk; 3, Burning Sands, Lovin' Sam, by Ben Ray and Rudy Patek; 4, Lullaby Moon, Love Sends a Little Gift of Roses, by Betty Williams and Her Musical Buddies; 5, Caprice Viennoise, Japanese Etude, by Eloise Bedlan; 6, Popular dance selections, by Isham Jones and orchestra; 7, Love Sends a Little Gift of Roses, The Sweetest Story Ever Told, by Rose Quinn; 8, Caprice Espagnole, by Milan Lusk; 9, Dixie Highway, Wedding of the Winds, by Ben Ray and Rudy Patek; 10, Sahara Butterfly, Dearest, by Betty Williams and her Musical Buddies; **9:05 P. M.,** "Spring Clean-Up and Beautifying Campaign," by National Board of Fire Underwriters.

WBAP, Central, **7:15 to 8:00 P. M.,** Concert by Jesse Morris of Dalhart, Texas; **9:30 to 10:30 P. M.,** Concert by the Glee Club of the Daniel Baker College, Brownwood, Texas.

WBZ, Eastern, **7:45 P. M.,** "The Most Dangerous Animal in the United States," by Harold E. Miner, M. D., State District Health Officer; **8:00 P. M.,** Concert by Laura O. Payne, soprano; L. Thompson, baritone; Miss Thompson, pianist and accompanist.

WHAS, 4:00 to 5:00 **P. M.,** Concert by the Alamo Theater Orchestra; Three minute biography of Old Testament Characters: "Sennacherib"; Piano solos, Miss Alice Griffin; Selections by Heyde C. Conrad; **7:30 to 9:00 P. M.,** Soprano solos, Miss Beatrice Thompson, accompanied by Mrs. Albion Cornwall; Baritone solos, Albion S. Cornwall, accompanied by Mrs. Albion S. Cornwall; Soprano and baritone duets, Miss Thompson and Mr. Cornwall, accompanied by Mrs. Cornwall; Piano solos, Miss Carol Dean Talley, of Anniston, Ala.; Reading, Miss Augusta Van, of Anniston, Ala.; Lyric soprano solos, Miss Sara Riley, of Buckhorn, Ky., accompanied by Reginald Billin; singing Kentucky mountain ballads; Reading, An Interesting Historical Episode; Setting-up exercises.

WJAX, Eastern, **8:30 P. M.,** Concert by the Conference Orchestra and Conference Chorus of the Sixteenth Annual Meeting of the Music Supervisors' National Conference. Program, Part 1, 1, Overture, "Mirella"; 2, "The Happy Wanderer"; 3, Minuet from Symphony in E Flat; 4, "Rakoczy March"; 5, Minuet for Strings; 6, Grand March from "Queen of Sheba," by Conference Orchestra, Osbourne McConathy, Northwestern University, Director. Part 2, Community singing by audience and chorus led by George Oscar Bowen, University of Michigan, Music Department. Part 3, Ten choruses by American composers sung by the Conference Chorus, directed by W. Otto Miessner, Milwaukee State Normal School: "Out of the Silence," "Hope Carol," "Song of the Marching Men," "Indiana Mountain Song," "Israfel," "Song of the Western Men," "My Ole Banjo," "Summer Night," "Mexican Serenade," "Here Comes the Flag."

WJZ, Eastern, **2:00 P. M.,** "Book Review," by Grace Isabel Colbron; **9:00 P. M.,** "Foods for Health and Pleasure"; "Fat Folks and Their Food," by Anne Lewis Pierce, Director of Tribune Institute; **9:15 P. M.,** "Review of Reviews," by Beatrice Prince; **9:30 P. M.,** Ampico Series of Distinguished Artists' concerts. The artists for evening are John Mundy, cellist, and Clytie Hyne, soprano; **10:01 P. M.,** Continuation of program by the Ampico Artists.

WLW, Central, **8 P. M.,** Band concert by Tenth Infantry Band of Fort Thomas, Ernest Fisher, Conductor; Cello solos by Mrs. H. Morris, accompanied by Ruth Draper; Baritone solos by Ray Lombardi, accompanied by Marjory Garrigus; A short Radio burlesque by Richard Alvin Plough; March, Barnum and Bailey's favorite by Tenth Infantry Band; A group of Italian songs, by Ray Lombardi, accompanied by Marjory Garrigus; Tenth Infantry Band, selections from The Red Mill; Cello solos Berceuse from Jocelyn; Calm as the Night, by Mrs. H. Morris; Fox Trot, "All Muddled Up:" Trombone Tragedy, "Sliperitus," Tenth Infantry Band; Waltz, "Wedding of the Winds," Tenth Infantry Band; A group of English songs by Ray Lombardi, Marjory Garrigus at the piano; Sounds from the Sunny South; Selection from Chimes of Normandy, Tenth Infantry Band; Cello solo, Saraband, by Mrs. H. Morris, Ruth Draper at the piano; March 324th Field Artillery, Tenth Infantry Band.

WMAQ, Central, **4:35 P. M.,** Program arranged by the Cosmopolitan School of Music and Dramatic Art; **7:00-7:30 P. M.,** Miss Georgene Faulkner, the Story Lady, stories for the children; **9:15-10:00 P. M.,** Mrs. Clara M. Schevill, soprano.

WOC, Central, **3:30 P. M.,** Educational talk, by D. K. Kirk; **7:00 P. M.,** Concert, by Mt. Ida Presbyterian Church Choir, of Davenport, Iowa; **10:00 P. M.,** Musical program, by Swedish Baptist Church Choir, Moline, Ill., Erwin Swindell, Musical Director.

WWJ, Eastern, **3:00 P. M.,** The Detroit News Orchestra; **8:30 P. M.,** The Town Crier; The Detroit News Orchestra, program by the J. L. Hudson Stores.

Thursday, April 12

KDKA, Eastern, **6:00 P. M.,** Organ recital from the Cameo Motion Picture Theater; **8:30 P. M.,** Concert by Imperial Sextet of Harmony, assisted by Pika Johnson and Margaret Daugh, soloists; Program: Orchestra selections, "Falling," "Lovin' Sam," "A Kiss in the Dark," "Carolina in the Morning," "French Trot," "Stuttering," "Lonely Nest," "Buddy," and "I Wish I Knew." Vocal selections, "Carolina in the Morning," by Mr. Johnson; and "Buddy," by Miss Daugherty.

KYW, Central, **8:00 to 9:00 P. M.,** Musical program courtesy Lyon & Healy Concert Department, also Isham Jones and orchestra; **9:05 P. M.,** "Twenty Minutes of Good Reading," by Rev. Claude J. Pernin.

WBAP, Central, **7:15 to 8 P. M.,** Concert by Blewett's orchestra of Denton, Texas; **9:30 to 10:30 P. M.,** Concert by the 300-voice choir of the First Baptist Church, Fort Worth.

WBZ, Eastern, **8:00 P. M.,** Concert by Mabel Burns, soprano; Mrs. Eftaver, violin; Wilber Woodworth, basso; Mary Steele, pianist.

WDAP, Central, **10 P. M.,** Concert, Miss Jessie R. Edwards, soprano; Mrs. Clara West Moulton, contralto; Jack Chapman's Dance Orchestra.

WGY, Eastern, **2:00 P. M.,** Music and talk, "What Animal Experimentation Has Taught Us," Miss Jessie G. Cole, nutritionist, N. Y. Department of Health; **7:45 P. M.,** Radio drama, "On Trial;" Instrumental selection, "Intermezzo;" WGY Orchestra; Drama, "On Trial," Reizenstein; The cast: The Defendant, Edward H. Smith; His Daughter, Rosemary St. Louis; His Wife, Ruth Schil-

(Continued on page 6)

FLEWELLING RECOMMENDS CROWN *Triple Coil Mountings*

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ETF:KM

NIGHT HAWKS USE DIRECT WIRE PLAN

UNIQUE MICROPHONE EXCHANGE EMPLOYED

Operator on Duty All Day Can Connect with Local and Out-of-Town Points

By Vera Brady Shipman

"It's the Kansas City Night Hawks, folks," and the air is full of jazz. The Coon-Sanders orchestra at the Hotel Muehlebach is a nightly feature of WDAF, the Kansas City Star, beginning at 11:45 p. m. Coon of the orchestra assists the Merry Old Chief, designated as the "professor," in initiating new members by Radio with the aid of a cowbell or a cuckoo.

This microphone connection with the Star's plant, (there is one on the announcer's table as well as one secreted in the flowery latticed ceiling decorations of the Muehlebach grill), belongs to a series of connections located at various public buildings of Kansas City as well as in three Kansas towns—and is unique in this country in complete broadcasting service. An operator is always on duty at WDAF on the Star roof, ready to tune in at any hour for any kind of a public gathering.

Where Direct Wires Go

There is a wire to the American Royal building from which last November, when the Kansas City Live Stock Show was in progress, the famous Lindsborg, Kansas, Messiah chorus of 500 voices was presented. By broadcasting this chorus to those who could not attend the show in person, the world's greatest oratorio was saved for thousands.

A wire to the Grand Avenue Temple tunes in some of the finest religious gatherings, which houses a choir of Kansas City's finest musicians, and an organist of national note.

A wire to the new Million Dollar Speedway tells the world of the races direct as they are run.

A triple connection for the Neumann Theater gives Radiophans the orchestra, stage acts or the pipe organ.

Three Muehlebach Hotel microphones connect into the dining rooms, the most spectacular of which is the grill housing the Night Hawks' frolic.

Wires Connect to Outside Cities

There is a wire to the University of Kansas at Lawrence, forty miles away. Last December, a K. U. alumnae program was given. I know of one group listening in Chicago (450 miles away) who sang their alma mater with a deeper significance and yelled their famous "Rock Chalk" with a stronger vehemence because of the romance attending Radio.

A wire out to Manhattan, Kansas, the State Agricultural College, 150 miles west, performs a like college service.

Connection with the Kansas State Penitentiary at Lansing, permits news broadcasts of escaped prisoners.

A performance at any of those places at any time, is connected by a turn of a switch, and the entire nation is given the opportunity to listen in.

Foreign Listeners Hear WDAF

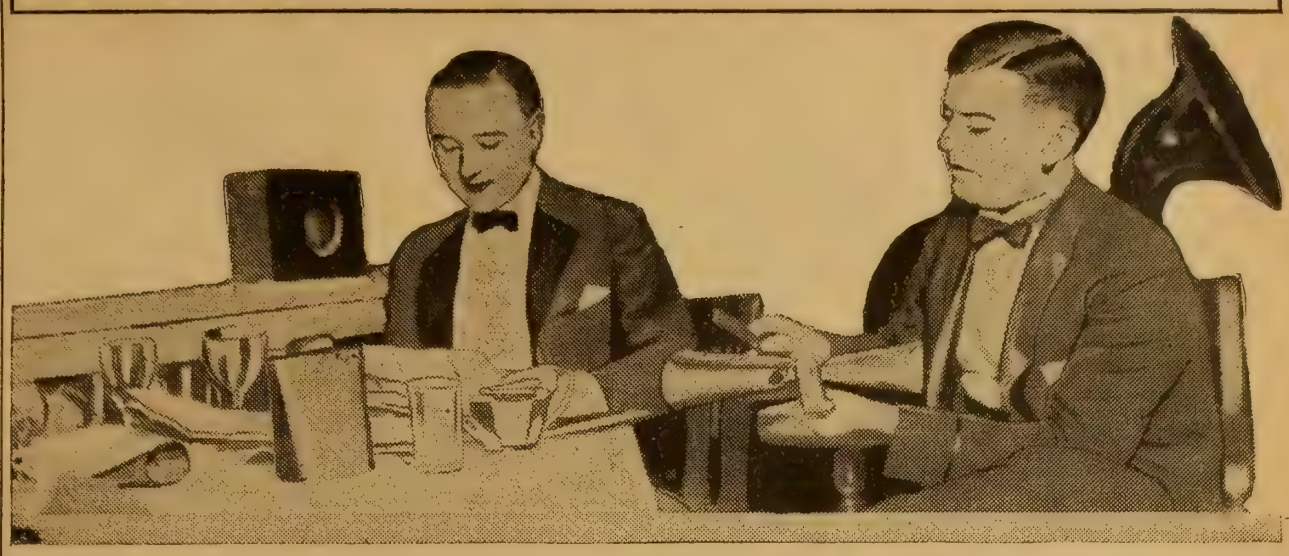
Not only America, but foreign countries are hearing WDAF. London, 3,500 miles away, has reported three times. A ship off Australia told of hearing the Star station once. Even Hawaii listens in each evening to the Night Hawks. The states of Central and South America, the West Indies, and Alaska have expressed thanks for the WDAF entertainment. A man in London, England, has even made a dictaphone record of a complete WDAF concert.

The Radio department of The Star keeps WDAF on its tiptoes. The personnel includes Leo Fitzpatrick, Radio editor and Merry Old Chief of the Night Hawks; Robert M. Reed, program manager; D. D. Johnson, engineer and operator; Ernest Moorfield, chief announcer; Don Phelps, assistant operator; John Patt, secretary and assistant announcer.

The Kansas City Star, one of America's greatest newspapers, is keeping up to its journalistic standard in the realm of Radio as well.

Turkey has neither ship nor coast stations open to public service. This country will not accede to certain regulations regarding the accounts for Radiograms originating from foreign vessels in the harbor of Constantinople.

THE "MERRY OLD CHIEF" AND CARLTON COON



This is the "Merry Old Chief," of the Kansas City Star Night Hawks, initiating new members into that organization at one of the regular nightly sessions held at the Hotel Muehlebach. The attending gentleman (with the cow bells) is Carlton Coon of the Coon-Landers Orchestra. If you are a listener of WDAF you have heard both of them on the air

25,000 BOY SCOUTS TAKE UP AIRPHONES

Several Powerful Sets Are Maintained by Individual Troops—Others Have Own Apparatus

NEW YORK.—The 25,000 Boy Scouts of Greater New York are taking an active interest in Radio. Not only do many of the individual Troops maintain powerful sets but in addition several thousand of the boys have installed apparatus of their own.

A special Radio Information Bureau is conducted by the Manhattan Council, which has jurisdiction over some 7,000 Scouts. Through this agency the boys are encouraged to build their own sets, and so gain a much more intimate knowledge of the principles of Radio than they could otherwise get. As an outcome of thus teaching the Scouts to depend on their own resources, a number of ingenious sets have been developed among which a small but efficient "Hiking Set" weighing only ten pounds, is outstanding.

CANADA TO BAR BOOK MAKERS FROM ETHER

Introduce New Bill to Prohibit Race News by Radio

LONDON, ONT.—A bill which has been introduced in the Ontario legislature by Hon. W. E. Raney, attorney-general, aimed at bookmaking on horse races, covers broadcasting tips by Radio. If it is found that it does not, then amendments will be made to cover this form of spreading news, states the attorney-general.

It is further interesting to note that Sir Lomer Gouin, of the Dominion Parliament, may have to bring in further amendments to his federal legislation on betting on horse racing. The section of the criminal code to which the federal bill is connected names "telegraph, telephone, mail or express" as prohibited means for conveying information.

Apparently Radio is not named in the criminal code. It means that another section of the code will have to be amended to bring Radio in as illegal methods for distribution of betting odds and prices.

International Conference on Radio to Follow Hague

WASHINGTON.—An international conference for the control of submarines, Radio and aircraft may follow the informal negotiations just concluded at The Hague. The State Department has cabled the governments concerned for permission to make public the report of its special commission, which was submitted to Secretary Hughes Saturday. The interested nations may then seek to work out the problem in much the same way they undertook the limitation of armaments.

WJAX Broadcasts Al Sirat Grotto Band—Proves Hit

CLEVELAND, O.—Plans for another Radio Concert by the Al Sirat Grotto band have been formulated here by officials following the receipt of "encore" telegrams from almost every section of the country. The first Radio concert by this famous band was given recently at the Union Trust company's broadcasting station, WJAX, under special arrangements with the Cleveland News and News-Leader.

Congdon Resigns From WGM

WGM, The Atlanta Constitution, has a new director. Through the resignation of George Congdon, Jr., L. O. Mosely, former assistant director and well-known sheik with the Southern drawl, has been promoted to director of the station. Mosely is a native Georgian, graduate of Emory College, member of the Phi Kappa Psi fraternity, and an all-round newspaper man.

WOR Opera Season Wins Fans' Favor

Letters from All Parts of Country Prove Popularity of Bamberger Programs

NEWARK, N. J.—The "opera season" at WOR here is proving a great success. Philip Ienni, the manager of the Puccini Grand Opera Company, which is putting on the performances has received thousands of letters from fans from all over the United States, Canada and Mexico, telling how much the operas are enjoyed by everyone. The operas are given once a month. The entire cast and orchestra assembles at the WOR studio. The following operas are yet to be given:

"Aida", April 17; "Carmen", May 8; "Barber of Seville", June 1. Other operas will be announced later.

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—Confucius.

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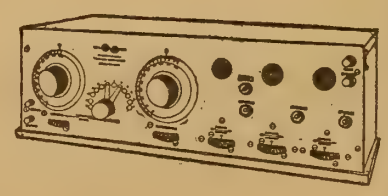

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WERNES AND PATCH

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ADVANCE PROGRAMS

(Continued from page 4)

ling; Her Father (deceased), Horace Roberts; The Dead Man, Frank Quinn; His Widow, Margaret V. Smith; His Secretary, Edward E. St. Louis; A Maid, Viola Karwowska; A Hotel Proprietor, Cortland Hopkins; The Judge, Frank Oliver; District Attorney, J. S. B. Mullarkey; The Defendant's Counsel, Franklin Hill; Foreman of the Jury, Severn Le Valley; Act I, scene 1—Library in the house of Gerald Trask, June 24, 1922. Time, 9:30 in the evening; Scene 2—The Court Room; Orchestral selection, "Jardins d'Amour;" Act II, scene 1—The Court Room, scene 2—The sitting room in the home of Robert Strickland, June 24, 1922, at 7:30 in the evening; scene 3—The Court Room; Orchestral selection, "Serenade;" Act III, scene 1—The Court Room, the second day of the trial; scene 2—A room in a hotel on Long Island thirteen years earlier; scene 3—The Court Room; Orchestral selection, "Intermezzo Gracile;" Epilogue—scene 1—Jury Room; Scene 2—The Court Room; Orchestral selection, "Victory March."

WHAS, Central, **4 to 5 P. M.,** Concert by the Alamo Theater orchestra; Three minute biography of Old Testament Characters: "Manasseh;" Selections by Heyde C. Conrad, playing the Alamo Theater organ; **7:30 to 9 P. M.,** Full concert by the Warren Memorial Quartette, Miss Esther Metz, soprano; Mrs. Guy Ellis, contralto; Dr. Noble Mitchell, tenor; Walter Shackelton, bass, accompanied by William E. Pilcher, Jr.; Three minute digest of International Sunday School lesson for April 15th, by Rev. J. B. Weatherspoon; Three minute Child Welfare talk, by Linton Swift; Reading: An Interesting Historical Episode; Setting-up exercises.

WJAX, Eastern, 8:15 P. M., Last concert, by the Cleveland Orchestra, Program, Symphony No. 4, F Minor, Op. 36; Oriental Impressions, Korean Sketch, Siamese Sketch, Entenraku, Chinese Ceremonial Music, 700 A. D., Japanese Nocturne, Chinese Sketch, Good Friday Spell, Transformation Scene and Glorification, from Parsifal, Overture, "The Russian Easter," Op. 36; Instruments used in "Oriental Impressions" sent from Orient by composer.

WWJ, Eastern, **8:30 P. M.,** The Town Crier; The Detroit News Orchestra; Miss Evelyn Karr, coloratura soprano; Bruce Meyers, baritone; William M. Schumaker, tenor; **11:00 P. M.,** Midnight concert; Miss Evalyn Karr, coloratura soprano; The Detroit News Orchestra.

WLW, Central, **10 P. M.,** Entertainment by the Hotel Sinton Dance Orchestra; One-act play by Albert Hackett of the Stewart Walker Players. In the cast, Kay Strozzi, as the youthful wife; Albert Hackett, author, playing the part of young husband; Alvin Plough, descriptionist; Violin solo, Meditation from Thais, William Stoess Ellerbrock, accompanist; To My First Love, Rain, by Happye West; Violin solos, The Canebrake Waltz: Old-Fashioned Days, by William Stoess; "Mon coeur ne peut changer," by Happye West; A one-act play, "The Obliging Husband," by Albert Hackett; Selected violin and vocal solos; Entertainment by the Hotel Sinton Dance Orchestra.

WMAQ, Central, **4:35 P. M.,** Program arranged by the Lyceum Arts Conservatory; **7:00-8:00 P. M.,** Talk on Boy Scouts; Price Trio, Steel Guitars; **9:15,** The Cosmopolitan School of Music and Dramatic Art.

WMC, Central, **8 P. M.,** Hotel Chisca Philharmonic Orchestra; Miss Clara Ahern, director.

WOC, Central Standard, **3:30 P. M.,** Educational talk, by Karl G. Stephan; **7:00 P. M.,** Artist musical program, Erwin Swindell, musical director.

WJZ, Eastern, **7:00 P. M.,** "Jack Rabit Stories," by David Cory, N. Y. Evening Mail; **8:30 P. M.,** "Understanding Misunderstood Latin America," by Paul Vanorden Shaw; **9:00 P. M.,** "Sports," by W. J. Slocum, Sport Editor, New York Tribune; **9:30 P. M.,** Concert by Leiderkranz Society from Leiderkranz Auditorium, N. Y.; **10:01 P. M.,** Continuation of program by Leiderkranz Society.

Friday, April 13

KDKA, Eastern, **7:30 P. M.,** Review of "Cyrano de Bergerac" Rostand, by Marjory Stewart; **8:15 P. M.,** Concert by Carnegie Tech. Mandolin and Glee Clubs, broadcast from Carnegie Lecture Hall.

KSD, Central, **8:00 P. M.,** Mound City Orchestra; **8:30 P. M.,** Pauline J. Bell, soprano; Louise Bernero and Anna Sorkin, pianists; **11:30 P. M.,** Mrs. Frank Howard, mezzo-soprano; Mrs. J. H. Eggerts, violinist; Lucille Cook, pianist; John C. Sartelle, whistler; J. H. Eggert, cellist; Mrs. Georgia McAdams Clifford, reader; Max Mason, French Horn; James Hay, Jr., flutist; Mrs. Nellie MacKenzie, accompanist.

KYW, Central, **8:00 to 9:00 P. M.,** Musical program, Salvation Army Band, Adjut. J. A. Fynn, conductor, also Isham Jones and his orchestra; Program: 1, "Divine Love," Selection: "Banner of Liberty," by Salvation Army Staff Band; 2, Vocal solo, "The Name of Jesus," by Colonel Fynn; 5, Sextette, "The Lost Chord," by Salvation Army Sextette; 6, March, "Vigilance;" Selection, "Nazareth," Chimes, "Hollingside;" March, "Emancipation," by Salvation Army Staff Band; **9:05 P. M.,** Review of Latest Books by L. Jones, Lit. Ed. of Chicago Evening Post.

WBAP, Central, **7:15 to 8:00 P. M.,** Concert by Mrs. Leslie Ware and Bess Ware of Baylor College for Girls, Belton, Texas; **9:30 to 10:30 P. M.,** Program by the President's Day banquet of the Fort Worth University Club, musical program by the Texas Christian Univ.

WBZ, Eastern, **8:00 P. M.,** Concert by Mme. Calixta Dupont Courchene, pianist and reader, assisted by E. S. Wells, tenor.

WGY, Eastern, **2:00 P. M.,** Music and talk, "Music in the Home," Mrs. Edward P. Pressey; **7:40 P. M.,** Health Talk, "Golf Dangerous to Health," Dr. W. Nicolls, Jr.; **7:45 P. M.,** "The Pirates of Penzance;" Pallophotophone Address, Colonel Frederick Palmer; Operetta, "The Pirates of Penzance," Gilbert & Sullivan; The Cast: Richard, Pirate Chief, M. H. Simmonds; Samuel, his Lieutenant, Carl N. Jester; Frederic, a Pirate Apprentice, Asa O. Coggeshall; Major-General Stanley, of the British Army, Kolin D. Hager; Edward, Police Sergeant, J. F. Quinlan; Mabel, General Stanley's youngest daughter, Edith Ennis; Kate, Edith, Isabel, General Stanley's daughters, Ethel Guest, Agnes MacDavitt, Jane Terrell; Ruth, a Piratical Maid of All Work, Rose Mountain and WGY Orchestra; Act I: Pirate Chorus, "Pour, O King, the Pirate Sherry;" Ruth, "When Frederic Was a Little Lad;" Pirate King and Chorus, "O Better Far;" Ruth and Frederic, "Oh, False One;" Ladies' Chorus, "Climbing Over Rocky Mountains;" Frederic and Ladies' Chorus, "Oh, is There Not One Maiden;" Mabel and Ladies' Chorus, "Poor Wandering One;" Mabel, Frederic and Ladies' Chorus, "How Beautifully Blue the Sky;" Major-General Stanley and Chorus, "I Am the Very Pattern of a Modern Major-General;" Cast, "He is Telling a Terrible Story;" Act II: Mabel and Ladies' Chorus, "O Dry the Glistening Tear;" Sergeant of Police and Policemen, "When the Foeman Bares His Steel;" Ruth, Frederic and Pirate King, "When You Had Left Our Pirate Fold;" Mabel and Frederic, "Ah, Leave Me Not Alone;" Mabel, Sergeant and Policemen, "Tho' in Body and in Mind;" Sergeant and Policemen, "When a Felon's Not Engaged;" Sergeant, Pirates and Policemen, "A Rollicking Band of Pirates We;" Samuel, Pirates and Policemen, "With Catlike Tread;" Major-General Stanley with Pirates and Policemen, "Softly Sighing;" Entire Cast, "We Triumph Now;" **10:30 P. M.,** Musical program, Instrumental selection, "Old Time Medley," by WGY Quartet; Pallophotophone Address, "The Need for the National Reserve Corps," General Brice P. Disque; Contralto solo, "In the Gloaming," by Gladys Robinson, Ann Connell, accompanist; Piano duet, "Poet and Peasant," by Mrs. W. Murdock and Ivan Strough; Cello solo, "Traumerei," by Ernest Burleigh; Instrumental selection, Fantasia on "My Old Kentucky Home," by Quartet; Contralto solo, "Juanita," by Gladys Robinson; Piano duet, "Humoresque," by Mrs. W. Murdock and Ivan Strough; Some Humor from "Topics of the Day;" Violin solo, "Flower Song," by Edward A. Rice; Instrumental selection, "Homestead Melodies," by Quartet; Contralto solo, "Just a Song at Twilight," by Gladys Robinson; Instrumental selection, "Down on the Plantation," by Quartet.

WGY, Eastern, **9:00 to 11:00 P. M.,** Music by Cain's Castle Orchestra.

WHAS, Central, **4 to 5 P. M.,** Concert by the Alamo Theater Orchestra; Three minute biography of Old Testament Characters: "Josiah;" prepared and read by C. M. Hanna, of Shelbyville, Ky.; Selections by Heyde C. Conrad, playing the Alamo Theater organ; **7:30 to 9 P. M.,** One hour concert by the Courier-Journal Quartet; Mrs. Charles Shannon, soprano; Mrs. K. W. Surman, contralto; K. W. Surman, tenor; Albion S. Cornwall, baritone; accompanied by Mrs. Albion S. Cornwall; Soprano solos: Miss Monroe, of Jeffersonville, Ind., accompanied by Miss Anna Jacobs, of Jeffersonville; Tenor solos: H. Archer Culmer, accompanied by William E. Connen; Guitar trio: Miss Georgia Pope, Miss Ruth Elder and J. Henry Brady; Reading: An Interesting Historical Episode; Setting-up exercises.

WJZ, Eastern, **3:00 P. M.,** Concert by the Steinway Piano Company; **7:30 P. M.,** Dance music by the Vincent Lopez "Red Cap" Orchestra; **8:30 P. M.,** "Trip to Yucatan," by Prof. Marshall H. Saville, Prof. of American Archeology, Columbia University; **8:40 P. M.,** Literary talk by Harper Bros.; **8:55 P. M.,** Concert by Billy MacWilliams, Scotch comedian; A. D. Smith, accompanist; **9:10 P. M.,** Literary talk by the Outlook; **9:25 P. M.,** Continuation of program by Billy MacWilliams; **9:45 P. M.,** Unique entertainment arranged by Remizoff for Club Petroushka, a chorus of twenty Gypsies of the Great Russian Steppes will sing weird and dreamy melodies and wild and passionate songs. They will be accompanied upon the seven-stringed Russian guitars. The Balalaika Band, a typical Russian institution will also perform.

WMAQ, Central, **4:35 P. M.,** Program under direction of Bertha L. Iles, president of the Academy of Dramtic Education; **7:00 to 7:30 P. M.,** Mrs. Marx E. Oberndorfer, on "Hearing America First," one of a series; **9:15 P. M.,** Esther Sopkin, pianist and the Sopking String Quartet.

WMC, Central, **8 P. M.,** Entertainment furnished by Miss Marguerite Storch, contralto; Mlle. Madelin Garnier, soprano; Miss Rosamond Werner, pianist, and Mr. C. H. Van Hooser, baritone; **11:00 P. M.,** Midnight Frolic.

WOC, Central, **3:30 P. M.,** Educational Talk, by C. C. Flanagan; **7:00 P. M.,** Musical Program, by The P. S. C. Orchestra.

WWJ, Eastern, **3:00 P. M.,** The Detroit News Orchestra; **8:30 P. M.,** The Town Crier; The Detroit News Orchestra; Anne Campbell, Detroit News poet; Mrs. John M. Carter, soprano; James E. Brown, tenor; Miss Amy M. Vente, lyric soprano; Prof. R. A. Turner, Michigan Agricultural College, speaker.

Saturday, April 14

KDKA, Eastern, **7:00 P. M.,** "One-day Auto Trip and Road Conditions," Pittsburgh Auto Club; **7:15 P. M.,** One-act play by School of Drama, Carnegie Institute of Technology; **8:00 P. M.,** Boy's Features, by the J. G. Bennett Co.; **8:30 P. M.,** Concert by Monessen Volunteer Firemen's Band, direction of W. B. Laird.

KHJ, Pacific, First anniversary of station, **8:00 P. M.,** Sammie Sisters in Patriotic revue; Address by Colonel Arthur Williams and Colonel J. M. T. Partello.

KSD, Central, **8:00 P. M.,** Thaleta Kronsbein, contralto; Hartzel Lyon, baritone.

KYW, Central Standard Time, **8:00 to 9:00 P. M.,** Program, Henrietta Pepin, soprano; Margaret Miller, accompanist; R. C. Kuhn, violinist; Mrs. R. A. Brandt, accompanist; Bruce L. Stocking, pianist; M. S. Wetzel, pianist. Isham Jones and orchestra. Program, 1, Lost—A Wonderful Girl, by B. L. Stocking and M. S. Wetzel; 2, "Ich Liebe Dich," "Leng," by Henrietta Pepin; 3, Mr. Gallagher and Mr. Sheen, by B. L. Stocking and M. S. Wetzel; 4, Berceuse from Jocelyn, by R. C. Kuhn; 5, Popular dance selections, by Isham Jones and Orchestra; 6, The Nightingale Has a Lyre of Gold, soprano solo, by Henrietta Pepin; 7, Medley of Popular Airs, B. L. Stocking and M. S. Wetzel; 8, Pekin, by R. C. Kuhn; 9, Aggravatin' Papa, by B. L. Stocking and M. S. Wetzel; **9:05 P. M.,** "Under the Evening Lamp," a service including stories, articles and humorous sketches.

WBAP, Central, **6:30 to 6:45 P. M.,** Review of the interdenominational Sunday school lesson by Mrs. W. F. Barnum, leader of the Barnum Bible Class of the First Methodist Church.

WBZ, Eastern, **8:00 P. M.,** Concert by Marjorie Brown, soprano; Paul Webber, pianist.

WDAP, Central, **10:00 P. M.,** Mrs. Agnes T. McMeekin, soprano, and popular music program; Jack Chapman's Dance Orchestra.

WHAS, Central, **4:00 to 5:00 P. M.,** Concert by the Alamo Theater Orchestra; Three-minute biography of Old Testament Characters: "The Three Prophets, Zephaniah, Habakkuk, Nahum"; Selections by Heyde C. Conrad, playing the Alamo theater organ; **7:30 to 9:00 P. M.,** Full concert by the Beta Pi Omega Sorority, Miss Margaret Hammerstein, director. Reader, Miss Bessie Sonner; Violin solos, Miss Sarah Hill Richardson; Piano duets, Miss Mary Emily Chenault and Miss Annette Waring; Piano solos, Miss Ruth Blakey and Miss Margaret Hammerstein; Soprano solos, Miss Sallie Pennington, Miss Thelma Duffin; Contralto solos, Miss Stella Wharton; Five-minute address, Arthur Mason, associate director of Louisville Conservatory of Music; Setting-up exercises.

WJZ, Eastern, **1:15 P. M.,** Concert by G. O. West and Swanee Orchestra, B. Nathanson, violin and saxophone; R. C. Errickson, saxophone; A. R. Wooley, saxophone; G. I. Johnson, banjo; O. R. Seaman, trumpet; Early Worthley, trombone; H. Ennis, drums; Wm. Griffin, bass; G. O. West, piano director. They will play popular numbers; **7:00 P. M.,** "Uncle Wiggily Stories," by Howard R. Garis, author.

WMAQ, Central, **7:00 to 7:30,** Talk on Red Cross by Capt. Hiatt; **9:15,** Talk on the "Plan to plant another tree" campaign; the Park-Kostner Band.

WMC, Central, **8:00 P. M.,** Program supplied by residents of Helena, Arkansas, quartette composed of Hugh Bennett, first tenor; Joseph Greenfield, second tenor; E. E. Clifford, first bass, and W. F. Evans, second bass; Mrs. B. L. Lyford, soprano; Prof. Sharkis, violinist; Mrs. S. E. Mundt, pianist.

WOC, Central, **3:30 P. M.,** Educational talk, by C. C. Hall; **7:00 P. M.,** Musical program, Erwin Swindell, musical director, Girls' Glee Club of Penn College; **8:00 P. M.,** Educational lecture, "America and Her Wonderland, the Yellowstone Park," by Chas. A. Payne, world traveler and special lecturer for the University of Minnesota; **9:30 P. M.,** Dance program (one hour), P. S. C. Orchestra.

WWJ, Eastern, **3:00 P. M.,** The Detroit News Orchestra.

Sunday, April 15

KDKA, Eastern, **10:45 A. M.,** Services First Presbyterian Church, Pittsburgh, Rev. M. Alexander; **2:30 P. M.,** Bible Story for Children, by Rev. W. A. Logan, of Alpha Lutheran Church, Turtle Creek, Pa.; **2:45 P. M.,** Address by Dr. L. S. Mudge of Philadelphia, Pa.; **4:00 P. M.,** Organ recital by Dr. C. Heinroth, organist; **4:45 P. M.,** Vesper services of Shadyside Presbyterian Church, Pittsburgh, Rev. Hugh Thompson Kerr; **7:45 P. M.,** Special service for sailors and seamen, by Rev. E. J. Van Etten, of Calvary Episcopal Church, Pittsburgh.

KYW, Central, **11:00 A. M.,** Central church services from Orchestra Hall, Dr. F. F. Shannon. Musical program under direction of Daniel Protheroe; **3:30 P. M.,** Studio Chapel service, Dr. A. J. McCartney, Kenwood Ev. Church; **7:00 P. M.,** Chicago Sunday Evening Club service from Orchestra Hall, Chicago. Special musical program by Choir of One Hundred under direction of Edgar Nelson. The speaker will be Dean Charles R. Brown, Yale University.

WBAP, Central, **11:00 A. M., 12:15 P. M.,** Complete services First Methodist Church, Rev. J. W. Bergin; Will Foster, organist; **3:30 to 4:30 P. M.,** Concert by the Broadway Presbyterian Church Choir presenting cantata, The Atonement.

WDAP, Central, **9:15 P. M.,** Hans Muenzer, violinist; Henry Selinger and the Drake Concert Ensemble.

WGY, 10:30 A. M., Church services, Sermon, "Christianity Limited," Rev. A. W. Rogers, D. D., Emmanuel Baptist Church; **4:00 P. M.,** Orchestral selection, "Serenade," by WGY Symphony Orchestra, Leo Kliwen, conductor; Soprano aria, "One Fine Day," from Madam Butterfly," by Irene Nettles, Mrs. Katherine Michaelson, accompanist; Orchestral selection, "Lyric Suite," "Shepherd's Boy," "March of the Dwarfs," by WGY Symphony Orchestra; Soprano solos, "The Time for Making Songs Has Come," "In the Time of Roses," by Irene Nettles, Mrs. Katherine Michaelson, accompanist; Orchestral symphony, "Surprise Symphony, G Major," Andante, Menuetto, Allegro di Molto, by WGY Symphony Orchestra; **7:30 P. M.,** Church services, sermon, "Christ and His Church," Rev. A. W. Rogers, D. D., Emmanuel Baptist Church.

WHAS, Central, **9:57 A. M.,** Organ music; **10:00 A. M.,** Church service under the auspices of the Broadway Methodist Church; Rev. Dr. David K. Pegues; organist and choir director, Miss Florence Ritter. Miss Ruth Hedden, soprano; Miss Alma Hood, contralto; Miller Haas, tenor; Robert D. Creamer, baritone; **4:00 to 5:00 P. M.,** Address by Dr. Maxwell Savage; contralto soloist, Mme. Cara Sapin; baritone soloist, Reginald W. Billin; violin soloist, Miss Emily Locke Breaux.

WJZ, Eastern, **11:00 A. M.,** Morning services West End Presbyterian Church, N. Y. City, sermon by Rev. A. E. Keigwin, D. D.; Sacred music by children's mixed choir of 110 voices under direction of Miss Maleva Harvey, organist, also by mixed quartet; Willard Ward, baritone; Lotta Madden, soprano; Jane Crawford Eller, alto, and Easton Kent, tenor; **3:40 P. M.,** "Poems," by Angela Morgan; **4:10 P. M.,** Concert by Erna Korn, contralto, and Hedy Spielter, pianiste; **6:30 P. M.,** Readings and records from the "Bubble Books That Sing," by Ralph Mayhew; **7:00 P. M.,** "Coming Events Cast Their Shadows Before—What Present World Shadows Augur," fifteen minute analysis, by New York Times Annalist; **7:15 P. M.,** Estey Organ Recital; **8:00 P. M.,** "Visby—Enchanted City of the World," by Wirt Barnitz, World Traveler; **8:15 P. M.,** Concert by Frances Callow, harpist; **8:45 P. M.,** Concert by Waldorf Astoria Symphony Orchestra, Joseph Knecht, conductor; **10:01 P. M.,** Concert by Myron Watkins, tenor.

WWJ, Eastern, **11.00 A. M.,** Church services from St. Paul's Cathedral; **4:00 P. M.,** The Detroit News Orchestra.

Monday, April 16

WBAP, Central, **7:15 until 8:00,** Vocal and instrumental concert presented by the Fine Arts Department of the Texas Presbyterian College, Milford, Texas; **9:30 to 10:30,** Concert by the American Legion quartet and other artists of Paris, Texas.

WHAS, Central, **4:00 to 5:00 P. M.,** Concert by the Alamo Theater Orchestra; Three-minute biography of Old Testament Characters: "Zedekiah," prepared and read by Rev. R. R. Rose, of Shelbyville, Ky.; Piano solos, Miss Margaret Munro, of Berkeley, Cal.; Mezzo soprano solos, Miss Ruby Freeman, of Benton, Ill.; Selections by Heyde C. Conrad, playing the Alamo Theater organ; **7:30 to 9:00 P. M.,** WHAS is silent on Monday evenings.

WGY, Eastern, **2:00 P. M.,** Music and household talk; Instrumental selection, "Lalla Rookh," by WGY Instrumental Quartet; Some humor, from "Topics of the Day;" Cello solo, "Siciliano," by Ernest Burleigh; Soprano solo, "My Lullaby," by Mrs. Edward Coons, E. C. Smith, accompanist; Instrumental selection, "Air de Ballet," by WGY Instrumental Quartet; Reading, "Something of Interest to All;" Instrumental selection, "Mazurka Caprice," by WGY Instrumental Quartet; Address, "The Broadcast Listeners' Antenna," by R. H. Langley, Radio Engineer; Violin solo, "Air" from "Concerto in A Minor," by Edward A. Rice; Soprano solo, "I Love But Thee," by Mrs. Edward Coons; Instrumental Trio, "Romance," by American Trio; Soprano solo, "A Memory," by Mrs. Edward Coons; Instrumental trio, "Le Cygne," by American Trio.

Japanese Ambassador Speaks

NEW YORK.—It was the Radio audience's unusual privilege to hear the Japanese Ambassador to the United States, the Honorable H. E. Masanao Hauikara when speeches at the annual dinner of the Japan Society were broadcast through WEAF on the evening of April 4.

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One of the most popular dance orchestras of the South is the "Melody Five Boys," head-liners at Station WSY, Birmingham, Alabama. Their wailing saxophones and tremulous minors of the banjo and piano creates a brand of creepy jazz that somehow seems associated with "down in Dixie," the kind that is only heard by listeners of WSY. The above photo shows the boys in action before the microphone

ETHERIZED SERVICE PROVES POPULARITY

LISTENERS IN GATHER IN SMALL GROUPS

Request for Address Given Over Ether Results in 100,000 Copies Being Distributed

BOSTON, MASS.—A tremendous power has been developed by the Radio for the church, in the past few months, since the Greater Boston Federation of Churches has taken up the Radiophone and services broadcasted from two different stations by arrangements with several different churches. The congregations, from mere handfuls have grown to thousands, and the sphere widened from a comparatively few members of the sending church to homes many miles distant, some of them hundreds of miles away.

Listeners In Are in Groups

One Nashua, N. H., young man told of one Sunday night service when a group of eight gathered at his home to hear the broadcasted service from WGI (Amrad). He stated that he knew personally of five other similar gatherings in his own neighborhood. In addition lenten services have been broadcasted every noon from Keith's Theatre, Boston, and letters have been received from all parts of New England, as well as other states.

Gives Copies of Address

One speaker, J. Weston Allen, received a request for the manuscript of his address, that 100,000 copies of it might be made for distribution. A set recently presented to the Massachusetts Society for the Prevention of Cruelty to Children, for use at its temporary home by the Episcopal Cathedral of Boston has been productive of much good among the children.

WOC REPLACES WIRES DOWN BY SNOWSTORM

Davenport Plant Handles Sickness and Death Messages

DAVENPORT, IA.—A severe sleet and snowstorm played havoc with all lines of communication in the vicinity of Davenport recently. The Bell Telephone Company's loss of toll poles in the Davenport area alone was estimated at two thousand. The telegraph wires were demoralized, making it exceedingly difficult for the telegraph companies and railroads to get messages through to destination.

On the following morning, Radiophone Station WOC, with two operators constantly on the job, was placed at the service of the railroad, telegraph and telephone companies for important messages to aid them in securing crews and material to repair their lines, and for sickness and death messages. The regular programme of Station WOC was abandoned for this work, and the station was kept busy until far into the night. This is probably the first time on record when a Radio assistance to the public through the aid given the telegraph and telephone companies in time of a storm.

Canada Hears Police Message

LONDON, ONT.—The possible wide use of the Radiophone in tracing criminals and stolen property was illustrated by the fact that a London Garage having a receiving Radio set, received recently here a message broadcast from Palmer Chiropractic college (WOC) in Davenport, Iowa, asking police and garage employees to be on the lookout for a stolen motor car.

Wife Sues Hubby; Names Radio Set

Says His Affections Are Won by—a Coil, a Tube and a Hank of Wire

LOS ANGELES, CALIF.—One small joy-bringing Radio set has been named as a co-respondent in a divorce complaint which has been filed in the local Superior Court on March the 15th. The case is considered to be the first one of its kind on record.

The complaint was filed by Mrs. Grace Mead Purdy against her husband, Kenneth C. Purdy. Mrs. Purdy stated that her married life had been perfectly happy until her husband became a victim to Radio. After that, she said his passion for her was entirely submerged in his passion for Radio.

Spends Cash on Set

Instead of presenting her with money to buy clothes with, she says her husband began to spend all his free change on Radio material. This in spite of the fact that his income was stated to be over $500 a month. Not only did Mr. Purdy spend all his money for Radio, but he spent all his time in the company of his new desire declares his wife in the complaint. Finally, the point was reached where Mr. Purdy received the choice of his wife or his Radio set, and according to the statement of Mrs. Purdy in Court, her husband chose his Radio set.

COLLEGE TO HAVE NEW BROADCASTER

Lake Forest School Will Be on the Air About May 1

CHICAGO.—Lake Forest college will soon be telling the world all about the advantages of education on the North Shore, according to plans announced today by President Moore of the institution. Contracts have been signed for the installation of a broadcasting outfit, which will be erected soon after May 1. The set will be capable of broadcasting 800 miles, it is said. The operating room and studio will be placed on the third floor of College hall with aerials strung to masts erected on College hall and North hall.

January Exports of U. S. Total $141,577 Apparatus

American Radio exports in January fell off slightly over those of December. The exact figures were: January $141,577 against December, $163,236. During January, the last month for which figures are available, most of these exports went to Canada, although large shipments of apparatus went to Australia and Cuba.

Establish Customers Club

BOSTON, MASS.—Chandler & Farquhar, hardware dealers, who have opened a new store here in Winthrop Square, having an enlarged Radio department, have established a Customers' Club on the second floor, extending across the entire front of the building, and well back to the rear. Here are comfortable chairs, with all the latest Radio publications, and a library of books on Radio, and a chance to smoke and talk Radio with friends or acquaintances. Talks and expert advice are given by a staff of Radio experts to those who wish help or information. In addition, the firm constructs sets free for those who buy their parts there.

CFCN Works Five Hours' Broadcast

Special St. Patrick's Night Concert Sets New Record for Calgary Plant

CALGARY, ALTA.—Five hours of broadcasting without an intermission was the feat accomplished by CFCN, the Radio station of the W. W. Grant Radio, Ltd., at Calgary, on St. Patrick's night, Saturday, March 17. Three Irish concerts and a dance program were broadcast between 9:30 o'clock in the evening and 2:30 o'clock the next morning, Mountain Standard time.

Give Special Concert

Several local talented artists were secured to broadcast a special Irish concert for the benefit of local and Alberta Radiophans. Following this there was a special concert and partial dance program for residents of Prairie City, Oregon, which was requested by telegraph by Paul H. Crouter, of Prairie City. Then CFCN went on the air with its regular Saturday night, program, which was followed with a program for Republic, Washington, arranged with Rev. Raymond A. Riedner, pastor of the Church of the Immaculate Conception.

Following its lengthy program telegrams and letters were received from all parts of the country congratulating CFCN.

WESTINGHOUSE IS BARRED BY CHINA

MINISTER OF WAR REFUSES RIGHT TO EXPORT

Radio Apparatus Classified as Contraband of War—Refer to Arms Conference Restrictions

WASHINGTON, D. C.—The Government of China has refused the Westinghouse Electric International Corporation permission to import Radio materials into China and to establish broadcasting and receiving stations.

Application which was made through the American Legation at Peking, followed a decision by the concern to attempt to establish Radio telephony in China. Permission was refused by the Minister of War, on the ground that Radio apparatus is contraband of war, and therefore cannot be brought into China, upon penalty of seizure. Reference was made by the Chinese to the restrictions concerning Radio adopted by the Washington Arms Conference.

Records to be played on the phonograph which teach the Radio code, are now on the market and are said to be very good for anyone taking up this interesting and profitable study.

Now Obtainable!

The New
Pacent Universal Plug

A Pacent quality product that answers perfectly every plug requirement. Simple to connect—affords perfect biting contact—and the price enables you to have one for every phone cord. Ask your dealer for Number Forty PACENT Plug.

PACENT ELECTRIC CO.
Incorporated
22 Park Place, New York

50¢

SALES OFFICES
Chicago—Philadelphia—St. Louis—Minneapolis—Washington, D. C.—San Francisco
Canadian and British Licensees: Colonial Radio Ltd., Hamilton, Canada

Radiophone Broadcasting Stations

Corrected Every Week—Part III

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WOAY, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KDZA, KFDH

Arkansas:
Fayetteville, KFDV
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KDZH, KMJ
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KFCL, KFI, KHJ, KJS, KNN, KNV, KNX, KOG, KUS, KWH, KXS
Modesto, KXD
Oakland, KLX, KZM
Pasadena, KLB
Reedley, KFAZ
Richmond, KFCM
Sacramento, KFBK
San Diego, KDPT, KDYM, KFBC, KFFA, KON
San Francisco, AG1, KDN, KDZG, KDZX, KFDB, KLS, KPO, KSL, KUO
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFBV, KFCK, KHD
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KLZ
Gunnison, KFHA
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WQAW

Florida:
Jacksonville, WDAL
Miami, WIAZ, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH
Winter Park, WRAP

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS

State, City, Call

Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO, WRAB

Idaho:
Boise, KFAU, KFDD
Kellogg, KFEY
Moscow, KFAN
Thomasville, WPAX
Wallace, KFCC

Illinois:
Belvidere, WOAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WCAP, WHAP
Elgin, WTAS
Galesburg, WRAM
Mattoon, WQAL
Peoria, WJAN, WQAX
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WEAW
Brookville, WSAL
Evansville, WOAU
Fort Wayne, WFAS
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WGAZ
Terre Haute, WEAC
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDP, WGF, WHX
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Lamoni, KFEV
Le Mars, KFCY, WIAU
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WNAK, WTG
Marion, WRAD
Parsons, WOAJ
Salina, WFAD
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS WLAP
Paducah, WIAR

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, WGAQ

Maine:
Auburn, WMB
Bangor, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, WBAD, WBAH, WCAS, WLAG, WLB
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KFEZ, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, KFDU, WFAV, WGAT, WJAB, WKAC, WMAH, WQAP, WSAS
Norfolk, WJAG

State, City, Call

Oak, KFEQ
Omaha, KFCZ, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
York, KFDR

Nevada:
Reno, KDZK, KFAS,

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW.
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WBAB, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

Ohio:
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WJAJ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WLAM, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA

State, City, Call

Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

Oregon:
Astoria, KFGG
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Brookings, KFDY
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WGAB, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WOAI
Stanford, WOAZ
Tyler, WOAF

State, City, Call

Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KDZL, KFCP
Salt Lake City, KDYL, KDYV, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZR
Centralia, KDZM
Everett, KDZZ, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CHCQ, CFAC, CFCN, CJCY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
Kitchener, CJCF
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 8:30-10. Central.

WLW, Cincinnati, O. 2,000 mi. Crosley Mfg. Co. Daily ex Sun, 10 am, 1 pm, 3, 4. Mon, Wed, 8-10 pm. Tues, Thurs, 10-12 pm, music, news. Sun, 11 am, church service. Central.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Mon, Wed, Thurs, 8:30-9:30 pm, concert. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 100 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Thur, 7:30 pm, music. Central.

WMAJ, Kansas City, Mo. 485 only. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 485 also. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Eastern.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Mon, 4:35-5 pm, 9:15-10. Wed, Fri, Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 485 also. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMB, Auburn, Me. Auburn Elec. Co.

WMC, Memphis, Tenn. 400, 485 only. 2,000 mi. The Commercial Appeal. Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm. Fri, 8-9:30 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. 485 also. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Groves, Mo. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAO, Mishawaka, Ind. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAQ, Portsmouth, Va. Portsmouth Radio Assn.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 600 mi. Penns. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAY, Birmingham, Ala. John M. Wilder.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, Tues. night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed. only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 only. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12 m, time; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Thurs, 7:50 pm, concert. Eastern.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, 11:30-12 m, 1:30-2 pm, 2:30-3, 6-6:30. Daily ex Sun, Mon, Wed, 8:30-9:30 pm, 10-10:05. Mon, 11-12 mid. Sun, 3-3:30 pm, 9-9:30. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB. State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7 pm, music. Wed, Fri, 10-11 pm. Sun, 2:30-3:30 pm. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

(Continued on page 9)

STATION SCHEDULES

(Continued from page 8)

WPAP, Winchester, Ky. Theodore D. Phillips.
WPAQ, Frostburg, Md. General Sales & Engineering Co.
WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.
WPAS, Amsterdam, N. Y. J. & M. Electric Co.
WPAT, El Paso, Tex. Saint Patrick's Cathedral.
WPAU, Moorhead, Minn. Concordia College.
WPAV, Laurium, Mich. Tinetti & Sons.
WPAW, Wilmington, Del. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.
WPAX, Thomasville, Ga. 25 mi. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music Mon, Wed, Fri, 8:30-9:30 pm, music. Sat, 10-11 am, codes. Sun, 11:30 am-12:30, 8:30 pm-9:30, church service. Eastern.
WPAY, Bangor, Me. Bangor Radio Lab.
WPAZ, Charleston, W. Va. Dr. John R. Koch.
WPG, New Lebanon, O. 485 also. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.
WPI, Clearfield, Pa. Elec. Supply Co. pm, news. Mon, 8 pm, concert. Eastern.
WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.
WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. 200 mi. E. B. Gish.
WQAD, Waterbury, Conn. 310 only. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 6:30-7:45 pm, music, Boy Scout news. Wed, 8:30-9:30 pm, concert. Eastern.
WQAF, Sandusky, O. Sandusky Register.
WQAH, Lexington, Ky. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, Ia. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. 100 mi. Coles County Tel. & Tele. Co. Tues, Thurs, 9-11 pm, music, lectures. Central.
WQAM, Miami, Fla. 500 mi. Electrical Equip. Co. Daily ex Sun, 5:15-5:45 pm, news, stocks, weather; 7:30-9 pm, music. Sun, 9-11 pm, music. Eastern.
WQAO, New York City, N. Y. 300 mi. Calvary Baptist Church. Sun, 11:15-12:15 am, 8:30-9:30 pm, church services. Eastern.
WQAP, Lincoln, Nebr. Am. Radio Co.
WQAR, Muncie, Ind. Press Pub. Co.
WQAT, Richmond, Va. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5. Eastern.
WQAS, Lowell, Mass. 50 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WQAV, Greenville, S. C. 75 mi. Huntington & Guerry, Inc. Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.
WQAW, Washington, D. C. Catholic University of America.
WRAA, Houston, Tex. 400 mi. Rice Institute. Mon, 8:0 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.
WRAB, Savannah, Ga. Savannah Board of Public Education.
WRAC, Mayville, N. D. State Normal School.
WRAD, Marion, Kans. Taylor Radio Shop.
WRAH, Providence, R. I. Stanley N. Read.
WRAJ, Pittsburgh, Pa. M. H. Pickering Co.
WRAL, St. Croix Falls, Wis. Northern States Power Co.
WRAM, Galesburg, Ill. 200 mi. Lombard College. Wed, 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. 100 mi. Jacob C. Thomas. Tues, Fri, 7-9 pm. Central.
WRAU, Amarillo, Tex. 50 mi. Amarillo Daily News. Tues, Thurs, 7:30-8:30 pm, music. Central.
WRAV, Yellow Spring, O. Antioch College.
WRAY, Scranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15, 10:30 pm, music. Sun, 4 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAA, Marietta, O. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. Clemson Agri. College.
WSAH, Chicago, Ill. A. G. Leonard, Jr.
WSAJ, Grove City, Pa. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. Franklin Elec. Co.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 10 am, 11, 12:20 pm, 2, reports. Central.
WSAV, Houston, Tex. Clifford W. Vick. Temporarily discontinued.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:15-12 music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSN, Norfolk, Va. 100 mi. Shipowners Radio Service Inc. Mon, Wed, Sat, 8:15-9:30 pm, concert. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWAY, Chicago, Ill. Marigold Gardens.
WWB, Canton, O. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed, 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400, 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30 am, weather; 11:55-12, time; 12:05-12:45 pm, music; 2-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, markets; 7-10, entertainment. Sun, April 15, and every other week, 11 am, 5:30 pm, church services. Sun, fill in weeks, 2 pm, concert; 7:30, church services. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford Daily 3-4:30 pm, 7:30-9:30. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

Largest Radio Store in America

RADIO

BUY HERE FOR LESS

Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90

Consisting of:	Regular Price	Our Price
9x10½ Formica Panel	$1.42	$ 1.20
23-Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, Plain or Bank Wound with Tape	3.00	1.95
1 Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
9 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½ with hinged top	5.00	2.95
25 ft. Hookup Wire	.20	.10
Regular Price	$19.37	

Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in a schematic form but are drawn so that anyone without any technical knowledge can follow with ease. Our Price ... **$11.90**

Freund's Wonder Circuit $13.20

KHG, KFI, and KYY received from Chicago on one tube.

	Regular Price	Our Price
9x10½ Formica Panel	$ 1.42	$ 1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95
Bakelite Dial	.75	.25
Variometer	5.00	1.95
43 Plate Vernier Condenser	7.00	3.45
Remler Bakelite Socket	1.00	.45
8 Binding Posts	.80	.40
CRL Variable Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
Howard Vernier Rheostat	1.50	1.35
Regular Price	$24.32	

Complete instructions for drilling, assembling and wiring furnished with each order. Written so that anyone without any technical knowledge can understand. Our Price **$13.20**

Complete Parts for Reinartz Sets, $11.45

CONSISTING OF	Regular Price	Our Price
7x18 Formica Panel	$1.89	$1.70
Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cuni Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Freshman Variable Grid Leak and Condenser Combined	1.00	.75
8 Binding Posts	.80	.40
25 Feet Tinned Wire	.30	.20
Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$21.69	
Our Price		**$11.45**

Complete Parts for 2 Step Amplifier

Can be used to amplify Reinartz, Flewelling, Short Wave Receiver, Crystal, Aultra Audion or any Receiving Set so that Loud Speaker or Phonograph can be used in place of head set.

CONSISTING OF—	Regular Price	Our Price
7x10 Formica Panel or Other Suitable Size	$1.05	$0.80
High Ratio All-American or Thordarson Transformer	4.75	3.95
Low Ratio Thordarson or All-American Transformer	4.50	2.95
2 Howard Rheostats	2.20	2.00
2 Remler Bakelite Sockets	2.00	.90
3 Double Pacent Jacks	3.00	1.50
13 Binding Posts	1.30	.65
Baseboard for Mounting	.30	.15
Regular Price	$20.10	
Wiring Diagram, with Complete Instructions for Drilling, and Assembling Panel		
Our Price		**$12.45**

Moulded Variometers	$3.45
180° Moulded Variocouplers	$3.45
Mahogany Variometers	$1.95
180° Bakelite Variocouplers	$1.75
Freshman Variable Grid Leak and Condenser	75c
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35
Master Baldwin Type C Units with Cord	$3.95
Master Baldwin Type C Head Sets	$6.95

Brandes Superior Headset	$5.75
Valley Battery Chargers	$16.20
Antenella Aerial Plug	$1.15
3 Coil Honeycomb Mounting	$3.45
2 Coil Honeycomb Mounting	$2.60
WD-11 Bakelite Sockets	50c
Barchass Coils	$1.95
Firth Cord Tip Plugs	60c
Thordarson Amplifying Transformers	$2.95

Complete Parts for Knocked-Down Receiving Set $17.95

CONSISTING OF	Regular Price	Our Price
2 Variometers	$10.00	$3.90
1 Variocoupler	5.00	1.75
3 Bakelite Dials	3.00	.75
Remler Bakelite Socket	1.00	.45
Howard Rheostat	1.10	.80
Cunningham C-300 Detector Tube	5.00	4.45
Mahogany Cabinet	4.50	2.75
Genuine Formica Panel	2.25	1.75
8 Binding Posts	.80	.40
Switch Lever	.50	.25
12 Switch Points	.40	.20
Freshman Grid Leak and Condenser Combined	1.00	.75
Complete Drawing for Assembly and Wiring	1.00	.50
Regular Price	$30.85	
Our Price		**$17.95**

Complete Parts for Flewelling Circuit $12.45

CONSISTING OF—	Regular Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Remler Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
75 Turn Honeycomb Coil	.75	.40
50 Turn Honeycomb Coil	.80	.40
2 Remler Coil Mounts with Straps	1.20	.80
1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
1 Bakelite 3" Dial	1.00	.25
8 Binding Posts	.80	.40
1 Baseboard for Mounting	.30	.20
1 Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$22.16	
Our Price		**$12.45**

VARIABLE CONDENSERS

$4.30 Value, 43 PLATE, now	$1.75
$3.70 Value, 23 PLATE, now	$1.45
$3.30 Value, 11 PLATE, now	$1.35
$3.10 Value, 5 PLATE, now	$1.25
$2.70 Value, 3 PLATE, now	$1.15
$7.00 value 43-plate Vernier Variable Condenser	$3.95
$6.50 value 23-plate Vernier Variable Condenser	$3.45
$6.00 value 11-plate Vernier Variable Condenser	$2.95

U.S.A. SIGNAL CORPS Aviation Type 194-W WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at $9.95

Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special..... $4.65

3000 Ohm GUARANTEED HEADSETS, $8.50 Value $3.65 | MAGNAVOX, LOUD SPEAKERS, Type R3 . . . $27.45

Jacks

Pacent Single Circuit	$0.35
Pacent Double Circuit	.50
Federal Single Circuit Filament Control	.35
Federal Double Circuit Filament Control	.50

HONEYCOMB COIL

1,500 Turns	$1.50
1,250 Turns	1.50
1,000 Turns	1.25
750 Turns	1.00
250 Turns	.75
150 Turns	.60
100 Turns	.50
75 Turns	.40
50 Turns	.40
35 and 25 Turns	.40

Cabinets

MAHOGANY AND WALNUT

6x 5⅜" by 6" deep	$1.45
6x 7⅜" by 6" deep	1.95
8x14" by 6" deep	2.45
8x16½" by 6" deep	2.95
8x22" by 6" deep	2.95
9x12½" by 7" deep	3.95
9x10½" by 5½" deep	2.95

Rheostats	45c	Signal Corps Super Sensitive Microphone Transmitters	$2.45	Spaghetti Tubing, yard	10c
Sponge Rubber Ear Caps, Pair	50c			Lightning Arresters	95c
Dials, 2, 3 and 3½ Inch	25c	Solid Copper Aerial Wire, 100 ft.	35c	2-Slide Tuning Coils, at	$1.95
Grewol Detectors	$1.65			Phone Caps, for mostly all phones	25c

Anti-Capacity Switches	$1.50
Lightning Switches	$2.65
Hydrometers, now at	45c

FORMICA PANEL, ⅛" thick, Black or Brown, Square Inch 1½c

We guarantee all merchandise purchased of us. Mail orders receive immediate attention

Complete Parts for Single Tube Reflex Circuit $32.65

Consisting of	Regular Price	Our Price
43-Plate Vernier Variable Condenser	$ 7.00	$ 3.95
Radion Loop Aerial	7.00	5.95
Cunningham C301-A Tube	9.00	5.95
Grewol Glass Inclosed Detector	2.00	1.65
All American Radio Frequency Transformer	4.50	3.45
All American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
2 .001 Micon Condensers	.70	.50
1 .002 Micon Condenser	.45	.35
Howard Potentiometer	1.50	1.35
Howard 25 Ohm Rheostat	1.10	1.00
8 Binding Posts	.80	.40
9x10½ Formica Panel	1.42	1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95

Complete instructions for drilling, assembling and wiring furnished so that anyone with no technical knowledge can easily follow. Regular Price ..... $45.22 Our Price **$32.65**

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CHICAGO SALVAGE STOCK STORE

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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, April 14, 1923 No. 1

Aid to Shorthand Students

Good Practice Obtained by Taking Down Speeches

EVERY day brings to light another use for Radio broadcasting. It is now revealed that students of shorthand and typewriting are picking up addresses out of the ether to increase their speed at the typewriter or in writing shorthand symbols of the speaker's words. Those who have had to rely upon the patience of a member of the family or a friend to read to them while they dashed off the dots, dashes and curves, can appreciate the advantage of Radio dictation.

Railroads Considering Radio

Large Demands for Communication Forces New Methods

THE unusual development of the Radio in recent months has aroused renewed interest in the investigation now being conducted by the Telegraph and Telephone section of the American Railway association in the use of Radio and wire carrier systems on the railroads.

The committee having this in charge are consulting with manufacturers of Radio equipment so as to make a study of the feasibility of securing carrier current telegraph operation over railroad wire plants.

It is the intention to use Radio to a greater extent on railroads, wherever it can be placed to advantage at the present time and to gain a place for standardization on all systems.

Warning to the Youth

Be Careful About High Power Electric Wires

RECENTLY a boy of 16 years rose early one morning to fasten his wires to the rear porch of his home and in doing so he tossed the ends across an electric light service wire, the ends of the antenna falling to the next door yard. He ran down and grasped them. The wires stuck and he tugged and twisted them. This tugging wore the insulation from the electric light wires and there was a flash. The boy fell to the ground screaming—his hands and arms were burned by the high voltage which had run through his antenna wires. He was started for the hospital but he died en route.

Radio experts can draw a lesson from the tragedy, pointing to it as a warning to youthful Radiophans for exceptional care in the preparation of their sets in the city and the dangers of permitting antenna to be too close to power and light wires.

Advertising with Noise

Filling the Air with Overstrained Music Is Obnoxious

THERE have been complaints to our office on many different subjects but the most recent one, and one that is quite common to most of us, is for Radio shops to make as much noise from their stores as it is possible for them to make. The expectation, of course, is to gain trade by this manner of supposed advertising. One local paper in a certain community says, "Loud, noisy, nerve-racking, tormenting and torturing music comes from the Radio store." In this community a petition was circulated which had many signers. It was used to place the grievance before the commissioners. The petitioners said that after a solid day spent in listening to the strains of jazz and syncopated canned music as wafted to the street from the Radio shop they do not only go half mad, but they are unable to work with normal efficiency.

Recently we published an editorial on "Ether Etiquette" which pointed out the unsportsmanlike methods of breaking into concert time or, in other words, "speaking out loud in an assembled audience." Now this complaint comes at the other end of the line. Neighbors' rights are again trodden to earth.

It may be all right to fill the air with music from one's retail store, but it would be better to confine it within the walls. Then, too, with the tone brought down to where it should be, the reproduction will be more perfect and the all-around results and business getting will be better.

Condensed

Radio, as usual, is abreast of the times. Ever since the discovery of Tut-ankh-Amen's resting place and the treasures buried with him, there has been a mad rush to make everything we wear and do correspond to that period in ancient Egypt. So Station WJAX, of Cleveland, broadcasted a Radio night in Egypt and made quite a hit. This is the first, I believe, that Radiophony has been used to pay homage to King Tut, who, if he could see and hear again would find just a few things of which his age could not boast—Radio among them.

Nearly all fans are agreed on one thing and that is the genuine observance of a silent period. Chicago is not alone in its attitude toward the "staggered hour" scheme as it is a dangerous substitute for a real period of silence. Nothing short of an entire evening's silence on the part of local broadcasting stations should be countenanced. This subject has been hashed and rehashed until it would seem as though we were ready to go ahead and do something, but some such substitute as the staggered hour comes up to prove how slow is our progress. One fan in the East wrote a savage letter to a daily newspaper expressing his candid opinion of a local station whose duty seemed to be to broadcast each evening until a very late hour. He was desirous of hearing something other than the announcement of that station's call letters. There remain some stations who would seemingly prefer to shut down completely rather than give one evening a week to the reception of outside broadcasting. But that leads to another observation.

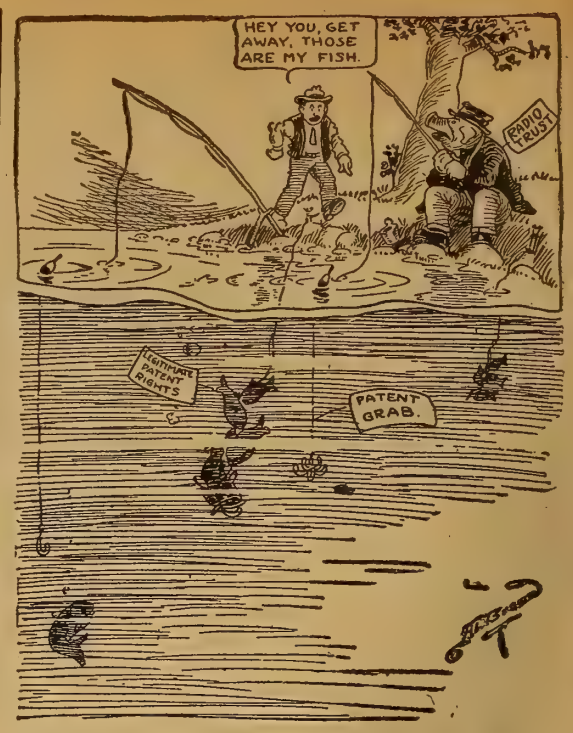
Some of the interference now experienced by those operating receiving sets will disappear with the allocating of higher wave bands to broadcasting stations. This was proposed by the National Radio Chamber of Commerce at the meeting called by Secretary Hoover a short time ago. Extending the range of wavelengths to include up to 550 meters would lessen the present jam on two wave lengths, considerably clearing the air. Perhaps this should have been attended to before now; yet we must not lose sight of the fact that until rather recently no one foresaw the trouble resulting from so many licenses to broadcast. It had to be either a reduction of the number of stations licensed or a greater number of wave bands on which they could operate. Possibly the English rule was a very wise one pertaining to broadcasting. Our problem will soon be solved and then we can enjoy listening in with a minimum of interference.

You may have read of the appeal to the Department of Commerce from a blind man in South Dakota for a receiving set, as he understood these were being distributed to the blind. Of course no such generous plan is in effect anywhere in our government departments. However, the Government Radio authorities are urging private parties to contribute to a fund for the express purpose of purchasing sets for the afflicted. A blind person is so limited in his contact with the rest of the world without a receiving set and so very much a part of it with one. Surely inexpensive equipment could be assembled at specified points and then distributed to those so sorely needing them. Radio Clubs might profitably spend some of their time in constructing sets for the blind; bringing credit to the club and untold joy to the sightless.

Music carried by Radio is being used in one instance to supply this necessary adjunct to a movie house. A Radio amplifier installed in the gallery of Old Chapel at Pennsylvania State College gives to the students music from a large group of broadcasting stations, insuring good orchestra music with the cinema. There are times when the selections being transmitted are held despite the incongruity sometimes noticed, as, for instance, a comedy picture with music of a serious or sacred nature. At this student Y. M. C. A. gathering there are in the neighborhood of one thousand present and some of the music heard there originates in the city of Chicago. This is said to be the only motion picture audience in the country securing its music in this manner.

The popularity of exercising to Radio has entered a stage of low visibility, yet Station WHAS has made a valiant attempt to renew the interest in this gymnastic feature. Not only does this station devote a certain period to instruction in health exercises, but they arrange them in such a manner that they may be followed when headsets are used. A picture was shown in a Radio paper of the entire office force in one company taking their regular exercises to the instructions coming through the loud speaker. Invite in all your friends who have not the advantage of a receiving set and then get WHAS to lead you all in alleviating torpidity of the liver. That sad looking gentleman with sallow complexion will become a new individual after a few trips to your home while this feature is being broadcast. Try it.

There are certain limitations to the things a licensed liquor dispensary in England may do and one of them concerns Radio. So many owners of hotels and restaurants have been impressed with the attractiveness of providing their patrons with Radio reception that they have installed these wherever possible. However, the British authorities have recently ruled that public houses in England may not install Radio sets, as to do so would convert them into a different type of entertainment house than that stipulated in the liquor license. We have no such restrictions over here, but then we haven't the liquor houses either.



RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

The Radio Tramp

By Walt Drummond

At times, when tuning in your set,
You hear a g-r-r-r! and clack!
And other sounds come trooping in—
You cannot keep them back.

Now, I will tell who makes these sounds,
It's my friend, Happy Jack;
He's either on his way somewhere,
Or else he's coming back.

Jack was an old-time printer tramp,
Was ever "on his way,"
Who rode a hundred thousand miles
In box-cars in his day.

He worked on every sheet of note,
A day or two at most;
He'd journey from the north down south,
And then from coast to coast.

One day, about five years ago,
Jack halted here to rest;
He'd worked his way in from the east,
Was headed to the west.

He said to me: "In this fast age,
The freight train is too slow.
I've had a hunch when 30's called
I'll ride the Radio.

(The "Radio Tramp" will be concluded in April 21 issue)

We Don't Read the Disgust

Dear Indi—'Slie. 'Slie. I don't believe it either! You are allus saying something about QRM and there ain't no sech station. I know 'cause it ain't on page 8 of the Disgust. See for yourself. —Peggy.

Your Third Question Is Correct

deer indi—as i am a reader of the radio disgust i think i got a rite to ask some q & a's—(1) can you play dx records on the phonograph? (2) do you have to change the toobes plates to bowls when you use a souper set? horribly yrs, dick h roberts—hootstown arkansas.

You Are Right, You're Right, We'll Sayurite!

Indi—In some section "squeals" are bothering the fan. Probably the air hogs.—Lillian G.

Yea, He Lives in Our Block

Dear Indi—A headline reads: "1,000,000 persons within 3,000 miles of the city to hear 'The Fool.'" Who using Radio has not heard him, I ask you?—Rita M.

There was a young man from Wilmette
Who rigged up a Radio-set,
When he tuned in the latter
He heard the thing chatter,
"Good-Night," with the whole alphabet.
—In Disgust.

—Or the "Lost Chord"

Indigest—I suggest the "Broken Melody" might be appropriate when statie is around.—S. N.

A. B. C. Lessons for Radio Beginners

Chapter XV—Construction and Use of the Loop Aerial

By Arthur G. Mohaupt

THE loop aerial is a convenient form of aerial to use for receiving Radio messages and broadcast entertainments when it is difficult or impossible to erect a suitable outdoor antenna, or when an aerial is desired that can be readily carried from place to place without involving extensive erection or construction work.

The loop aerial is also the best type of aerial to use when it is desired to reduce to a minimum the interference resulting from other stations operating at or nearly at the same wave length. In fact, it is in these extreme directional effects that the greatest possibilities and values of the loop aerial lie. For example, a properly designed loop aerial can be directed toward a distant transmitting station, and the signals received without practically any interference from local or nearby stations, except in case one of these is in the same line with the distant station.

Advantages of Loop Aerial

Other advantages of a loop aerial are that it is entirely immune from any dan-

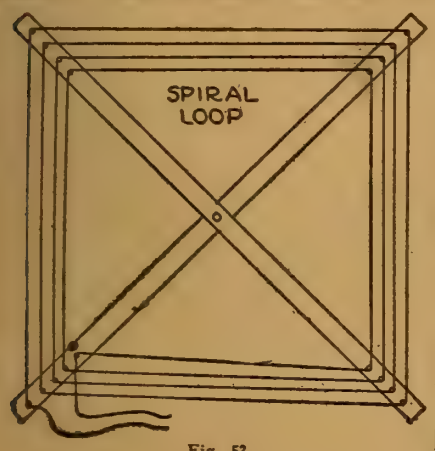


Fig. 52

ger due to lightning, and that it is not affected by atmospheric or weather conditions. Static also does not interfere with the effective operation of the loop.

In spite of these numerous desirable features, the loop aerial is by no means a perfect aerial, for the amount of energy it can absorb is very small, and hence Radio frequency amplification is necessary before the incoming oscillations are strong enough to be impressed upon the input or grid circuit of the detector tube. This not only adds to the initial expense of the required apparatus, but it also adds to the number of adjustments that must be made in the tuning process.

The loop aerial really came into existence only during the last few years, for prior to that the principles underlying

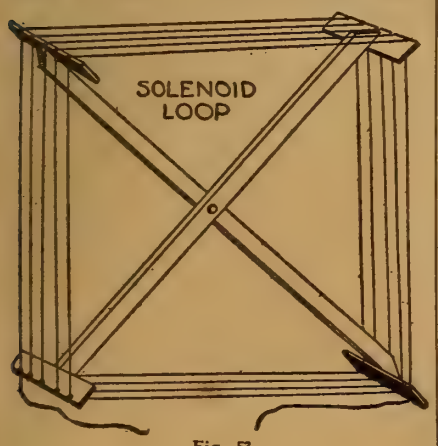


Fig. 53

Radio frequency amplification were still very vague, and suitable apparatus was not available on the market for effectively receiving the small amounts of energy accepted by a loop aerial. However, with the advances made recently in the design and perfection of Radio frequency amplifying apparatus, the loop aerial has now come into its own, and bids fair to extensively replace the old familiar outdoor aerial where compact and portable receiving equipment is desired.

Types of Loop Aerials

As the name suggests, the loop aerial consists of a long wire wound in the form of a loop or coil and held rigid on some convenient and sturdy support. This loop may be wound in different forms or shapes; for example, it may be wound in the form of a square, rectangle (one pair of sides longer than the other) or a triangle (three-sided loop). Some loops have even been wound in the form of a figure eight, or a square loop with figure eight windings. However, from numerous trials and tests it has been found that the most satisfactory form of loop, both from the point of view of directional qualities and receiving efficiency, is the square loop.

The square loop is easily constructed, is very directional, and if properly designed forms a very effective receiver.

The Spiral Loop

The square loop, in turn, can be wound in two ways. In the first place, it can be wound in the form of a spiral with one turn inside of the other and each turn becoming smaller as the center of the loop is approached. A loop aerial of this type is illustrated in Figure 52. As is shown, the wire starts at one corner, and after making one complete turn, the second turn is started inside of the first, the successive turns being spaced about one-half inch apart. The spiral loop thus resembles a large pancake coil, with all the wires lying in the same plane and each successive turn being smaller than the preceding turn.

The Solenoid Loop

Another way of winding a square loop is illustrated in Figure 53. Here the loop is wound in the form of a large square coil or solenoid with a very large diagonal compared to its length. This form of loop aerial seems to be the more popular and is used to a greater extent than the spiral loop. One important feature about it is that it lends itself readily to being wound on the interior of the cabinet enclosing the receiving apparatus. Such an arrangement forms a very compact and self-contained unit; and if used in conjunction with suitable Radio frequency amplifying apparatus, it gives very satisfactory and efficient service.

The spiral loop is highly directional and can be wound to be very compact. It is used very extensively for Radio compass stations and direction finders. It possesses the disadvantage, however, that its operation is restricted to the shorter wave lengths, in that it cannot easily be wound for the longer wave lengths on account of the smaller space allotted to each successive turn.

The solenoid loop, however, is not hampered by such restrictions, because for a given size loop more turns can be arranged and each turn is of the same length. It is somewhat less directive than the spiral loop and also permits of broader tuning. It is thus somewhat better adapted for the reception of broadcast messages and musical entertainments.

How the Loop Aerial Receives

The operation of the loop aerial is, of course, based upon the principles of electromagnetic induction. We will remember that Radio messages are carried through space in the form of electromagnetic waves, and these waves as they advance are intercepted by the numerous metallic objects and wires that lie in its path. As these waves thus come upon the loop aerial, they cut across the wires comprising the loop and induce in them electrical oscillations corresponding in nature to the characteristics of the impinging waves.

The effect produced by these induced oscillations, however, depends upon the position of the loop with respect to the direction in which the waves are advancing. If the plane of the coil is parallel with the front of the wave, that is, if one face of the coil is in the direction the wave is moving, then the oscillations induced in opposite sides of the coil will oppose each other and thus be neutralized. However, if the plane of the loop is at right angles to the front of the advancing wave, the nearer side of the coil will be intercepted before the farther side is; and although the difference may appear to be so minute if the speed of propagation of the wave is considered, the out-of-phase conditions of the oscillations in opposite sides of the loop are sufficient to enable the detection of the resulting induced currents if sufficiently sensitive apparatus is employed.

It is thus evident why the loop aerial is so directional in its operation, for the nearer the face of the loop is at right angles to the front of the wave the greater will be the phase difference, and the more marked will be the resulting oscillations flowing in the loop. Therefore, when a loop aerial is used for receiving, the plane of the loop should point in the direction of the station from which the received signals are coming. By then turning the loop slightly in one direction or the other, a position will be found at which the signals are coming in loudest. If the loop is turned at right angles to this position, no sounds at all will be heard.

Constructing a Loop Aerial

In the construction of a loop aerial there are two items to consider, the first is the supporting framework and the second is the winding of the loop itself. The framework should be rigid and strong enough to support the loop without requiring any bracing from the wire itself. It should also be arranged so as to be capable of being rotated on a vertical axis in order that the loop can easily be adjusted for receiving sending stations in any direction.

A convenient arrangement to use is two varnished wooden strips 42 inches long so that each side of the square loop will be about 30 inches (two and one-half feet) long. This size has been found to be very satisfactory for receiving wave lengths ranging from 360 to 485 meters. In order that the wire will be well insulated where it passes over the ends of the 42-inch supporting sticks, it is a good plan to mount bakelite end pieces with suitably cut

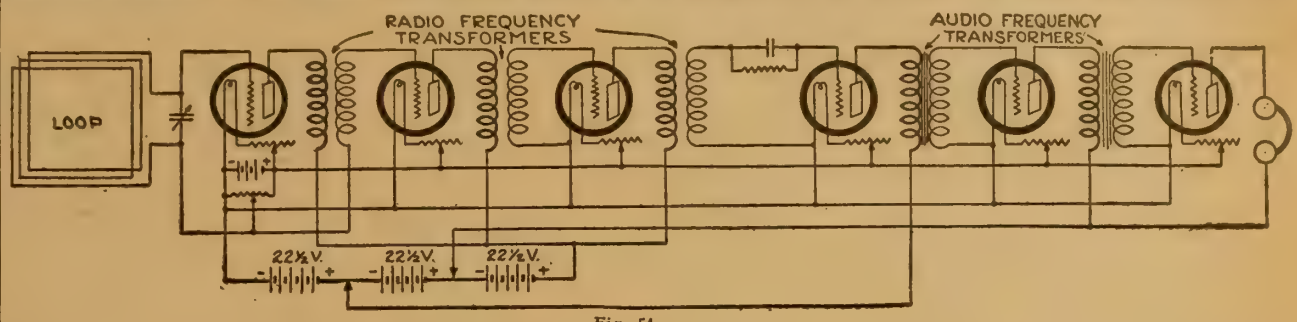


Fig. 54

grooves in them for holding the loop. This will to some extent avoid the collection of dirt and moisture, and thus prevent current leakage between the successive wires at these points.

In mounting the loop it makes little difference as to whether the sides of the coil are vertical and horizontal, or whether it is tilted at an angle of 45 degrees so that one diagonal forms the vertical axle. But it should be constructed perfectly symmetrical, and mounted so that it will remain in a set position without requiring constant resetting.

Winding the Loop

The actual size of wire to use is not so very important, but should be sufficiently large to avoid high resistance or excessive current loss. Practically any size wire between 14 and 18 is very suitable. Bare copper wire is quite generally used to good advantage, for it does not involve any serious dielectric losses due to the insulations. Number 14 braided or tinned copper strand seems to work best and produces the best quality signals.

As to the size of the loop, experiments have shown that in general the larger loops operate with better efficacy, for with a larger loop less turns are needed to give the necessary inductance, and with less turns the amount of distributed capacity is reduced. However, another factor to consider is that a coil which has the greatest inductance possible for a given

(Continued on page 14)

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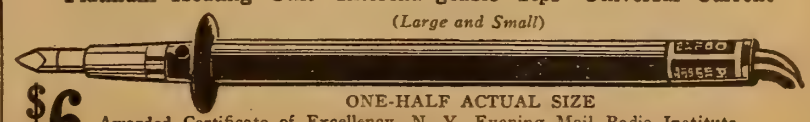

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Reinartz Hook-Up Secures Results

Change in Tickler Coil Wiring Improves Circuit

After having done considerable experimenting with the Reinartz circuit I found that very much stronger signals could be received with the hook-up as shown in Figure 1. It will be seen that the change is made with the inside or tickler coil. The connection thus makes all the current which passes through the receiver to also run through the tickler coil. Several of my friends have tried this and find they get stronger signals.

Being bothered with a considerable amount of body capacity from the switch handles and points I made some changes which absolutely eliminates this trouble. The diagram Figure 2 shows how this was accomplished.

The coil of units was separated from the coil of 15 and sevens, or the grid coil where they joined in the center, then these coils were again joined by connecting the two switch handles together. The grid lead was taken from the severed end of the grid coil and the antenna lead was taken from the severed end of the units coil. The joined switch handles were connected to the ground, thus eliminating all chance of body capacity. Naturally the flow of current had to be reversed in the tickler coil, which change is also shown on this diagram but it could be easily used on the regular Reinartz circuit.—C. K. Beebe, Chicago, Ill.

HOOK-UP FOR RECEIVING SET

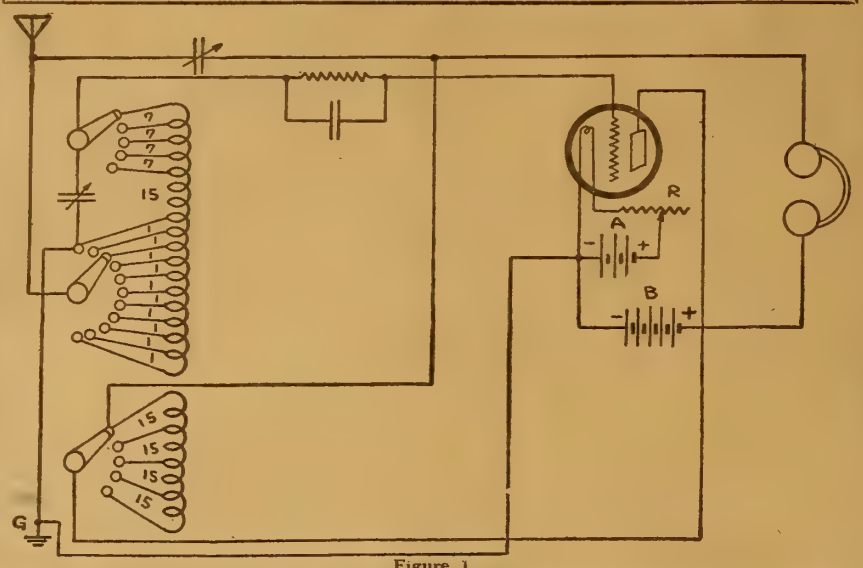


Figure 1

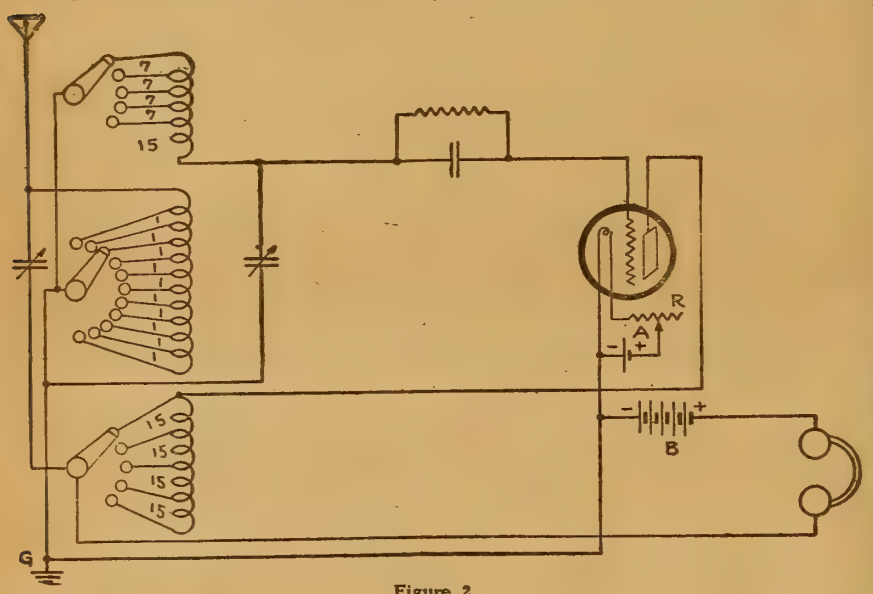


Figure 2

Switzerland is showing a growing interest in Radio. Parts of that country are cut off from Radio communication owing to the very high mountains, but fans in other sections listen in daily to the news sent out from the Eiffel Tower in Paris.

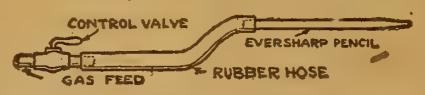
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

Soldering Gas Torch

I was experimenting with a gas torch recently and it gave me the idea as follows: An eversharp pencil was procured and the magazine removed from it. A rubber hose was attached to the large end of the pencil and the other end of the hose secured to a gas connection on the gas stove.

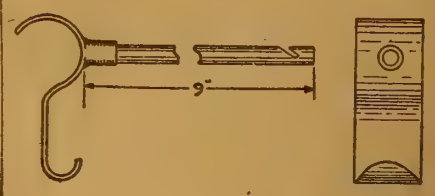


If there is no connection on the stove lift one of the burners from the pet cock and slip the hose on this tube. I found this a very handy tool for soldering connections.—Robert M. Cramer, Chillicothe, Mo.

Radio signaling up to the present time is made up of several different methods: Damped wave telegraphy (spark); interrupted continuous wave (ICW), and continuous wave (CW).

Picture Molding Hook Supports Inside Aerial

The ordinary picture frame hook provides a means for making an inside aerial support. All that is necessary is to procure a number of the hooks and solder on a rod conection 9 inches long. A notch is cut in the outer end into which the wire is placed. These are attached to the molding at intervals and the antenna wire dropped into the notches.



Value of Short Wiring

The reason for the use of short wiring and right-angle turns in connecting a set is a simple one. Every wire carrying an electric current has a magnetic field; if two wires are placed near each other, they will absorb current, but if placed at right angles they will oppose each other, which is just what they should do. If the wires are run long they will, of course, meet with other long leads, and there will be adverse inductions.

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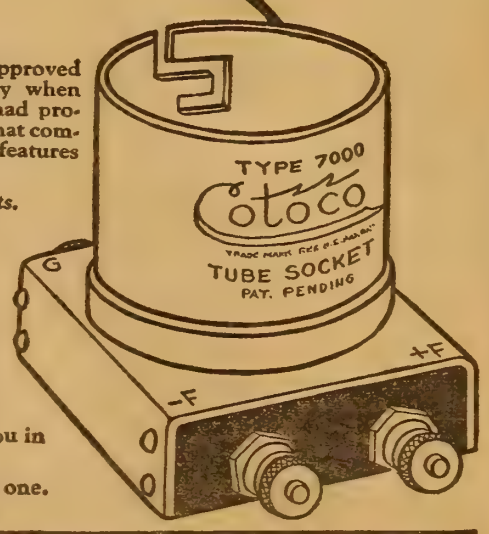

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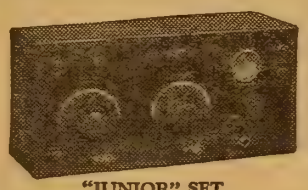

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How to Make a Regenerative Receiver

Cabinet and Coils Are Easily Made at Home

The following is a description of the construction of a good regenerative receiver, using the well-known Armstrong tickler coil in the plate circuit.

LIST OF MATERIAL

- 1 bakelite panel 18 in. by 9 in. by ⅛ in. thick.
- 1 bottom of cabinet 18 in. by 6 in.
- 1 top of cabinet 18 in. by 6 in.
- This wood should be walnut, oak or mahogany ¼ in. thick.
- 2 sides of cabinet 9 in. by 6 in.
- 1 back of cabinet 18 in. by 9 in.
- 175 ft. No. 23 S. S. C. magnet wire.
- 2 .001 Mfd. variable condensers unmounted with knobs and dials.
- 1 telephone condenser, .0012 Mfd. capacity.
- 1 cardboard tube 6 in. long, 4½ in. diameter by ⅛ in. thick.
- 1 cardboard tube 2¾ in. long, 2⅞ in. diameter, ⅛ in. thick.
- 20 switch points ¼ in. diameter.
- 6 switch stops 7-32 in. diameter.
- 2 switches for inductance—radius of blade 1¼ in.
- 1 switch lever and knob for tickler coil.
- 2 bushings for tickler coil shaft.
- 1 brass rod 7 in. long by 3-16 in. diameter.
- 8 binding posts.
- 1 filament rheostat.
- 1 grid leak condenser.
- 1 vacuum tube socket.
- 6 machine screws with nuts for condensers and rheostat.
- 2 dozen wood screws.

Construction of Coils

Take the cardboard tube, 4½ inches in diameter, and punch two holes at the extreme end about ½ inch apart, leaving enough protrude for connections and begin winding, taking a tap off after ten turns have been wound. Continue the winding until ten taps of ten turns each have been taken. This completes the primary. A space of 2 inches should be left between the primary and secondary windings on the coil. After the last tap of the primary has been taken off, the wire should not be broken, but wound diagonally across the 2-inch space and the secondary winding started. Take a tap off for each complete turn and take ten taps. Punch two small holes ½ inch apart near the last tap and push the end of the wire through one and then through the other hole, pulling it up tight, leaving enough for connections.

Through the center of the 2-inch space, between the primary and secondary, cut a hole 3-16 inch in diameter through each side of the coil for the tickler coil shaft. The two bushings for the shaft should be fitted in these holes. Two more small holes are punched through the space between the windings, in order to make connections from the tickler to the plate. When the coil is completed, it should be given a good coat of shellac.

Tickler Coil Winding

The tickler coil winding is started on the cardboard tube, which is 2¼ inches long, in the same manner as the primary coil, by punching two holes at the end of the tube, pushing the wire through one hole and bringing it through the other, leaving 4 inches for connections, wind twenty-five turns, then leave a space of ⅝ inch in the center of the tube, bring the wire across the space and wind twenty-five more turns in the same direction, on the other side of the space. Punch two small holes near the end of the last turn and make the wire fast, as at the beginning of the winding, leaving about 4 inches for connections.

In the center of the ⅝-inch space cut one 3-16 inch hole on each side for the shaft. No bushings are necessary here, as the tickler should be kept in place by sealing wax after the tickler has been inserted inside the large tube and the shaft pushed through the holes. The two ends of the winding on the tickler coil, where connections are to be made, should be soldered on to about 6 inches of soft flexible cord wire, a telephone cord, or the like, to give enough play in the wire when revolving the tickler inside the large coil.

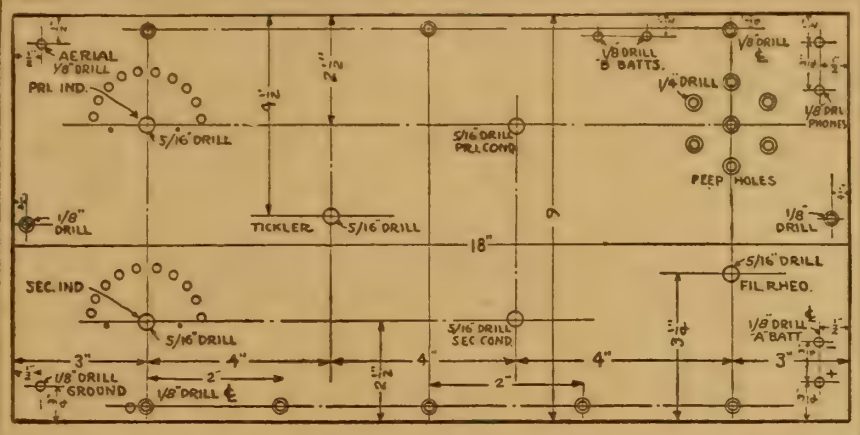
The soldered connection should be insulated with a piece of rubber tubing. When the coil is completed it should be given a good coat of shellac.

Insert the tickler inside the inductance coil and pass the brass shaft through both tickler and large tube. The end of the shaft should have a small hole about 1-32 inch drilled through the diameter and a pin inserted to keep the shaft in position. The two leads from the tickler are brought out through the two small holes in the inductance coil.

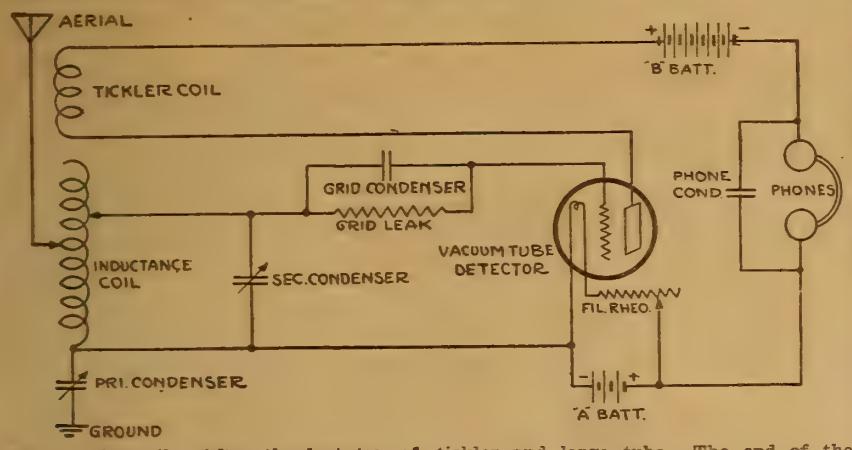
Drilling the Panel

The panel should be drilled as illustrated, and the bottom of the cabinet fastened to it with wood screws. Two small blocks of wood or other material with a hole in the center, should be obtained for a foundation for the coil, which should be screwed down to the cabinet through the blocks. When fastening the coil to the bottom, see that the end of the shaft fits exactly through the hole drilled in the panel for the tickler coupling. The primary and secondary condensers and filament rheostat should be screwed to the panel with the six machine screws and nuts. The vacuum tube socket and grid leak condenser are fastened to the bottom piece of the cabinet. All binding posts, switch points and switch stops should be screwed to the panel before wiring. The ten taps from the primary and secondary are soldered to their respective switch points. The telephone condenser may be maintained in place by the con-

(Continued on page 14)



PANEL LAYOUT FOR ONE TUBE SET



How to Prevent Spilled Acid from Doing Harm

The solution or electrolyte used in lead acid battery is composed of water and sulphuric acid. This solution will destroy any but wool cloth and hence should not be spilled on carpet or clothing. If the solution should become spilled, apply as quickly as possible, household ammonia or baking soda to the spot covered by the solution. The ammonia or soda, being alkalies, will neutralize the sulphuric acid and prevent its further destructive power. —H. E. Jameson. Milwaukee, Wis.

Breaks in Flexible Receiver Cords

One of the commonest occurrences of open circuits in a Radio receiving outfit is in the flexible telephone receiver cords. These leads are continually being twisted and untwisted and bent so that it frequently happens that the strands break, usually near the tips.

The symptoms of this condition are evidenced by hearing intermittent or interrupted signals in the receivers every time the flexible cords are shaken. The noise heard when the broken ends of the strands are rubbed together is a series of clicks quite similar to strong static.

One remedy is to cut off the broken end and solder the cord tip on the new cord end thus made available. In most cases, however, it will be found advisable to put in new cords, since a repair to a broken cord weakened by constant usage may only serve as a temporary remedy.—P. J. M. Clute, Schenectady, N. Y.

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Potter Precision Single Phone—1100 Ohms	4.50	3.00
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Acme transformer—type A-2S	5.00	4.25
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11 Plate Condenser, moulded ends, .00025	2.50	1.35
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Framingham Vernier Rheostat	1.50	1.15
Amsco Potentiometers—360 Ohms Resistance	1.75	1.00
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Firco Jacks, Open Circuit	.70	.30
Firco Jacks, Closed Circuit	.85	.40
PLUGS		
Flat Plugs	1.00	.50
Round Plugs—Bulldog Grip	1.25	.60
4 Way Plug	1.50	1.25
CRYSTAL DETECTORS		
Glass enclosed, moisture proof, spring adjustment, moulded bakelite base, with tested crystal, perfect design	1.50	1.25
Open type—moulded base (completely assembled)	1.50	.50
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3 inch Composition Dial and Knob	.75	.30
3½ inch Unbreakable Dial and Knob—¼ inch hole	1.00	.50
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Bright Star "B" Battery	3.00	2.00
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22½ Volts, Variable, 5 Positive terminals	1.75	1.10
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A. B. C. LESSONS

(Continued from page 11)

length of wire is a more efficient absorber of radiant energy than another coil of the same inductance but with less number of turns. It is therefore necessary for a given wave length to strike a happy medium between these several attending circumstances. For the reception of ordinary broadcast messages which are sent out at wave lengths ranging from about 360 to 485 meters, a loop about 30 inches (2½ feet) square and wound with ten turns spaced ½ inch apart, forms a very efficient receiving aerial.

The wires leading from the loop to the receiving set should be arranged as short as possible and should be placed so as to reduce to a minimum all capacity and inductance effects upon adjacent conductors, etc.

The Receiving Circuit.

The receiving circuits used with loop aerials are very similar to the multi-stage Radio frequency amplifier circuits illustrated and discussed in the previous chapter; except that in this case the loop is regarded as comprising the tuning coil or inductance, and the receiver is tuned to the desired wave length by means of a 23-plate variable condenser shunted across the terminals of the loop. The remainder of the detector and amplifier circuits do not differ from the receiving circuits employing a variocoupler or variometer as a tuning inductance.

An efficient loop aerial receiving circuit is illustrated in Figure 54. Here three stages of Radio frequency and two stages of audio frequency amplification are employed. As is shown, the terminals of the loop lead directly to the terminals of the receiver corresponding to the aerial and ground connections. Shunted across these two terminals is a 23-plate variable condenser for tuning purposes. The remainder of the circuit does not differ any from the general form previously described.

In operating a receiving station of this kind, the filaments are first heated to their normal brilliancy. The receiver is then thrown into resonance with the incoming waves by adjusting the tuning condenser. The loop is then rotated the necessary amount to bring the signals in loudest, and finally the other necessary adjustments are made until stable operation results.

After resonance is established between the loop and the tuning condenser, the potential oscillations are impressed on the grid and filament of the first amplifier tube. From here they are sent through the second and third stages of the Radio frequency amplifiers, and are then impressed upon the input circuit of the detector tube. From the output circuit of the detector tube the audio frequency oscillations are amplified through two stages of audio amplification. The current oscillations are then sufficiently strong to efficiently operate a loud speaker.

Conclusion

Although the loop aerial will hardly replace the outdoor aerial completely; nevertheless, with improved Radio frequency amplifying apparatus and more efficient receiving and detecting equipment, the loop aerial will come into more and more extensive use among the Radio public. It is true that the necessary stages of Radio frequency amplification greatly increase not only the initial cost but also the maintenance expense; but where these items are of less importance, the loop aerial receiving station forms a very desirable form of Radio receiver.

Chapter Sixteen

Chapter sixteen which will occur in the next week's issue, will be devoted to the nature and characteristics of reflex receiving circuits which have of late come into such extensive use. The reflex circuit, combining as it does Radio and audio frequency amplification, is a very interesting type of receiver and one that many will like to try out.

REGENERATIVE RECEIVER

(Continued from page 13)

nections. Other wiring should be done as indicated in diagram. The wiring should be done with stiff wire and covered with rubber tubing or other insulating material.

The two sides, back and top of the cabinet are screwed together and then fastened to the panel and bottom. Applying two coats of varnish on the cabinet makes a very neat appearance to the set.

In order to distinguish the different controls, and improve the appearance of the receiver as a whole, small name plates may be attached under their respective controls. If the A and B battery binding posts are marked by a name plate, the polarity is readily ascertained, and mistakes are less likely to occur.

No further explanation of the wiring is necessary, as the diagram and back view of the set is simple and easily understood.

The receiver has a wave length range from 200 to 700 meters.—A. R. Friess.

The Reader's View

Week-End Set

Many thanks to your prompt reply to my letter of February regarding the Super-Hetrodyne circuit. This information checks up with the data I have on hand and from which I am going to build my set during the summer.

I have followed your articles regarding the Flewelling Circuit with interest. The first one came out in your paper of October 21st, 1922, and the next morning I had one in operation—it is certainly a wonder—we do not call it a "Flivver"—a "Week End" Set is the name we have given it. In the back of the car it goes with a WD 11 tube, 75 feet of wire and a pair of Baldwin phones and we have music wherever we go.

During the last of November I picked up practically all of the stations east of Kansas City, Texas, Cuba, Atlanta, etc., on a Cunningham 300 tube with 22½ Volts Max. on the plate. At that time I had finished experimenting and built it into a permanent set for taking on trips. I have tried out many of the new arrangements and have yet to find anything better than the one I decided to use; but I admit that some of the new ideas make a little more noise, which some fans believe is volume.—Judson Hayward.

New Association Formed

ST. LOUIS.—At a recent gathering of owners and operators of licensed Radio transmitting stations in this city, an organization to be known as the "Radio Transmitters' Association of St. Louis" was formed.

The object of this association, as set forth in the constitution, is to promote the interest of all licensed Radio operators and their stations. The following officers were elected: J. D. Lucas, president; P. F. Ring, vice president; Leslie Essington, secretary and treasurer.

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Fada Type Switch Levers	.23	Vernier Rheostats	1.35
Firth Crystal Detectors	1.00	11-Plate Condenser	1.35
Brach Lightning Arrester	1.25	43-Plate Condenser	2.15
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The "How" of the Simplified Super Circuit

Part X—An Explanation of Several Causes of Failure

By E. T. Flewelling

DURING my travels throughout the United States I have been able to pick up some very valuable information concerning the points that seemed to give the fans the greatest amount of difficulty in securing successful operation of the Flewelling circuit.

It seems best at this time to get right down to cold, hard, point-blank statements as to how the circuit should be handled, because it is only in this way that one may be sure of securing the results that most of us know may be obtained.

The various parts have been discussed but there are so many new fans who have entered into the game that it is only fair to go over some of the points for their benefit.

Utilizing a Nuisance

Previous articles have shown that one of the main features of the circuit is that of changing a nuisance into a utility. To be more clear, in the old days, the squealing and howling caused by rectification with a block tube, due to oscillations and improper grid leak settings, etc., was considered the nuisance. Now, in the Flewelling circuit the entire secret is this: Absolute control of the blocking and absolute control of any squealing or howling that may present itself in the operation of the circuit. This is done in two ways; with proper values in the circuit itself, and by positive control of the grid by the way of the grid leak. The whole secret of the circuit operation actually centers on this point. Everything else being right, if you are unsuccessful in making the circuit operate, then you may concentrate your entire efforts on the grid leak.

Proper Grid Leak Necessary

At the time the circuit was first brought out, it was an impossibility to secure any satisfactory form of commercial grid leak due to the popularity of the Flewelling circuit and our constant hammering on the point that a good grid leak is an absolute essential in any Radio circuit, especially one using hard tubes; however, there are now several more or less acceptable forms manufactured. There is one type in particular that enjoys a large scale that is not at all suitable for any Radio circuit. It is suggested that you be careful not to try this form on the Flewelling circuit.

It seems too bad that we must limit our remarks to suggestions at times, but due to the large field that we are in and the fact that the writer has no personal axe to grind we will have to satisfy ourselves with references only to those types that have been used and found successful. Grid leaks are very difficult to manufacture and secure uniform results from each and every one and it is suggested that you purchase what you believe to be a reliable form and if you are unable to secure results from it understand that possibly you were unfortunate in that the particular one that you purchased happened to be defective. Give the leak benefit of the doubt and purchase another one. This may seem a peculiar procedure but it is suggested in view of the writer's extensive experience with the types of leaks now manufactured. I am simply passing this on to you as my own personal experience, and it is only a profitable thing to do. As said before, a good grid leak is valuable on any set.

Mounting the Coils

Another point that comes to mind is the matter of mounting the coils. I am going to have a lot to say about various coils in future articles. The plan is to broaden out considerably from the 50 and 75-turn coils.

Considering these two just now, the point comes up as to whether tight or loose coupling is desirable. It is easily answered to this end. Local work frequently calls for loose coupling. Distance work on the other hand almost invariably calls for close coupling. Many are troubled with the question "What type of mounting should be used?" and this is answered in the same way as before. A good reliable honest product is the only answer. Inasmuch as I have suggested various types for other parts of the circuit, I will say that at this time I am using the Crown coil mounting, which, I believe, is manufactured in New York. The idea to be looked for in a coil mounting is the ability of the mounting to give either loose or close coupling and stay where it is put. In other words, do not purchase a mounting that is unable to hold its setting.

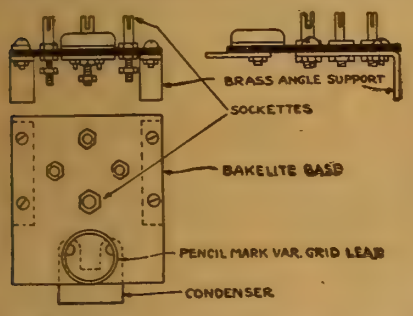
Adjusting the Coils

This brings us to the point which I have often emphasized, but the Radiophans seem to overlook. The Flewelling circuit has been reduced to the point where it is as simple as can be expected and where it is guaranteed to work immediately if the famous grid leak and other parts are right, with this one exception, the fields of the two coils must work together. Therefore, when the circuit is entirely finished and it does not operate, and the grid leak has no effect on it, there is only one thing to look for, and that is the ability of the coils to "work" together or "buck" one another. They must work together. Try reversing the two lead going to the 75-turn coil, if unable to get results.

These two points are the kernel of the nut. If they are right, it is safe to say that you will enjoy the same wonderful results as reported to date by thousands of my friends.

Combination WD11 Tube Socket and Grid Leak

An inexpensive and neat little socket for the WD 11 tube was made up in combination with the grid leak condenser and support as shown in the accompanying sketch. A piece of ⅛-inch thick insulating composition was cut 2½ by 3



inches to serve as a base. Four vacuum tube sockets were located, as shown, to take the tube prongs. A variable grid leak of the pencil type with cap was mounted near one edge. The grid condenser is of the type to fit the terminals of the leak and is attached thereto underneath the base. Two pieces of ⅛-inch brass, ⅝ inch wide were cut and bent to form angle supports as shown. Use 6-32 or 8-32 round head brass screws and nuts for fastening the supports to the base. The whole arrangement is attached to the panel just under or over the rheostat, as desired, by means of the same size flat head brass screws and nuts. —J. M. Walsh, Honesdale, Pa.

Cut Down Aerials

LONDON, ENGLAND. — French Radio experts are having considerable difficulty ascertaining who is broadcasting on the same wave length as the Eiffel Tower and at the same time. In the vicinity of London there is a problem of a different nature. Interference from amateurs has been prevalent and now someone has taken to cutting aerials down, in an effort to get rid of the alleged nuisance. The work is believed to be that of boys, but so far the miscreants have not been discovered.

One of the uses of Radio is the taking of speeches, news and lectures by shorthand students, thus increasing their efficiency and speed.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of RADIO DIGEST, published weekly at Chicago, Illinois, for April, 1923.

State of Illinois, County of Cook, SS.—Before me, a Notary public in and for the State and county aforesaid, personally appeared E. C. Rayner, who, having been duly sworn according to law, deposes and says that he is the publisher of the RADIO DIGEST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher E. C. Rayner, 717 Irving Park Blvd., Chicago, Ill.; editor, Chas. F. Smisor, 4757 Lake Park Ave., Chicago, Ill.; managing editor, Evans E. Plummer, 1018 N. State St., Chicago, Ill.; business manager, none.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) Radio Digest Publishing Co., Inc., 123 W. Madison St., Chicago, Ills.; E. C. Rayner, 717 Irving Park Blvd., Chicago, Ills.; S. O. Bronstein, 4600 Lincoln Ave., Chicago, Ills.; F. T. Ryan, 123 W. Madison St., Chicago, Ills.; A. R. White, 7015 Ellwood Ave., Chicago, Ill.; Joseph Seaman, 260 Fifth Ave., New York, N. Y.; George Seaman, 2350 Parkway, W. Chicago, Ill.; D. R. Seaman, 49 Cedar St., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

E. C. RAYNER, Publisher.

Sworn and and subscribed before me this 29th day of March, 1923.

(SEAL) JEAN M. MEACHER.

(My commission expires September 8th, 1926.)

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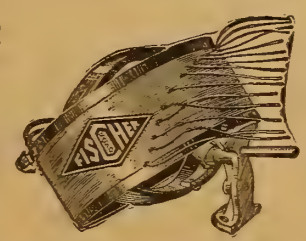

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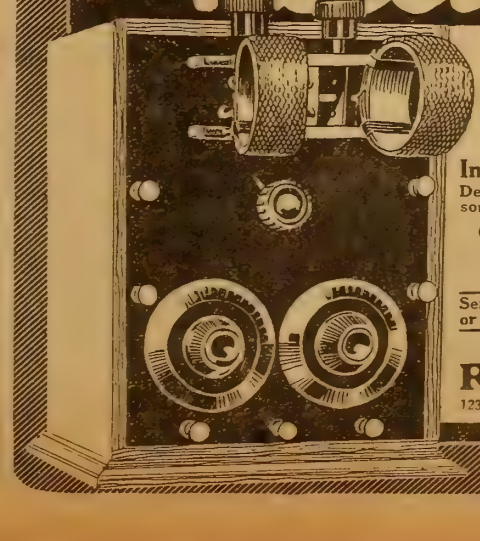

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RECEIVING RECORDS CONTEST

By the Contest Editor

THIS week the complete list of record holders revised to date is given. Since the March 10 issue, 132 more records have been added to the 312 then published. Only 70 of these records have been beaten, and the rest have been able to hold their own. Send your records in this week and see if you can keep them in until the next time the complete list appears.

The rules of the contest are also given this time for the benefit of the new fans who have become interested.

Below is the list of the "survival of the fittest":

Station—Miles Away—Who Heard It

AS6—1250, John Kiener, Cleveland, O.
CFAC—1650, R. A. Deger, Dayton, O.
CFCA—1850, C. C. Beery, Spokane, Wash.
CFCB—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CFCN—2000, C. M. Bussey, Hudson, N. Y.
CHBC—2450, S. S. Florence B. Phillips.
CHCA—1625, T. S. Wildman, Nicholas, Iowa.
CHCR—2125, Arthur Chapelle, Woodburn, Ore.
CHCC—1325 Samuel Woodson, Jr., Liberty, Mo.
CHCF—1250, B. U. Livingston, Morristown, N. J.
CHCQ—2100, G. F. Aiken, Providence, R. I.
CHXC—1500, M. B. Gilbert, Douglas, Wyo.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
CJCB—1300, V. Dennis, Oskaloosa, Kans.
CJCE—2100, F. C. Woodford, Canton, O.
CJCG—1425, G. E. Wharton, Houston, Tex.
CKAC—2700, A. C. Carter, Juneau, Alaska.
CKCD—1325, E. M. Perkins, Jr., Sioux Falls, S. D.
CKCK—1650, L. C. Burwell, Jr., Charlotte, N. C.
CKCR—1225, Samuel Woodson, Jr., Liberty, Mo.
DD5—1225, C. D. Mason, Cleveland, O.
DM4—1700, Arthur Chapelle, Woodburn, Ore.
DM7—1150, L. J. Martin, Minneapolis, Minn.
DN4—2100, W. E. Davison, Berwick, N. S., Can.
KDEK—1225, E. M. Perkins, Jr., Sioux Falls, S. D.
KDJ—2450, C. Edge, Jr., Melbourne, Fla.
KDKA—2500, Robert Rowe, Santa Clara, Calif.
KDN—2175, F. C. Woodford, E. J. Poyser, Canton, O.
KDPT—1800, C. Hackney, Fairmont, Ind.
KDYL—2450, R. Doull, Halifax, N. S.
KDYM—2025, F. B. Steer, Cleveland, O.
KDYQ—2550, C. M. Rice, Jr., Worcester, Mass.
KDYR—2300, F. H. Peran, Oswego, N. Y.
KDYS—1700, M. C. Ridenour, Kingwood, W. Va.
KDYU—1525, T. S. Wildman, Nichols, Ia.
KDYW—2175, Edmund Howard, Waterbury, Conn.
KDYX—5000, C. F. Rose, Jr., Springfield, Mass.
KDYY—1325, J. Wallace, Bridgeville, Pa.
KDZA—2025, Breisch Motor Co., Ringtown, Pa.
KDZE—1725, Philip Delano, Bonne Terre, Mo.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KDZQ—2175, H. S. Olding, New Glasgow, N. S., Can.
KDZT—1250, E. M. Perkins, Jr., Sioux Falls, S. D.
KFAB—2325, Breisch Motor Co., Ringtown, Pa.
KFAD—2125, Mrs. A. S. Mawhinney, New York, N. Y.
KFAE—1650, G. E. Wharton, Houston, Tex.
KFAF—1775, F. W. Foss, Boston, Mass.
KFAM—1775, J. W. Hawes, Boston, Mass.
KFAN—1250, Chas. N. Schwab, Grinnell, Iowa.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFAS—1900, F. Brumon, Urbana, O.
KFAU—1325, Ross Hansch, Baraboo, Wis.
KFAW—1325, M. L. Johnson, Atchison, Kans.
KFAY—2200, L. A. Graf, Dunkirk, N. Y.
KFBB—1050, R. Henry, Butler, Mo.
KFBC—2125, J. D. Crosby, Stauffer, Pa.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFBH—1450, R. B. Reed, Eureka, Kans.
KFBJ—1775, Richard Reeder, Alliance, O.
KFBK—1950, H. S. Juday, Eldorado, O.
KFBM—2450, T. W. Zeigler, Charleston, S. C.
KFBQ—1025, B. H. Seydel, Tacoma, Wash.
KFC—1950, J. W. Mayfield, Cincinnati, O.
KFCB—1425, O. P. Klein, Leduc, Alta., Can.
KFCC—1175, M. L. Johnson, Atchison, Kans.
KFCF—1775, R. A. Deger, Dayton, Ohio.
KFCL—1300, M. L. Johnson, Atchison, Kans.
KFCX—1075, G. E. Wharton, Houston, Tex.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFDL—1225, John Kiener, Cleveland, O.
KFEB—1125, R. L. Hartman, Hoisington, Kans.
KFEL—1050, H. R. Wunder, Cheviot, O.
KFGH—1425, M. L. Johnson, Atchison, Kans.
KFI—2900, W. E. Davison, Berwick, N. S., Can.
KFV—1750, A. L. Ober, North Manchester, Ind.
KFZ—2175, A. A. Acken, Jersey City, N. J.
KGB—1250, C. Bennett, Aurora, S. D.
KGE—1350, S. M. Woodson, Jr., Liberty, Mo.
KGG—1650, Vernon Adams, Joplin, Mo.
KGL—1650, D. E. Rogers, Crandon, Wis.
KGN—1875, Fay Allarding, Lake Odessa, Mich.
KGU—4650, Eugene Evans, Tippecanoe City, Ohio.
KGV—3700, M. C. Bidwell, Grinnell, Ia.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KHD—1000, Arthur Chapelle, Woodburn, Ore.
KHJ—3000, H. S. Olding, New Glasgow, N. S., Can.
KHQ—2500, C. M. Rice, Jr., Worcester, Mass.
KJJ—2175, M. P. Jacot, Copley, O.
KJR—2300, H. S. Olding, New Glasgow, N. S., Can.
KLB—1900, Billy Withington, Jackson, Mich.
KLP—2180, W. G. Mann, London, Ont., Can.
KLX—2600, C. C. Dunbar, Greenville, N. H.
KLZ—2100, W. E. Davison, Berwick, N. S., Can.
KMJ 1050, C. C. Sawyer, Liberal, Kans.
KMO—1600, Ross Hansch, Baraboo, Wis.
KNI—2150, John Kiener, Cleveland, O.
KNJ—1425, J. Wallace, Bridgeville, Pa.
KNT—2425, J. H. Wall, Rensselaer, N. Y.
KOB—1975, C. M. Rice, Jr., Worcester, Mass.
KOG—2125, A. H. Jessup, Erie, Pa.
KON—1900, F. Brinnon, Urbana, O.
KOP—2075, T. W. Smith, Watsonville, Calif.
KPO—2550, C. M. Bussey, Hudson, N. Y.
KQI—1350, E. M. Perkins, Jr., Sioux Falls, S. D.
KQP—2100, G. A. Walter, McDonald, Pa.
KQV—1325, M. B. Gilbert, Douglas, Wyo.
KQW—1900, C. Conrad, Logansport, Ind.
KSD—4000, Walter Lee, Lost Harbor, Alaska.
KTW—1250, C. Bennett, Aurora, S. D.
KUO—2675, C. M. Rice, Jr., Worcester, Mass.
KUY—2100, Roland Smith, Hilo, Hawaii.
KVQ—1125, G. D. Robarts, Edmonton, Alta., Can.
KWG—2500, Mrs. A. S. Mawkinney, New York, N Y.
KWH—2300, C. L. Walker, Napanee, Ont., Can.
KWJ—2125, C. J. Lohman, McDonald, Pa.
KXD—2075, Richard Reeder, Alliance, O.
KXS—2325, A. C. Thompson, Owego, N. Y.
KYF—1106, R. L. Hartman, Hoisington, Kans.
KYG—2175, J. F. Means, Oil City, Pa.
KYI—1750, W. Schultze, Chicago, Ill.
KYJ—2025, V. V. Tompkins, Cleveland, Ohio.
KYT—2325, Breisch Motor Co., Ringtown, Pa.
KYW—1850, J. J. Beales, Jr., San Anselmo, Calif.
KYY—2500, J. R. Purcell, Fort Jervis, N. Y.
KZM—2700, Sarkis Kachajian, Worcester, Mass.
KZN—1650, E. K. Kitts, Bluefield, W. Va.
KZV—1175, C. Bennett, Aurora, S. D.
KZY—1950, A. Galloway, Jr., Grand Rapids, Mich.
NAA—2250, R. J. Gall, Blythe, Calif.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAAB—1325, C. H. Vale, Providence, R. I.
WAAC—1775, W. F. Macleod, Prince Albert, Sask., Can.
WAAD—1100, R. Doull, Halifax, N. S.
WAAF—1850, L. W. Beretta, San Mateo, Calif.
WAAG—1600, C. C. Beery, Spokane, Wash.
WAAJ—1725, M. B. Gilbert, Douglas, Wyo.
WAAL—1550, Richard R. Martindale, Los Angeles, Calif.
WAAM—1575, M. B. Gilbert, Douglas, Wyo.
WAAN—1400, H. Baird, River de Chute, N. B., Can.
WAAP—1400, Arthur Chapelle, Woodburn, Ore.
WAAQ—1325, W. Douglas, Guthrie, Okla.
WAAW—1300, A. B. Butters, Los Angeles, Calif.
WAAZ—1700, W. E. Davidson, Berwick, N. S., Can.
WBAA—1575, C. C. Beery, Spokane, Wash.
WBAB—1425, G. E. Wharton, Houston, Tex.
WBAD—1125, N. Theobald, Attleboro, Mass.
WBAF—1250, M. Neuman, Guthrie, Okla.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAH—1050, F. T. Wycoff, Springfield, Mass.
WBAJ—1075, G. E. Wharton, Houston, Tex.
WBAM—1825, H. S. Olding, New Glasgow, N. S., Can.
WBAP—2550, C. Blanch, Amherst, N. S., Can.
WBAQ—1200, H. S. Olding, New Glasgow, N. S., Can.
WBAX—1350, G. E. Wharton, Houston, Tex.
WBAY—2175, C. C. Beery, Spokane, Wash.
WBF—2575, A. B. Butters, Los Angeles, Calif.
WBL—1900, H. S. Olding, New Glasgow, N. S., Can.
WBT—1250, W. C. Wolverton, M. D., Linton, N. D.
WBU—1400, Wilson Woodside, Calgary, Alta., Can.
WBZ—2500, Arthur Chapelle, Woodburn, Ore.
WCAE—2250, R Taylor, Livermore, Calif.
WCAF—1025, F. J. McKenney, New Prague, Minn.
WCAG—1325, K. McNeil, Ottawa, Ont., Can.
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WCAL—1150, G. D. Robarts, Edmonton, Alta., Can.
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WCAS—1450, Arthur Chapelle, Woodburn, Ore.
WCAT—1975, H. S. Olding, New Glasgow, N. S., Can.
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WCAY—1050, D. J. Morris, Weir, Tex.
WCAZ—1375, W. E. Davison, Berwick, N. S., Can.
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WCN—1200, W. M. K. Young, Kansas City, Mo.
WCX—2075, L. W. Beretta, San Mateo, Calif.
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WDAE—1700, Wm. Hurst, Jr., Winnipeg, Can.
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WDAH—1625, W. M. Brown, Pittsburgh, Pa.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAK—1200, R. Hastings, Atchison, Kan.
WDAL—2450, J. Beckman, Seattle, Wash.
WDAN—1375, W. H. Spencer, Montreal, Que., Can.
WDAO—1500, M. J. Solumbe, Plattsburg, N. Y.
WDAP—1875, M. J. Bevilockway, Lomita Park, Calif.
WDAQ—2375, M. C. Bidwell, Grinnell, Ia.
WDAR—1175, L. B. Martin, Springfield, S. D.
WDAS—1250, C. M. Bennett, Aurora, S. D.
WDAT—1200, E. M. Perkins, Jr., Sioux Falls, S. D.
WDAU—1250, A. L. Lewis, Stanberry, Mo.
WDAV—1275, J. H. Wall, Rensselaer, N. Y.
WDAY—1200, G. E. Wharton, Houston, Tex.
WDT—1400, G. E. Wharton, Houston, Tex.
WDY—2225, Nestor Barrett, Republic, Wash.
WEAB—1550, H S. Olding, New Glasgow, N. S., Can.
WEAD—1000, John Kiener, Cleveland, O.
WEAE—2000, R. J. Gall, Blythe, Calif.
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WEY—1250, Mrs. A. S. Mawhinney, New York, N. Y.
WFAA—1925, W. E. Davison, Berwick, N. S., Can.
WFAC—1375, H. S. Olding, New Glasgow, N. S., Can.
WFAF—2200, R J. Gall, Blythe, Calif.
WFAG—1375, R. L. Hartman, Hoisington, Kans.
WFAH—1025, John Kiener, Cleveland, O.
WFAJ—1150, W. E. Davison, Berwick, N. S., Can.
WFAL—1125, P. A. Meunier, Cleveland, O.
WFAS—1875, B. H. Seydel, Tacoma, Wash.
WFAT—1275, P. Benneyan, Fresno, Calif.
WFAV—1175, E. E. Case, Beverly, N. J.
WFAW—1550, C. Bennett, Aurora, S. D.
WFAZ—1150, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WFI—2350, A. B. Butler, Los Angeles, Calif.
WFO—1000, D. J. Morris, Weir, Tex.
WGAB—1700, W. F. Macleod, Pr. Albert, Sask., Can.
WGAD—2575, L. Jang, Hanley Falls, Minn.
WGAK—1400, H. S. Olding, New Glasgow, N. S., Can.
WGAM—1275, H. B. Porter, Lynn, Mass.
WGAN—1700, H S. Olding, New Glasgow, N. S., Can.
WGAR—1150, H. Dammann, Bronx, N. Y.
WGAS—1250, W. E. Davison, Berwick, N. S., Can.
WGAT—1675, R. Doull, Halifax, N. S.
WGAY—1000, D. J. Morris, Weir, Tex.
WGF—1425, Perkins Benneyan, Fresno, Calif
WGI—1750, E. L. Dye, Plainview, Tex.
WGL—237, R. B. Martindale, Philadelphia, Pa.
WGM—2175, Allan Harvey, Snohomish, Wash.
WGR—2175, N. E. Parr, Albany, Ore.
WGV—1800, H. S. Olding, New Glasgow, N. S., Can.
WGY—2575, J. J. Beales, Jr., San Anselmo, Calif.
WHA—1650, Perkins Benneyan, Fresno, Calif.
WHAA—1450, H. S. Olding, New Glasgow, N. S., Can.
WHAB—1550, G. W. Perkins, Thomson, N. Y.
WHAE—1050, H. Rawls, Phoenix, Ariz.
WHAI—1600, Dick Lawrence, Sacramento, Calif
WHAK—2175, Arthur Chapelle, Woodburn, Ore.
WHAL—1100, H. S. Olding, New Glasgow, N. S., Can.
WHAM—2225, Arthur Chapelle, Woodburn, Ore.
WHAN—1250, K. McNeil, Ottawa, Ont., Can.
WHAR—1150, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAS—1950, Arthur Chapelle, Woodburn, Ore.
WHAW—1325, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAZ—2550, H. Wilbert, San Francisco, Calif.
WHB—1675, W. E. Davison, Berwick, N. S., Can.
WHK—1550, L. W. Gushwa, Firth, Ida.
WHX—1025, Mrs. A. S. Mawhinney, New York, N. Y.
WIAC—1200, H. Mutze, Manassas, Va.
WIAF—1000, E. M. Perkins, Jr., Sioux Falls, S. D.
WIAG—1250, Wm. Hurst, Jr., Winnipeg, Can.
WIAO—1250, H. S. Olding, New Glasgow, N. S., Can.
WIAZ—1525, E. M. Perkins, Jr., Sioux Falls, S. D.
WIK—1150, G. E. Wharton, Houston, Tex.
WIP—1325, De Witt McKinley, Ft. Worth, Tex.
WIZ—1175, H. S. Olding, New Glasgow, N. S., Can.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAE—1700, A. Moffet, Ottawa, Can.
WJAJ—1000, D. J. Morris, Weir, Tex.
WJAL—1350, E. M. Perkins, Jr., Sioux Falls, S. D.
WJAN—1700, Arthur Chapelle, Woodburn, Ore.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAS—1900, Louis Raymond, Pullman, Wash.
WJAX—200, Allan Harvey, Snohomish, Wash.
WJAZ—1400, Wilson Woodside, Calgary, Alta., Can.
WJX—2550, Robert Rowe, Santa Clara, Calif.
WJZ—2575, J. J. Beales, Jr., San Anselmo, Calif.
WKAC—1175, H. Dammann, Bronx, N. Y.
WKAF—1500, C. M. Bennett, Aurora, S. D.
WKAL—1850, Arthur Chapelle, Woodburn, Ore.
WKAN—1100 C M. North, Malden, Mass.
WKAQ—3850, Arthur Chapelle, Woodburn, Ore.
WKC—1200, J. E. Latt, Fairfield, Tex.
WKY—2400, R. Bartholomew, Garrochales, Porto Rico.
WLAB—1100, C. H. Vale, Providence, R. I.
WLAC—1175, D. J. Morris, Weir, Tex.
WLAD—1275, M. J. Columbe, Plattsburg, N. Y.
WLAG—1575, L. W. Beretta, San Mateo, Calif.
WLAH—1500, D. J. Morris, Weir, Tex.
WLAJ—1450, J. H. Wall, Rensselaer, N. Y.
WLAK—1200, C. Larsen, Sioux City, Ia.
WLAL—1525, Arthur Chapelle, Woodburn, Ore.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WLAV—2000, G. A. Gallagher, Berkeley, Calif.
WLAW—1450, C. C. Sawyer, Liberal, Kans.
WLAY—4200, M. P. Jacot, Copley, O.
WLB—1150, Wilson Woodside, Calgary, Alta., Can.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—2025, L. W. Beretta, San Mateo, Calif.
WMAB—1450, Arthur Chapelle, Woodburn, Ore.
WMAC—1300, R. T. Andrea, Cobalt, Ont., Can.
WMAD—1150, H. J. Latshaw, Clearfield, Pa.
WMAF—1250, R. Henry, Butler, Mo.
WMAG—1150, L. C. Burwell, Jr., Charlotte, N. C.
WMAK—1175, Wm. J. Wolverton, Linton, N. D.
WMAM—1350, H. Dammann, Bronx, N. Y.
WMAQ—1850, R. Rowe, Santa Clara, Calif.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WMB—1300, R. Hastings, Atchison, Kan.
WMC—1625, Perkins Benneyan, Fresno, Calif.
WNAB—1350, H. S. Olding, New Glasgow, N. S., Can.
WNAC—1600, G. E. Wharton, Houston, Tex.
WNAD—1500, C. T. Mower, Malden, Mass.
WNAF—1525, W. Rankin, Woodfords, Me.
WNAK—1200, J. H. Wall, Rensselaer, N. Y.
WNAM—1375, H. S. Olding, New Glasgow, N. S., Can.
WNAQ—1000, R. T. Andrea, Cobalt, Ont., Can.
WNAS—1200 B S, Maynard, Detroit, Mich.
WNAT—1000, R. V. Hammer, Creston, Ia.
WNJ—2375, B. H. Seydel, Tacoma, Wash.
WOAA—1525, G. F. Cory, New Bedford, Mass.
WOAC—1600, O. P. Klein, Leduc, Alta.
WOAI—2250, H. S. Olding, New Glasgow, N. S., Can.
WOAP—1950, L. W. Beretta, San Mateo, Calif.
WOAS—1275 L. Hull, Eureka, Kans.
WOAZ—1525, E. S. Macartney, Ottawa, Ont., Can.
WOC—1675, H. S. Trost, San Jose, Calif.
WOI—1550, L. W. Beretta, San Mateo, Calif.
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WOO—1575, M. B. Gilbert, Douglas, Wyo.
WOQ—1475, Arthur Chappelle, Woodburn, Ore.
WOR—4800, Jack Costa, Haiku, Maui, T. H.
WOS—1375, L. Raymond, Pullman, Wash.
WOZ—1950, Fred Sheppard, Centralia, Wash.
WPA—1950, W. E. Davison, Berwick, N. S., Can.
WPAB—1250, J. Skinner, Corsicana, Tex.
WPAC—1250, Perkins Benneyan, Fresno, Calif.
WPAH—1650, Arthur Chapelle, Woodburn, Ore.
WPAK—1250, Arthur Chapelle, Woodburn, Ore.
WPAT—1375, L. C. Kemp, Seattle, Wash.
WPE—1475, Arthur Chapelle, Woodburn, Ore.
WQAM—1300, Wm. Attwill, Swampscott, Mass.
WQAQ—2150, H. S. Olding, New Glasgow, N. S., Can.
WRL—1100, W. M. K. Young, Kansas City, Mo.
WRP—1375, Guy V. Carrolo, Houston, Tex.
WRR—2000, H. S. Olding, New Glasgow, N. S., Can.
WRW—2550, L. W. Beretta, San Mateo, Calif.
WSAS—1225, F. T. Wycoff, Springfield, Mass.
WSAV—1125, Billy Withington, Jackson, Mich.
WSB—2275, L. K. Poyntz, Victoria, B. C., Can.
WSL—1175, L. Hull, Eureka, Kan.
WSY—2050, Arthur Chapelle, Woodburn, Ore.
WTAW—1525, L. W. Beretta, San Mateo, Calif.
WTG—1375, Arthur Chapelle, Woodburn, Ore.
WWAD—1050, M. L. Johnson, Atchison, Kans.
WWAX—1325, August Vinroth, Linton, N. D.
WWB—2150, R. Taylor, Livermore, Calif.
WWJ—2200, F. W. Hill, Cristobal, C. Z
WWL—1275 G. W. Perkins, Thompson, N. Y.
2LO—3175, S. F. Richards, Janesille, Wis.

Rules to Remember

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 1,000 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records.

2. Distances must be measured AIR-LINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of Radio Digest.

Station WLK Closes Down Due to Insufficient Aid

INDIANAPOLIS, IND.—It was officially given out last week that Station WLK will suspend operation at once. It was the unfortunate condition of the Hamilton Manufacturing Company, owners of WLK, to be unable to sufficiently enthuse the local Chamber of Commerce to underwrite the station.

The entire broadcasting apparatus incorporated in the plant with the exception of antenna and towers, is now for sale. The equipment is very flexible as the Meisner circuit was used with two large variable condensers, one in the antenna and one in the plate circuit.

When questioned by the Digest, Francis F. Hamilton, manager of the station, said, "We have been broadcasting for a year and a half for only the fun of it. It is extremely regrettable that we could not receive the support necessary for continuation of operation."

1500 Miles on One Tube Set

Complete parts for Regenerative Receiver. We hear Havana, Cuba, regularly on this receiver. It consists of the following standard parts: 1 180° variocoupler; 1 23-plate D. X. variable condenser; 1 Freshman var. grid leak and condenser; 1 Howard socket; 1 Klosner vernier rheostat; 1 Fada switch lever; 14 switch points; 2 switch stops; 8 binding posts; 1 7"x9" bakelite panel; 1 mahogany cabinet; 2 3" dials; copper shield for panel; bus wire, tube soderall, and connecting diagram.

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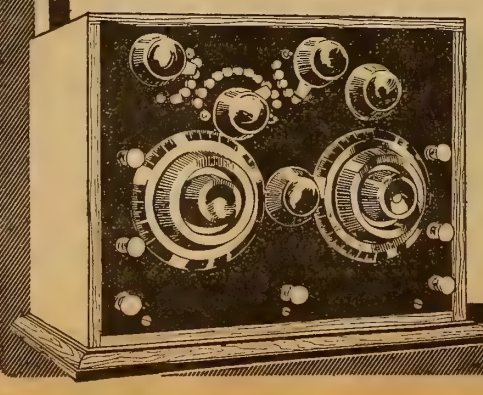
Description of apparatus and accessories and details of tuning.

WINDING A REINARTZ COIL

Cabinet Dimensions
Panel Layouts
List of Parts



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Construction of the Ultra Reinartz Receiver

Part IV—Wiring the Rear of the Panel

By H. J. Marx

IT WAS stated previously that all binding posts connections were in the rear of the panel in order to avoid the usual collection of unsightly wires adorning the front of the set. In the illustration of the front of the panel (Fig. 1), it can be seen that the only connecting points are the jacks for plugging in the phone receivers. Even the connections for the loud speaker are made in the rear.

Connection Panel

All these connections in the rear are concentrated on the panel detailed in Figure 2. This is made up of ⅛-inch panel stock. Eight binding posts are mounted on this panel. The ⅛-inch holes are drilled for the posts.

The proper connections to these posts are indicated in the illustration. The countersunk holes at each end are for the 6-32 thread brass machine screws fastening the panel to the two brass angle strips. These strips or supports are fastened to the panel sockets. No details are given of these strips—since the method of mounting this connection panel will vary with different types of apparatus used. It is therefore left to the ingenuity of the constructor. The method of mounting is clearly indicated in the back view illustration, Figure 3.

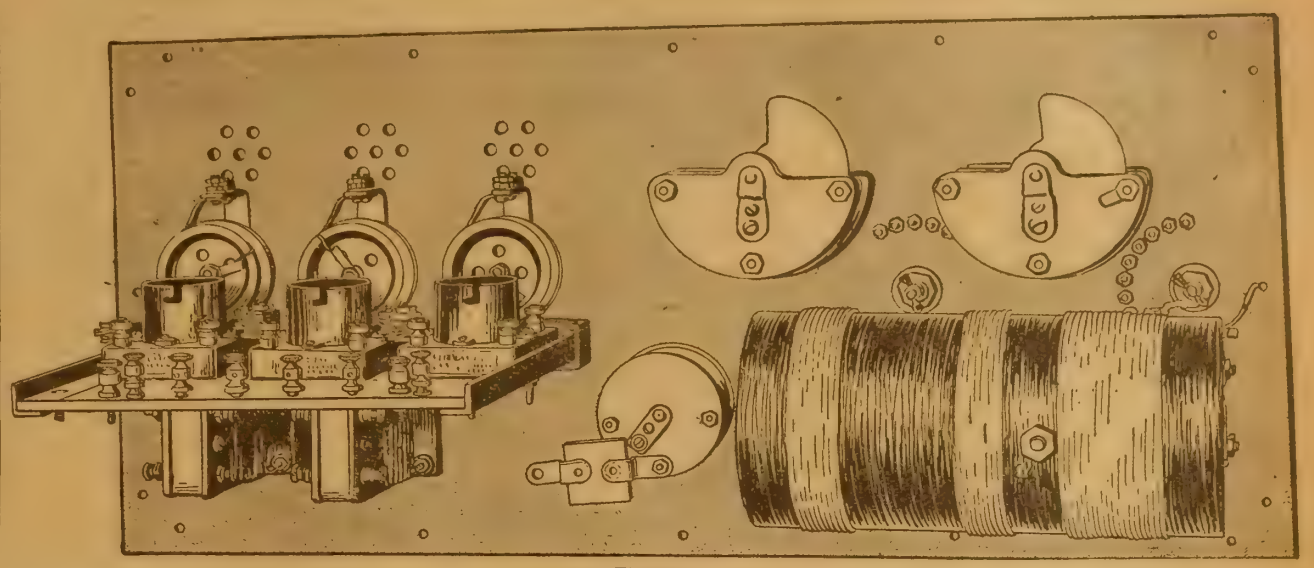

Figure 3

Wiring

After all of these details of the mounting of the apparatus on the panel have been completed, the question of wiring is next. The wire used by the author was a No. 14 gauge tinned and rubber covered copper wire. This particular kind of wire isn't required necessarily. Any good No. 14 gauge copper wire can be used, but it must be covered with spaghetti tubing or otherwise insulated on account of the considerable amount of wiring necessary. Ignoring this point will be the cause of a lot of difficulties through short circuits.

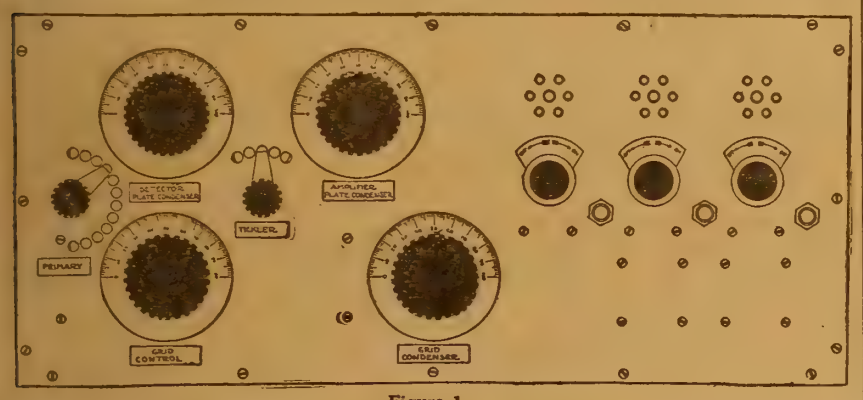

Figure 1

Since the wiring is somewhat complicated, and although the instruments are not crowded, the wiring can only be satisfactorily done if some form of procedure is followed.

Procedure in Wiring

Obviously the first step in wiring would be the tap leads to the contact points of the switches. In making these connections it is advisable to remove the two plate circuit condensers so that the soldering iron can be handled more easily. The five connections to the tickler coil winding are the first to be soldered. Then the leads connecting the plate of the first tube and the tickler switch lever should be inserted. A space of bared wire should be left on this lead for connection to the detector plate condenser after it has been replaced.

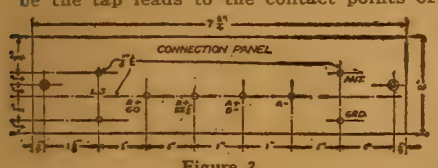

Figure 2

The connections should now be made for the primary tap switch. Then the primary switch lever is connected to the ground binding post. The lead from the first contact point on the primary switch should be soldered to it. The two plate condensers are then replaced and this lead can run from the two condensers over to the antenna binding post. The lead running from the stationary plates of the detector plate condenser can now be tapped into the lead between the detector tube plate and the tickler switch lever. The terminal attached to the shaft bearing on the rear side of the tuning unit coming from the rotor winding can be connected then to the rotating plates of the .001 mfd. variable condenser. The fixed plates are connected to the grid of the first tube. In addition, as shown in the diagram given in Part I of this series, a .0015 mfd. fixed condenser is connected across the two terminals so that the total maximum capacity will be .0025 mfd. The fixed plate side of the amplifier condenser can now be connected up to the plate circuit of the first amplifier tube. The tube and rheostat connections to the battery terminals should now be inserted.

Wiring Amplifying Stages

After these connections have been made, it is advisable to take up the amplifying stages. In the illustration, double-circuit jacks have been added. As stated in the first article, these are not essential and were omitted to simplify the wiring diagram. First the transformer circuit connections should be made, taking care to keep the grid lead from the secondary of each transformer to the grid of its amplifier tube as short as possible.

The fixed condensers in the secondary circuits require no special support outside of that of the leads. They should be placed in a position such that there will be no tendency for them to contact with any metal parts. In addition their positions should be such as to avoid any intercapacity re-action to any adjacent parts of the circuit.

Soldering Directions

A word of caution might well be added at this time that care be taken so that all soldered connections make good electrical contact. More than one Radiophan has condemned a circuit because what appeared to be a good soldered connection was really only a resin joint.

As a suggestion, wipe all soldered joints with a cloth while they are still warm and in addition, scrape off all surplus resin when hardened. This will immediately disclose any poor connection and avoid the necessity of trying to insert the soldering iron in difficult corners afterwards.

Don't let leads rest against the panel or against any part of the instruments except at joints. Panel material may be a perfectly good insulator, but after it is covered with dust and grease, it is apt to become a perfect grid leak with just sufficient conductance to prevent perfect operation of the set.

The Cabinet

Details of the construction of the cabinet have purposely been omitted especially because most of the constructors have particular cabinet ideas in mind. The panel size is 8 by 22 inches while the depth of the cabinet should be about 8 inches. It should have either a hinged cover or back to provide easy access to the tubes and the connection panel.

Tuning Directions

In operating this circuit both the detector and amplifier plate condensers should be set at 0, that is with the plates all the way out. The grid condenser is set at 50 around or with the plates halfway in. The tickler switch lever is set at the center tap. The dial on the rotor of the tuning unit should be adjusted so that when indicating the maximum of the graduations the rotor winding is in line and runs in the same direction as the secondary winding. In tuning, this dial is set at about 50 or halfway, which would put the rotor tube in a position at right angles to that of the tuning unit.

The primary tap switch should now be moved over the contact points for rough investigation for any carrier waves. At the same time, the grid control should be varied by means of the rotor dial. When reception has been brought to the maximum point of intensity and clearness, then the grid condenser can be adjusted as required. The next step then is to vary the tickler tapped switch. This will work very closely in conjunction with the detector plate condenser. This dial should be increased until the regenerative effect is brought up to its best point without distortion. If the amplifier stages are in use, the amplifier plate condenser capacity should gradually be increased by rotating the dial counter clockwise up to the point of maximum intensity.

THE END.

Correction

In the March 31 issue, page 14, in "How to Make a Prize Flewelling Set," by F. P. Hall, the grid condenser value was given as .0005 mfd. through a typographical error. This should have been .00005 mfd.

Again, on page 17 of the same issue, in "Construction of the Ultra Reinartz Receiver," by H. J. Marx, top of fourth column, the two plate condensers are referred to as each having a .00005 mfd. capacity. This figure should have been .0005 mfd.

REINARTZ CIRCUIT!

New Ultra Circuit Coupler & Diag., $1.75—built to H. J. Marx's specif. in March 24th Radio Digest. Ruby Mica-Copper-Bakelite mounted Condensers N. P. binding posts, .00015, 50c; .0015, 60c; .0025, 70c. Reinartz coil Doub. green silk-Bakelite Spider, $1.75. Reinartz plate circuit chokes (triple adjustable), $1.70. Complete set Reinartz tuner & detector parts, $10.65. Tuner, Det. & 2-Stage, $17.95. Two-stage outfit, $8.35.

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New Signal Corps Edison 3-cell, type BB-4, $4.50; Single cells for W. D.-11 tubes, $1.50; 60 A. H. for W. D.-11 tubes, $5.25; 6 Volts Edison, $7.75; Edison "B" battery single elements, 4c ea.; double, 10c.

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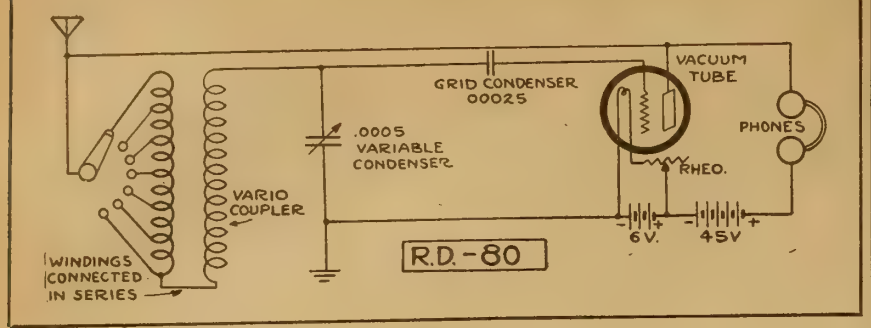

A CIRCUIT very similar to one that has been mentioned, not only in the Digest, but also in many other publications, is illustrated in R. D. 80. Its peculiar feature is the method of connecting the two windings of the variocoupler in series, thus enabling a control of the antenna and grid circuit through three distinct means: First, the tap switch in the primary circuit; second, the variometer effect of the rotor of the variocoupler, and third, through the variable condenser. It must be realized that all these controls are either in or directly connected to the grid lead and therefore maximum energy control is possible. Since the plate circuit is directly connected to the antenna circuit, the action is regenerative throughout. The tube used is a hard or amplifier tube and requires 45 volts in the plate circuit. This circuit will be found well adapted for long distance reception and, because of its simplicity, will be exceptionally interesting to that host of fans who live on the excitement and anticipation of trying out new and freak hook ups.

Book Reviews

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Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make radiophones. Twelve full page illustrations and diagrams. Price, 75c.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

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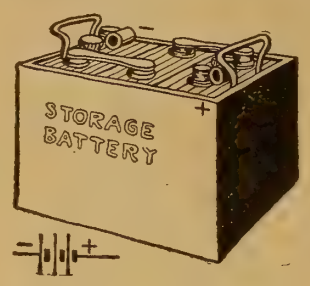
Kenosha To Have Plant

KENOSHA, WIS.—The Simmons Company, one of the largest concerns in Kenosha, is planning a broadcasting station at a cost of about $30,000. It is the company's intentions to broadcast the Midwest league baseball games.

About Radio Parts

The Storage Battery

The operation of the vacuum tube is based on the fact, that when the filament is heated to a degree of incandenscence, because of its resistance to the current flowing through it, electrous are emitted by this filament which pass over to the plate in the tube. In order to heat the filament of the tube then, an external source of electrical current is required. In the popular 6-volt tube a storage battery is commonly used. With the advent of the 1½-volt tubes, dry cells are often



substituted but the fundamental function of the battery is the same.

Depending on the type of circuit used the polarity of the terminals is of more or less importance. So the fan should acquaint himself with the possitive and negative post of the battery.

The storage battery is an accumulator of electrical energy. Through a chemical reaction it absorbs current that is led into it and likewise through a reversal of the chemical action is always ready to release its electrical energy. In Radio this energy in the storage or A battery is used to light the filament.

Each owner of a private Radio set in France must obtain a license and pay 10 francs as an annual fee.

LOUD SPEAKER FREE

The wonderful SHELTONE LOUD SPEAKER with every original NATH. 8½" High—Beautiful Rubberized Finish

BALDWIN

Type C Headset Complete

I PERSONALLY test every pair of phones to GIVE YOU a headset that has no equal. YOU CAN USE HEADSET IN REGULAR WAY ALSO.

My price on these special selected Phones is, postpaid..... $12.00

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WALTER SCOTT, 10 St. Lukes Place, Montclair, N. J.

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EVERY ITEM GUARANTEED ON MONEY-BACK BASIS

$25.00 RADIOETTE Crystal Set—Uses Loose Coupler and Variable Condenser $7.50
7.00 DIAMOND 2,000 Ohm Headsets.. 3.00
6.00 REXO 180° 800-Meter Couplers with Bank Wound Secondary..... 3.50
5.00 600-METER DX Couplers..... 1.55
5.00 CHELSEA Type 43-Plate Glass Enclosed Variable Condensers for both Table and Panel Mounting.. 3.00
4.00 CHELSEA Type 23-Plate—Same as Above 2.40

$1.25 CLAPP-EASTHAM Double Action Air Cooled Rheostats 45c

Mail Orders Promptly Filled

WILLIAMSBURG RADIO SUPPLY COMPANY, INC.

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1000—1500 MILES ON ONE-TUBE-ONE-CONTROL

150—25,000 METERS

NO Rheostat, Storage Battery, Variocoupler, Variometer, 3-coil Mounting, Variable Inductance, Taps, Dead End Losses or Radio Frequency. Complete hook-up, cuts, instructions, everything. Price $1.00. No checks. Nothing left for you to guess about. Build your own Receiver and save 50% or more and get better results.

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2.00 Grewol Crystal Detectors..... 1.50
1.00 Earla Sockets ..... .55
1.00 Hydrometers ..... .63

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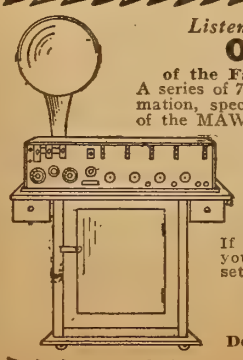
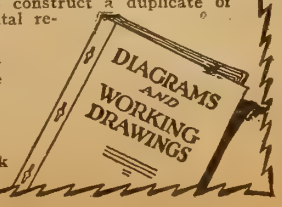
ORIGINAL BLUE PRINTS

of the Famous MAWHINNEY RECEIVING APPARATUS

A series of 7 blue prints giving in full detail all the necessary information, specifications, and method of construction, and assembling of the MAWHINNEY RECEIVING Apparatus. This is the 5-tube receiving set that picked up 5 stations in California, recently written about in Literary Digest and Radio Globe. The Blue Prints tell you in a very simple and clear manner just how to construct a duplicate of Mawhinney's transcontinental receiving set.





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REINARTZ CIRCUIT

EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD phone condenser, 23 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions $10.00

FLEWELLING CIRCUIT

EVERY PART COMPLETE

2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... $11.00

TWO STAGE AUDIO FREQUENCY AMPLIFIER

EVERY PART COMPLETE

1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 3 Jacks (Double Circuit), 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver..... $11.00

CONDENSERS

3 Plate Variable; value, $1.75..... $1.05
13 Plate Variable; value, $2.50..... 1.20
23 Plate Variable; value, $3.50..... 1.35
43 Plate Variable; value, $4.50..... 1.85

13 Plate VERNIER; value, $5.50..... 3.75
23 Plate VERNIER; value, $6.00..... 4.00
43 Plate VERNIER; value, $6.50..... 4.25

Honeycomb Coils, 50 turns mounted. $0.95
Honeycomb Coils, 75 turns mounted. 1.00
Double Coil Mountings..... 2.45
Triple Coil Mountings..... 3.35
Reinartz Coils and Mounting..... 1.75

VARIOCOUPLER—Celeron Condensite and Litz Wire Wound Secondary; Value $4.50. Special $2.95

Potentiometer with knob; value, $1.75; special at 1.00
Potentiometer with 2⅛" dial; value, $2.15; special at 1.15
BEST QUALITY JACKS, Single Circuit; value, 65c; special at..... .30
Double Circuit; value, 90c; special at..... .45
MULTIPLE POINT INDUCTANCE SWITCH with Knob and Dial (15 switch Points).... 1.75
LIGHTNING ARRESTERS approved by underwriters $0.90

BALL BEARING INDUCTANCE SWITCH—value 75c, special..... $0.30
V. T. SOCKETS—Nickeled, brass sleeve, composition base value, $1.00; special at.. .50
AUDIO FREQUENCY TRANSFORMER—Designed for use with W. D. 11 Tubes, list, $4.50; price..... 2.75

EXTRA SPECIAL
Telephone 3000 Ohms Headsets; $9.00 value; reduced to..... $3.50

ALUMINUM LOUD SPEAKING HORN
Nickel plated, highly polished; $8.00 list $3.75

THREE-INCH DIALS — Unbreakable — heat resisting composition—high finish; special.. $0.30
TWO-INCH DIALS—Same design—for rheostats and potentiometer; special..... .25
RAYMOND VERNIER RHEOSTATS—Value, $1.50; special ..... .95
FILAMENT RHEOSTAT—Condensite base; value, $1.10; special at..... .70
FILAMENT RHEOSTAT with 2⅛" dial; value, $1.50; special at..... .85
TELEPHONE PLUGS ..... .60
FRESHMAN VARIABLE RESISTANCE LEAK and MICON CONDENSER Combined .75

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of $5.00 or over east of the Mississippi River. All others include postage.

Questions and Answers

Thousand Mile Reception

(2840) ATB, St. Louis, Mo.

I have built a three-tube reflex circuit, using the crystal detector according to the diagram shown in one of your recent issues.

I have been able to bring in broadcast concerts within a range of 1000 miles, using either the loop or outside aerial, but all out of town stations even WOC Davenport, fail to come in as loud as my three stage Radio frequency set, without audio amplification, although on local concerts I have all the amplification expected from two stages of audio. Can you tell me the cause of the trouble?

A.—It is impossible for us to determine the source of limitation without a personal inspection of the set. Barring defective apparatus, possibly an inefficient crystal, the condition cited should not prevail in a properly executed circuit from diagram given.

Flewelling and Reinartz

(2324) EPS, Boston, Mass.

In making a comparison of the Flewelling and Reinartz circuits for broadcasting station reception, which circuit has the greater range? Which is the more selective?

What are the chief points of advantage of each over the other?

A.—A comparison of the relative virtues of the Flewelling and Reinartz circuit is largely a matter of personal discrimination. They are of the same type. They require respectively:

Flewelling.—Does not require much of an antenna, a loop will serve.

Tuning very critical.

External and tubing noises rather pronounced.

Amplification very, very high.

Selectivity very good.

Range one thousand miles or over.

Reinartz.—Requires a fairly good antenna.

Tuning very easy.

External and tube noises none.

Amplification fair.

Selectivity very good.

Range one thousand miles or over.

The above will help you to make your own comparison.

Inductances and Capacities

(2593) JG, Chicago, Ill.

In your January 27 issue you show several diagrams of Reflex circuits. In your circuit No. 2 will you kindly advise the ratio of windings and frequency range of Radio and audio transformers?

What number of turns are required on the primary and secondary of the variocoupler in this unit, also number of turns between taps on the primary?

What is the capacity of a 23-plate condenser? Can WD-11 tubes be used satisfactorily with the above circuit?

A.—Answering your inquiries, will advise that in Reflex circuit referred to standard Radio frequency transformers are used. For audio frequency transformers have three or four to one ratio.

Use a standard variocoupler having fifty-six turns of No. 22 wire tapped at every seventh turn on primary and thirty-six or forty turns of No. 26 wire on secondary.

A 23-plate condenser has a .0005 mfd. capacity.

We would not advise the use of WD-11 tubes with the circuit in question.

Reflex Selectivity

(2847) ND, Wilmette, Ill.

In making a set using two stages of A. F. amplification I believe that transformers of different ratio are used. Please give this proper ratio for the first and second stages.

What would be the correct ratio for each A. F. transformer used in the four-tube reflex set published in the Radio Digest for January 20, 1923?

In R. F. amplification which is best, tuned impedance or the regular transformer?

How does the four-tube reflex set compare with a six-tube set using regeneration in regard to selectivity, sensibility, D. X. and set noises?

In any set does a 43-plate condenser detract from the efficiency of the set?

A.—Use transformer of ten to one ratio and three or four to one ratio on first and second steps of audio frequency amplification respectively.

Use three or four to one ratio transformers for Reflex set described in January 20th issue of Radio Digest.

With Radio frequency amplification transformers are preferred rather than tuned impedance for wave lengths under one thousand meters.

The Reflex circuit compares favorably with six-tube regenerative as to selectivity and is less noisy. However, probably does not afford so great a range.

For short waves a forty-three plate condenser connected across an inductance does not afford close tuning adjustment. However, it is necessary in the antenna circuit.

Trouble

(2378) ICS, Carlinville, Ill.

The last few days I have had trouble with my set. I am able to tune in a station clear enough then suddenly my set seems to go practically or totally dead for several seconds, say from 5 to 10, when the station "comes back" again. This happens not only with stations farther off, such as KDKA, but also with those near by, such as St. Louis (KSD). My battery ought not to be at fault as it was recharged a short time ago. I cannot see any cause for trouble in the set. It seems to be the same as ever. At times the glow of the filament varies, will be dimmer for some seconds, and then comes back again. This fading out is exceedingly annoying.

I have had very good luck with my little set. Have listened to concerts from stations from San Francisco to Troy, N. Y., and from Canada to Havana.

This may be something old to many. I am only a novice at the game.

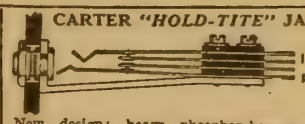
I find in your A.B.C. just what I have been looking for.

A.—Noting your specifications and difficulties experienced would advise that the condition has been encountered by the writer personally and has invariably reset and is usually located in the most unexpected place.

There may be some fault in your storage battery. If you have another available, or even a set of three dry cells, you can easily determine if trouble lies in battery or A battery leads. Would not be at all surprised if the trouble is found to be in leads.

There are 33 Radiophone stations in the United States broadcasting religious services. The territory covered, it is estimated, represents 65.2 per cent of the total area of the country.

CARTER *"HOLD-TITE"* JACKS



1 to 5 springs; price 70c to $1.10

New design: heavy phosphor-bronze springs; no spacer washers required. Write for Bulletin on these Jacks, "TU-WAY" Plugs and other Carter products.

CARTER RADIO CO., 209 S. State St., Chicago

Vario-Coupler $1.98 or Variometer

.006 Mica Condensers, 30c; Mica Phone or Grid Condensers, 20c; 23 Plate Condenser, $1.45; 43 Plate, $1.70; 3 Plate Vernier, 75c; Bakelite V. T. Socket, 40c. Any size dial with Knob, 25c. Variable Grid Leak, 35c. Panels Drilled Free, ⅛, 1½, ¾, 2c; ¼ in. 2½c per square inch. Every article guaranteed.

STAR RADIO SUPPLY & MFG. CO.
2061 East 102d, Cleveland, Ohio

DETECTOR AMPLIFIER

Aerial	+B	Input	+B
Ground	—A	Output	—A
Phones	—B	Phones	—B
+A	A-B	+A	A-B

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NAME PLATES

8 NAME PLATES TO A SET

Printed on celluloid, fits flush to panel, always in place.

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Memo Pad

What I will need to make a good tube set

A Kellogg No. 501 variocoupler
A Kellogg No. 605 variable condenser
A Kellogg No. 2 tube socket
A Kellogg No. 506 miniature condenser
A Kellogg No. 503 mounting
A Kellogg No. 609 radio resistance
A Kellogg No. 502 dial
A Kellogg No. 63A head set
A Kellogg No. 501 rheostat
A Kellogg switch and switch points
A and B batteries and cabinet
A Detector tube
Kellogg radio equipment is recommended for several reasons

First — It is easy to install and simple to operate.

Second — It is built of the highest grade material to give the best possible results.

Third — It is electrically and mechanically correct and will last a life time.

Fourth — It is built by the Kellogg Switchboard and Supply Co., who have manufactured high grade telephone equipment for the past 25 years.

Fifth — Every Kellogg radio part is GUARANTEED by the manufacturer.

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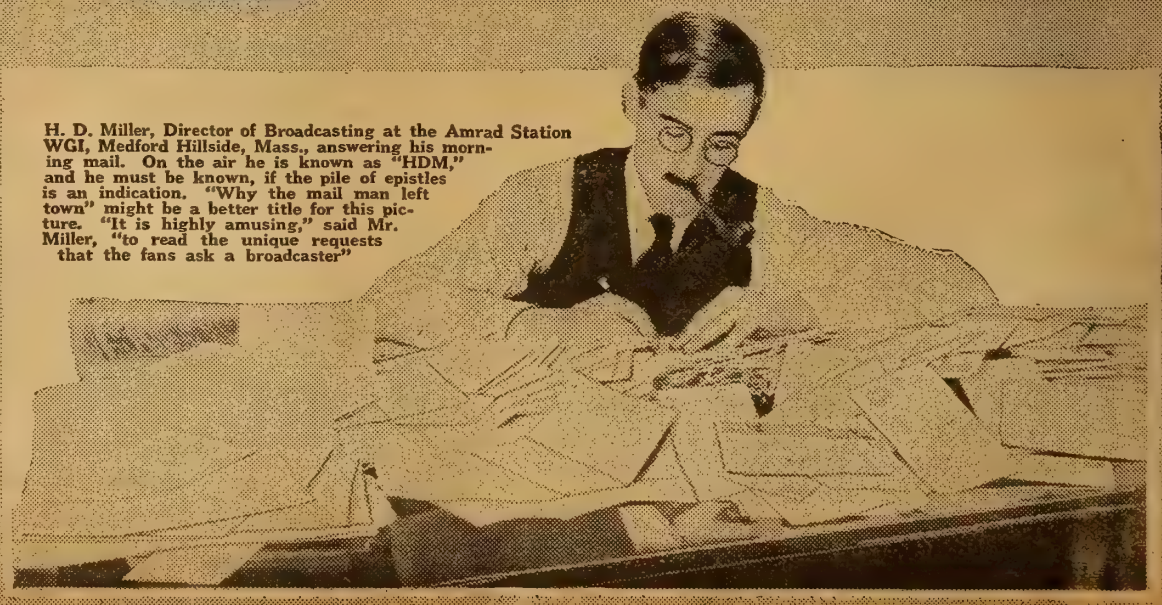
Radio Illustrated

The tiny tot with the viol is a member of the Kindergarten Class for beginners at the Music School Settlement, New York City, where East Side children get music lessons at a nominal charge. These youngsters recently were on the air from Station WEAF. Above is the largest Radio dial and socket in the world. It is being shown at the Third Radio Show at the Hotel Pennsylvania, New York City. Mrs. Dorothy Decker illustrates the comparison. This unusual exhibit caused a continual blockade by the crowd that gathered daily before the booth

Right Photo © Fotograms

That Radio outdoes Tut-Ankh-Amen in decoration for milady's hats is shown by the novelty above worn by Miss Marie Fleming
© K. & H.



H. D. Miller, Director of Broadcasting at the Amrad Station WGI, Medford Hillside, Mass., answering his morning mail. On the air he is known as "HDM," and he must be known, if the pile of epistles is an indication. "Why the mail man left town" might be a better title for this picture. "It is highly amusing," said Mr. Miller, "to read the unique requests that the fans ask a broadcaster"

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JUL 3 1923

Advance Programs, One-Tube Reflex, Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, APRIL 21, 1923 | No. 2

RADIO AIDS BOOTLEGGER

MAKES RUM TRAILS SAFE FOR RUNNER

Prohibition Enforcers Have New Handicap in Northern New York

Big Plant Pilots Booze

Illicit Liquor System Very Complete —"May Revolutionize 'Profession'" Declares One

By A. H. Munday

MONTREAL, QUE.—Radio has joined forces with rum-runners! Already handicapped by a lengthy boundary line and roads made inpassable by the weather, prohibition officers are now face to face with a problem developed by the criminal application of Radio.

Somewhere in the woods, over the Canadian line, according to men known to be engaged in the business of rum-running, is a large powerful transmitting station. In every town and city on the booze route there are, according to the same source, large and powerful receiving stations.

Details of the new safeguard for the

(Continued on page 2)

The petite brunette in the center?—That is Miss Inez Chambers, violinist virtuoso, of KGW. Now that you know who it is, you will agree that Inez plays as she looks—'Eh Bebe!' How heavenly she plays. At the right is Perin McGregor, well known and popular baritone, in Gypsy costume of one of his favorite roles. Mr. McGregor is considered a headliner on the programs of Station CJCD, Toronto, Canada. He has been heard many times from this plant and is always in demand by the fans. Above, left, is the 16-year-old pianist who entertained you recently from Edmonton, Alta.—"Eula, meet the fans.—Fans, meet Miss Eula Owens of CJCA." If Mr. Keith is on the lookout for all star talent, we recommend the above three as a sure-fire trio

Airphone Gives Sermon for Pastorless Church

Belmont Congregation Joins in Songs with Broadcast

BELMONT, MASS.—A little matter of being without a pastor at any time will not bother the Belmont Methodist Episcopal Church here, for a Radio receiving set with powerful amplifiers has been installed in the church, alongside the pulpit. The regular pastor was away one Sunday, and the laymen of the church took charge, with James P. Kelley in the pulpit.

New Broadcast Plant to Be Erected in Dublin, Ireland

A Radio station, somewhat similar to the Eiffel tower in Paris, but not quite so large, will shortly be erected in Dublin, according to the British press. It will be entirely a government enterprise, and is expected to be situated in the Phoenix park, where there is every facility for such a plant.

The Free State authorities, once the station is established, intend broadcasting to towns in the provinces the latest market reports, news, and weather bulletins.

CALGARY POLICE OUT AFTER TAX DODGERS

Canadian Owners of Home-Made Sets Evade License

CALGARY, ALTA.—Phenomenal development in Radio in this city has forced a new duty on members of the Calgary Police Department.

Both uniformed and plain-clothes men are now engaged in detecting Radiophans who have constructed Radio receiving instruments of the ten cent store variety, and are endeavoring to evade payment of the license levied by the post office.

CALLIOPE IS PUT ON AIR FOR FIRST TIME

TYLER, TEX.—A novel Radio concert was broadcast recently by members of the J. Doug Morgan's Vaudeville Company from Station WOAF, when a calliope was tuned up and the music from the old favorite of circus days sent out into the ether. The program also included orchestra music, vocal solos and Hawaiian numbers.

DEFOREST COMPANY BOUGHT BY JEWETT

DR. DEFOREST TO REMAIN AS ADVISOR

Possible That Newly Purchased Corporation Will Combine with Jewett Company

(Special to RADIO DIGEST)

DETROIT, MICH.—Outright purchase of the entire business, good will and patents of the DeForest Radio Telephone and Telegraph Company was announced today by President E. H. Jewett of the Jewett Radio and Phonograph Co. of Detroit.

Associated with Mr. Edward Jewett in the purchase are Theodore Luce, former Detroiter now associated with the New York and Chicago bond house of A. C. Allyn; Frank W. Blair, President of the Union Trust Co. of Detroit; H. M. Jewett, President of the Paige-Detroit Motor Car Company; and several other capitalists and Radio experts.

Possess 181 Patents

As a result of the purchase, the Detroiters come into possession of 181 Radio patents, among them the basic rights to the three-electrode audion bulb, which is an essential part of every long distance Radio receiving or sending set. All other tube manufacture is conducted by virtue of license under DeForest patents. Among the other patents are several others covering Radio equipment in general use, as well as a large number representing more recent development and research by Dr. Lee DeForest, and embodying startling new developments in the Radio field.

The purchase also includes the fine new plant of the DeForest Company at Jersey City, the largest individual plant in the world devoted solely to Radio manufacture, at which DeForest inventions are manufactured commercially. No announcement was made of the amount of money involved in the transaction.

DeForest to Remain

Dr. DeForest remains with the company under a long-time contract as consulting engineer and is now, according to Mr. Edward Jewett, giving a large share of his attention to the perfection of equipment by which the human voice is synchronized and reproduced in connection with moving pictures, thus adding a startlingly widened range of interest to the hitherto silent drama.

"Dr. DeForest is really the father of modern Radio," commented Mr. Jewett in discussing the transaction. "Without his contributions to the science, commercial Radio would not be possible. Like most inventive geniuses, the commercial side of his work has been distasteful and he is glad to turn over this factor to our group. It is our intention to make the name DeForest as significant to the general public of the best and the most advanced in Radio, as it stands today among the experts. In accordance with this policy we will put behind the DeForest products every bit of Detroit enthusiasm and merchandising ability within our power.

May Consolidate

"The affairs of the DeForest Company will be administered from Detroit, though we have no plans for any immediate change in the personnel or operating methods of the Jersey City factory.

"Will the DeForest Company be eventually combined with the Jewett Radio and Phonograph Company?" Mr. Jewett was asked.

"Such a combination is more than possible," replied Mr. Jewett. "It is also possible that the DeForest purchase may eventually result in a large addition to the manufacturing facilities of the Jewett plants at Allegan."

RUM RUNNERS RADIO

(Continued from page 1)

rum-runners, as told in Montreal, prove it to be complete in every respect. The place where the sending station is located is the headquarters of the large booze ring. The rum-runner reports to this station, whereas formerly he was obliged to communicate with every town along the line by telephone.

The minute the report as to location and time is received at the Radio station, it is broadcast to every station. The time, meaning the exact hour at which he has paid for his protection in every town, a proceeding observed before the trip is attempted, is then arranged according to the time made on the trip.

May Revolutionize "Profession"

"So far," declared one rum-runner, "it has worked fine. I have made two trips on the Radio schedule and got through without a hitch. All the men at the stations are experts in Radio and have no trouble in picking up all the signals. In fact, it is the most complete working system that I ever been connected with, and it looks as if it is going to revolutionize the 'profession' of rum-running."

Radiograms can be exchanged between vessels and Syria by means of the Alexandria Radio station. The rate is the same as the rate for Egypt increased by an additional rate of 30 centimes per word.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	7:30- 8:15	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	400	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	400	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00-12:00
KGW, Portland, Ore.	400	10:00- 2:00	.....	10:00-11:00	.....	10:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	400	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	400	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	400	8:00-11:30	8:00-10:00	8:00-10:00	.....	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	400	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:30	6:05- 7:40	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	6:30- 6:45	.....
WBAP, Fort Worth, Texas.	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	.....
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	400	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	360	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	400	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	400	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	400	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, Newark, N. J.	360	6:00- 9:30	6:00- 9:30	6:00- 9:30	6:00- 9:30	6:00- 9:30	6:00- 9:30	6:00- 9:30
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00	.....	.....	.....
WMAQ, Chicago, Ill.	400	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	400	8:00- 9:30	8:00- 9:30	.....	8:00- 9:30	8:00- 9:30	8:00- 9:30	.....
WOAI, San Antonio, Texas.	360	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	8:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	400	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....	6:30- 7:30

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

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Looking Ahead

E. T. Flewelling, Do You Know Him?—In a new series of articles starting next issue Mr. Flewelling will describe the construction of the marvelous One Condenser Simplified Super Set. Be sure to get the whole series by starting with the issue of April 28.

The Single Tube Reflex Set—that will bring the local plants in on a loop, will be continued by H. J. Marx in the next issue. Only a small investment is needed to make this efficient wonder set. Read the first article describing it on page 17, this issue.

A New Beginner's Series—by a nationally-known Radio writer—will start with the conclusion of the series by Arthur G. Mohaupt. Tell your novice friends to be on the lookout for this feature which will lead them through the intricacies of Radio nomenclature without a scratch.

You Can Tell When You Listen in for What and Where—with the new advance program department recently started in the Digest. Most all the big stations are there. Take your pick of their features and stay home that night.

Part Two of the Only Complete Radiophone Station Directory—will appear next issue, following Part One this week. Over 600 plants in the United States, Alaska, Cuba, Porto Rico, Hawaii, and the Dominion of Canada, are given. You can't get along without this weekly revised service.

Newsstands Don't Always Have One Left

WHEN YOU WANT

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FRISCO EXPOSITION NETS 5,000 DAILY

One Hundred and Forty-Four Exhibitors Show Latest Ether Apparatus and New Inventions

SAN FRANCISCO, CALIF.—The National Radio and Electrical Exposition that recently closed at the Civic Auditorium here attracted crowds estimated at five thousand persons a day. The attractions of the show included many novel inventions and adaptions new to the ether science. There were 144 exhibitors.

The opening address of welcome by Mayor Rolph and a short talk by Louis E. Leurey, president of the San Francisco Electrical Development League, were heard not only by those assembled in the Civic Auditorium, but also by countless Radiophans throughout the country. This broadcasting feat was made possible by means of remote control leading to Hale Brothers' Class B Station KPO.

Elaborate receiving apparatus was installed in the auditorium to supply musical programs from Station KPO between 8:00 and 10:00 each evening.

WDAL Gives Buttons

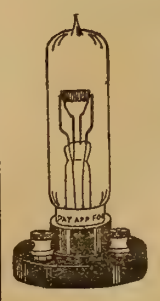
JACKSONVILLE, FLA.—The Florida Times, Station WDAL, is now awarding to their listeners in a button with the insignia and call letters of the station. In order to receive a button it is only necessary to write the Times and give data to prove reception of their programs.

The War Mothers of Idaho have presented a $500 set to the former service men at the Boise Barracks.

Lowest Prices
Western Army Stores

BALDWIN HEADSETS, type C, fully guaranteed	$6.85
BALDWIN UNIT, type C	$3.85
45 Volt B Battery, $5.50 Value	$2.95
22½ Volt B Battery, large size, $3.00 Value	$1.69
HOMCHARGER, De Luxe type, $18.50 Value, SPECIAL	$13.65
43-Plate Vernier Condenser, $5.00 Value	$2.98
23-Plate Vernier Condenser, $4.50 Value	$2.88
10-Plate Vernier Condenser, $4.00 Value	$2.78
Moulded Variometer	$2.98
Premier 180° Coupler	$2.65
MURDOCH LOUD SPEAKER, $5.00 Value	$3.95
100 Ft. Stranded Aerial Wire	50c
Composition Insulator	10c
ALL AMERICAN TRANSFORMER New Type, 3—5—or 10 to 1	$3.98
3000 Ohm Headset, fully guaranteed	$3.79
Composition Socket, Switch Lever, or 2 and 3 inch dials, each	25c
Asterloid Two Coil Mountings	$2.98
LOOP AERIAL, green silk wire, fully guaranteed, value $7.50, Spec	$4.95
Blue Prints for Ultra Audion, Reinartz, Flewelling, Wonder Circuit, Regenerative Feed-back. These prints are complete in every detail; are simple and easy to read. Also instructions how to build sets	35c

DIODE Tubes
DISCARD YOUR CRYSTALS
Attaches directly to crystal set in place of crystal detector
Electrad Diode Vacuum Tube



No storage battery required.
No B battery required.
Greater volume and distance from your crystal set.
A perfect detector tube operates on two dry cells. Low current consumption insures long battery life. Complete instructions with each tube. Tube and sockets; special,

$2.50

WESTERN ARMY STORES
2 BIG STORES
227-29 W. Madison St. 410-12 S. Wabash Ave.
CHICAGO, ILLINOIS
Mail Orders Promptly Filled

KYW AIDS DISTRESS IN RAGING STORM

ISOLATED NEWSPAPERS RECEIVE LATEST NEWS

Listeners In Co-operate with Westinghouse Plant in Reporting Wrecked and Disabled Trains

CHICAGO.—Recently when a blizzard and sleet storm raged through the Middle West and disabled telegraph wires, Station KYW, Westinghouse Company, aided news agencies, railroads, and brokerage concerns in relieving the ensuing distress.

Radio then returned to its original role as one of the protectors of public safety and, by broadcasting over a wide area warnings, orders, and news dispatches, enabled trains to be located and newspapers to come out on time and give out-of-town traders up-to-the-minute stock information which enabled them to put through valuable deals.

Arrange Code Communication System

As soon as the storm was known to have spread over a wide area and reports began to come in that telegraph wires were down all through the Middle West, the officials in charge of Station KYW began to receive numerous requests from the managers of railroads and the press associations for assistance in dispatching trains and spreading news. Although not organized for this relief work, a temporary system of communication was established by Walter C. Evans, chief operating engineer of KYW, in which the broadcasting station's powerful code transmitting set was put to use.

In a short time the code set was broadcasting over a wide area an appeal to broadcasting stations and amateurs located in the western portion of the Middle West to be on the watch for wrecked trains and those which were behind schedule. The persons hearing the call were instructed to communicate immediately with KYW, giving the station all available information. News began coming in at once by one way or the other. Included in the first signals received was the information that a train running on a single track line had been wrecked and passengers and crew were in distress. Telegraph signals were also received from train operators telling of damage and where help was needed.

Straighten R. R. Tangles

With this information officials of the Illinois Central railroad and the Chicago, Milwaukee and St. Paul railroad at once got into communication with the places at which train service was halted and by Radio transmitted orders that soon straightened out a tangled situation.

Then word was received that because of wrecked telegraph lines the Belvidere, Ill., Republican and the Sterling, Ill., Gazette were severed from the news agencies. Late news bulletins were, therefore, read from the studio and the newspapers were enable to fill their columns. According to letters received from the various editors all the broadcast news bulletins came in clearly, enabling them to make all their issues on time.

SECOND OHIO SHOW HAS NOVEL EXHIBITS

R. C. Higgy Displays Collection of Twenty-one Different Types of Tubes

COLUMBUS, O.—Columbus dealers in Radio sets and parts provided one of the most unusual displays possible at the second annual Ohio Radio Amatuer convention, held recently at the Columbus hotel. Displays were on exhibit by the Superior Radio & Telephone Equipment Co., The Erner & Hopkins Co., Avery & Loeb Electric Co., Higgy-Avery Co., and the Hughes-Peters Electric Co.

One of the most interesting displays to the Radio enthusiast was the collection of vacuum tubes brought to the show by R. C. Higgy, of the Higgy-Avery Co., consisting of tubes which he has picked up over a period of years, from both this country and abroad. Twenty-one types of receiving tubes, the largest of which was a monster auditron three inches in diameter and six inches long, made up the collection.

The Erner & Hopkins company installed a miniature broadcasting station with an outfit of ten watts capacity for visitors to view. Hundreds of Radiophans from all parts of Ohio watched this outfit with wonder and amazement during the three days' convention.

WRAV Strongest in Ohio

YELLOW SPRINGS, O. — Station WRAV, the strongest in this section, has been erected at Antioch College here and is now in active use. The equipment is that of the broadcasting station formerly maintained at the Rike-Kumler store in Dayton, dismantled some time ago. Since then it has been strengthened until now it is much more powerful.

ETHER WAVES HELP TO TRAIL PRISONERS

COLUMBUS, O.—The possibility of Radio as an aid to picking up the trail of escaped convicts was demonstrated here when G. L. Pirrung received a Radio broadcast from Davenport, Iowa, stating that two men, serving sentences for murder, had escaped from that city. Full descriptions of both men were given over the Radio and received perfectly by the Columbus amateur.

RECEIVING SETS ARE INSTALLED IN TAXIS

PARIS, FRANCE.—A popular feature of up to date taxis in this city are the Radio cabs, which are equipped with Radio receiving sets by which passengers can entertain themselves while riding to their destinations. Concerts are picked up from the Eiffel tower, as well as English broadcasts and those from Holland. An increased charge of two francs is asked.

USES "BRIDGE LAMP" AERIAL

In localities where an outside aerial is impracticable or forbidden, the Radiophan is oft hard put for a means of "getting" favorite stations. Our photo shows Miss Minnie Greenhouse, an ardent fan, who has solved the problem. She uses an ordinary iron "bridge lamp," which makes a beautiful bit of decoration and serves as an efficient aerial © K. & H.

INVITE VETERANS TO REUNION OVER ETHER

Confederates Sing Old Civil War Songs for Microphone

NEW ORLEANS, LA.—The invitations to attend the reunion of Confederate veterans in New Orleans were conveyed by Radio, Captain James Dinkins, in charge of arrangements, announced. The captain is himself a veteran and declares nothing but the most advanced methods of announcements would have served the aged soldiers, whose ideas, he asserts, are as progressive as those of the youngest recruit. The announcements were broadcast April 2 and April 7, from the De Soto hotel's station. In addition to the announcements a quartette of veterans sang Civil war songs, including "The Girl I left Behind Me" and "Lorena," and the services of a fife and drum corps were arranged for. This is said to be the first occasion of the braodcasting of fife and drum music in New Orleans. Miss Ida Jontz, secretary of the New Orleans Y. W. C. A., was in charge of the announcement-by-Radio programs. The convention was slated for April 10 to 13. Advance notices of the programs were broadcast.

Boston Has School Club

BOSTON, MASS.—A Radio club has just been organized in the South Boston High School. Tentative plans are under way for a broadcasting station. The officers are: Fred Flynn, president; Robert Hairn, vice president; Henry Jonses, secretary; John Lynch, treasurer.

Calgary Board of Trade Uses CHCB for Publicity

Plan Two-Minute Talks for Several Days

CALGARY, ALTA.—Definite advantage of the advertising facilities afforded by the Radiophone has been taken by business men of Calgary for the first time. Officials of the Calgary Board of Trade, analagous to the Chamber of Commerce in United States cities, will give brief speeches from CHBC, The Morning Albertan broadcasting station, extolling the good points and the beauties of Calgary and the surrounding district. The speeches will be of two minutes duration to be given at intervals of several days, and business men consider that Calgary in this manner will receive the most valuable and widespread advertising possible, and that only over the Radiophone could such results be obtained.

Publicity dealing with the famous Banff-Windermere trail to be opened this summer will be given for the special benefit of Radiophans of the United States, whom it is expected will form the greater part of the tourist traffic through Calgary and the mountain resort in the Rockies this year.

CHBC has been heard in every state in the United States and every province of Canada, and thus it is anticipated an audience of multitudes of peoples from many nations will be reached in this big publicity campaign.

Hospitals in Hartford, Connecticut, are equipped with Radiophones.

OFFER MEDICAL AID TO SEAMEN BY AIR

STANDARDIZED MEDICINE CHEST HELPS DOCTORS

Range of Ills Treated Over Ether Waves Varys from Ear Ache to Hernia

WASHINGTON, D. C.—Just a year ago the U. S. Public Health Service announced that it had completed arrangements to expand the medical aid service to American seamen, with which it had first been charged by Congress a century and a quarter ago, by prescribing by Radio for any sailor who might be taken ill at sea, and who might apply. Messages for aid were to be forwarded to the Service by the ship's Radio via the Radio Corporation of America or the Independent Wireless Telegraph Company.

Diseases Vary

The range of diseases and mishaps for which aid has been invoked during the first year has been amazing. The list includes appendicitis, asthma, cramps, diarrhea, ear ache, eye injuries, heart diseases, hernia, hiccoughs, influenza, infected teeth, malaria, opium poisoning, ptomaine poisoning, and swallowing broken glass. Many of the diagnoses were made on board ship because sailors are resourceful in meeting emergencies. Sometimes interchange of several messages was necessary to obtain clear information as to the cause of the trouble. Cramps among the crew and later more cramps and worse cramps elicited the information that all the sick ate at a single mess. This known, treatment of the sick and means of preventing further cases were definitely outlined.

Request from Czecho-Slovakia

When the patient grows better and the captain's apprehension is relieved, the case usually drops from observation. Weeks afterwards, perhaps, the interested hospital receives direct information as to what occurred later.

The latest call for help involving the Radio service of the Public Health Service came, not from a ship or sailor, but from a young man of 24, who lives in faraway Czecho-Slovakia. He had read in a local newspaper a Service broadcast about cancer, and at once wrote to say that he had had cancer of the nose and throat since he had been 18, and to beg the Service to tell him "how to get cured."

Standardize Medicine Chests

The Service could not tell him how to get cured; nobody could do that without seeing him—if then. But it could and did tell him that he very probably did not have cancer at all. Cancer of the throat, it added, was a very fatal and rapid disease which seldom or never spared a victim for anything like six years; and, furthermore, it was a disease of later life and was very rare in persons as young as he. It advised him to be examined by a competent physician without delay.

The "Ship's Medicine Chest," a manual issued by the Public Health Service and carried by most ships, prescribes the carrying of standard stocks of easily applied remedies. This enables the Public Health Service physician at the hospital ashore to prescribe by Radio with the knowledge that the drugs he specifies are probably in stock on the vessel.

BROADCAST HELPS TO AID GIRL'S RECOVERY

Victim of Skiing Accident Forgets Pain by Listening In

MONTREAL, QUE.—The science of Radio is helping the surgeons cure a Montreal society girl of a broken back injury which was thought at the time to be fatal.

Miss Florence Gardner, victim of a skiing accident a few weeks ago, who has been in the Montreal General Hospital ever since and whose ultimate recovery is now certain, does not find time swing heavy on her hands despite her injury. And it is interest in Radio, the doctors claim, that is giving her new life to fight her battle with death.

Dr. D. Smelzer, assistant superintendent of the hospital, who is himself an expert in the science of Radio, says that listening in to the many excellent concerts, broadcast from the United States and Canadian stations, has made life very happy for Miss Gardner.

Underground Communication Possible by Ether Waves

SPRINGFIELD, ILL.—Radio communication with those underground is believed to be possible through the experiments of the Radio and Research Club of the Springfield High School. In tests conducted at the Woodside mine, 250 feet underground, the club received messages from Radio stations in all parts of the country, and succeeded also in communicating with the outside world. The only means of communicating with entombed miners at present is by means of tapping on the walls.

THE ANTENNA BROTHERS **Spir L. and Lew P.** **But Webster Didn't Have a Radio**

The Week's Advance Broadcast Programs

Tuesday, April 17

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, Cameo Motion Picture Theater; **8:30 P. M.,** Concert, Allegro Mandolin Sextet and Company, direction of Percy Lichtenfels.

KGW (Pacific, 400), 3:30-4:00 P. M., Woman's program on child training.

KHJ (Pacific, 400), 8:00-10:00 P. M., German program, Los Angeles Trio, Piano, May McDonald Hope; Violin, Calmon Lubeviski; Cello, Ilya Bronson.

KSD (Central, 400), 8:00 P. M., Concert, Mart Radmer's orchestra; **8:30 P. M.,** Violin, Ardell Huth; Piano, Aleda J. Bassell and Irene Huth; Baritone, Meyer Levy; Soprano, Alma Fuchs; Accompanist, Mrs. A. R. Alexander.

KYW (Central, 400), 8:00 P. M., One act play, "Bargain Day;" Soprano, Bernice Anderson; Violin, Dorothy Boger; Accompanist, Lila Hanmer; Dramatic Coach, Jessie Royce Landis; Jimmy Hartwell's Orchestra. Dance music, Isham Jones orchestra.

WBAP (Central, 400), 7:15-8:00 P. M., Concert Tenor, James Wood; Violin, Clyde Whitlock; Baritone, C. E. Whitlock; 9:30-10:30 P. M., Opera, "La Traviata," Euterpean Club.

WDAP (Central, 390), 10:00 P. M.-1:00 A. M., Soprano, Rosemary Hughes; Concertina duets, Rudy Patek and Ben Ray; other artists by courtesy of Mrs. Saida Ballentine; **10:00 P. M.-1:00 A. M.,** Dance music program, Jack Chapman's orchestra.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; Talk, May Bliss Dickinson, Chairman of Mothercraft and Child Welfare Committee; **6:15 P. M.,** Weekly review, "Iron Trade Review;" **8:30 P. M.,** Weekly business report, Roger W. Babson; Lecture, "Benares, the Holy City of the Hindus," Satyananda Roy, Calcutta, India; Concert, Boston Collegians, direction of George P. Rupert, Jr.

WGY (Eastern, 370), 7:40 P. M., Talk, "Keeping Fires Out of Our Forests," Wm. G. Howard; **7:45 P. M.,** Comedy drama, "Merely Mary Ann," in four acts, music by WGY instrumental orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Concert, Alamo Theater orchestra, Three-minute biography of Old Testament characters, "Nebuchadnezzar;" Tenor and piano, Robert Veazy; Alamo Theater organ, H. C. Conrad; **7:30-9:00 P. M.,** Concert, Ray Pfaff orchestra; Reading, "An Interesting Historical Episode;" Setting-up exercises.

WJZ (Eastern, 360), 1.15 P. M., Recital, Soprano, Ethel Burton; Contralto, Etta Linipert; Piano, Mrs. L. Carroll Beckel; **5:30 P. M.,** "The Music Lover," digest of music by Dr. Sigmund Spaeth; **7:00 P. M.,** an adventure with Mitch and Sheeters, from "Mitch Miller," by Edgar Lee Masters; **7:40 P. M.** Concert, Patricia Boyle, blind pianist; **8:10 P. M.,** "Overheard in a Pullman Smoker" by Major G. K. Weston, East Orange, N. J.; **9:15 P. M.,** Concert, Williams College Musical Club from the Hotel Plaza.

WLW (Central, 360), 10:00 P. M., Musical program, Piano, Virginia Gilbert; Violin, Smith Farrar; Tenor, Fenton Pugh; Talk, Dr. Kaswell A. Mayo; Dance music, The Royal Ambassadors' orchestra.

WMAQ (Central, 400), 4:35 P. M., Concert, Bush Conservatory; **7:00-7:30 P. M.,** Gilbert & Sullivan Operetta, "Trial by Jury," Singers Club; **7:30-8:00 P. M.,** Talk, J. M. Fitzgerald; **9:15 P. M.,** Talk, "Value and Need of Community Centers," Eugene T. Lies.

WOC (Central, 400), 3:30 P. M., Educational talk, F. C. Walker; **5:45 P. M.,** Concert, Chimes.

WSB (Central, 400), 7:15 P. M., Radio Operatic Prologue for Atlanta's Annual Metropolitan Opera Week, direction of Erin Farley; **10:45 P. M.,** Colored Choir Big Bethel Methodist Episcopal Church.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by Woman's Editor; **3:30 P. M.,** Speaker, Col. John T. Axton.

WWJ (Eastern, 400), 7:00 P. M., The Town Crier; Detroit News orchestra; Saxophone, Jack Leffel; Syncopated songs, Douglas Bailey; Dance music, Kasoors orchestra, Port Huron, Mich.

Wednesday, April 18

KDKA (Eastern, 360), 6:15 P. M., Concert, KDKA Little Symphony orchestra, direction of Victor Saudek; Tenor, Elmer F. Ablett; Accompanist, Bertha Geib.

KGW (Pacific, 400), 3:30-4:00 P. M., Children's program; Music, pupils of Mary Bullock; Stories by Aunt Nell; **8:00-9:00 P. M.,** First Act of opera "Ernani," Portland Opera Ass'n.

KHJ (Pacific, 400), 8:00-10:00 P. M., Chinese program.

KSD (Central, 400), 8:00 P. M., Concert, Knights of Columbus Choral Club at the Odeon.

KYW (Central, 400), 8:00-9:00 P. M., Musical program of the Marshall Field Choral Society assisted by Chicago Madrigal Club, phoned from Orchestra Hall.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Fort Worth Chamber of Commerce; **9:30-10:30 P. M.,** Concert, Texas Hotel orchestra.

WGI (Eastern, 360), 6:45 P. M., Talk on farm, garden and lawn, by Breck's; Girls' Story Hour, Eunice L. Randall; Trio, Rita Bowers, director; Talk, "Water," Henry Copley Greene, American Red Cross; Trio.

WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theatre organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Jeremiah"; Recital under auspices Mary Frances Stewart, Louisville Conservatory of Music; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story, from Louisville Times; **7:30-9:00 P. M.,** Musical program, Stella Carrico, piano solo; Mary Bell Garrett, soprano; Rebecca Saunders, contralto; Mary Adams, piano solo; Mary Gorman, soprano; Grace Deppe, soprano; Mary Scudder, piano solo; Helen Eichenberger, accompanist; Violin recital, studio of King Waller; Reading, "An Interesting Historical Episode;" Setting-up exercises.

WJZ (Eastern, 360, 5:35 P. M., "Iron and Steel Review," by the Iron Age; **7:00 P. M.,** "Animal Bedtime Stories," by Florence Smith Vincent; **9:00 P. M.,** Program by Doubleday Page & Co.; **9:15 P. M.,** Program by the National Tuberculosis Ass'n; **9:30 P. M.,** Ampico Series of Distinguished Artists' concerts, by Wm. Knabe & Co.; Talk, "Must Music Tell a Story," John Tasker Howard, composer-speaker.

WLW (Central, 360), 8:00 P. M., Children's program; Violin, Richard White; "Ann's Half Birthday," a play for children, with introductory remarks by author, T. C. O'Donnell, given by Junior Students of Reulman School of Expression.

WMAQ (Central, 400), 4:35 P. M., Piano recital, pupils of Mme. Sirockey, Lillian Korecky, Mildred Korinek, children; **7:00 P. M.,** Stories of Paul Revere, Georgine Faulkner, the Story Lady; 9:15 P. M., Musical program, Tenor, John Griffin, Pianist, Robert Lindt.

WOC (Central, 400), 3:30 P. M., Talk, D. K. Kirk; **7:00 P. M.,** Concert, Pipe Organ, E. John Richards; **8:00 P. M.,** Lecture, "Americanism," J. Williams, Colfax, Iowa; **10:00 P. M.,** Concert, Carlisle Evans orchestra.

WSB (Central, 400), 10:45 P. M., Musical program by Atlanta Woman's Club.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner;" Talk by woman's editor; **7:00 P. M.,** The Town Crier; Detroit News orchestra; Speaker, G. S. Goldwater, Detroit fire marshal; Musical program, Grinnell Bros. music store.

BUILDING, as it were, on the first appearance of this feature in the Digest, the advance programs are this week more in number and easier to use as a result of improved form. It is planned to soon furnish advance programs for every big station (500 watts or more) in the Digest Radiophone Directory (page 8). The form too, will be changed to meet with the demands for space as the stations become organized so as to be able to furnish advance programs with expediency. There are only fifty eligible plants. Already sixteen of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Directory. The following data on the stations for which advance programs are given, may be of help to the listener in:

Call Letters	Owner and Location	Wave Length
KDKA	Westinghouse Co., E. Pittsburgh, Pa.	360
KGW	Oregonianian, Portland, Ore.	400
KHJ	Times, Los Angeles, Calif.	400
KSD	Post-Dispatch, St. Louis, Mo.	400
KYW	Westinghouse Co., Chicago, Ill.	400
WBAP	Star-Telegram, Ft. Worth, Tex.	400
WDAP	Chicago Board of Trade, Chicago, Ill.	390
WGI	Am. Radio & Research Corp., Medford, Mass.	360
WGY	General Electric Co., Schenectady, N. Y.	370
WHAS	Courier-Journal and Times, Louisville, Ky.	360
WJZ	Westinghouse Co., and R. C. A., Newark, N. J.	360
WLW	Crosley Mfg. Co., Cincinnati, O.	360
WMAQ	Daily News and Fair Store, Chicago, Ill.	400
WOC	Palmer School of Chiropractic, Davenport, Ia.	400
WSB	Journal, Atlanta, Ga.	400
WWJ	News, Detroit, Mich.	400

Thursday, April 19

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, Cameo Motion Picture Theater; **8:30 P. M.,** Concert, Univ. of Pittsburgh Band, transmitted direct from Carnegie Music Hall.

KHJ (Pacific, 400), 8:00-10:00 P. M., Concert, Philharmonic Symphony orchestra; Flutist, J. J. Gilbert.

KSD (Central, 400), 8:15 P. M., Massenchor Concert, 600 voices at St. Louis Coliseum, instrumental music by St. Louis Symphony orchestra.

KWY (Central, 400), 8:00-9:00 P. M., Concert, Lyon & Healy; Dance music, Isham Jones orchestra; **9:05 P. M.,** "Twenty Minutes of Good Reading," Rev. Claude J. Pernin.

WBAP (Central, 400), 7:15-8:00 P. M., Popular selections; Violin, Rowe Davison; Piano, Jack Norwood; **9:30-10:30 P. M.,** Concert Texas Women's College.

WDAP (Central, 390), 10:00 P. M.-1:00 A. M., Musical program, Soprano, Helen I. Blakeley; Baritone, J. F. McNichols; Soprano, Lorraine Ford. Senn High School students, boy soprano, Francis Goetz; Baritone, Gordon Ibbotson; Cello, Wm. Williams; **10:00 P. M.-1:00 A. M.,** Dance music program, Jack Chapman's orchestra.

WGI (Eastern, 360), 6:15 P. M., "General Conditions in the Shoe and Leather Industry," by New England Shoe and Leather Ass'n; **8:30 P. M.,** "Americanism," Judge Thomas P. Riley of Malden; Talk to American Legion Posts by Hon. James T. William; "Fashionable Intelligence" by Percy Fendall, A Comedietta in One Act, presented by The Amrad Players, W. Eugene Hammett, Director. Sketch, "Drifted Apart" by Sir Charles L. Young, Amrad Players.

WGY (Eastern, 370), 2:00 P. M., Talk, "What Animal Experimentation Has Taught Us," Jessie G. Cole, nutritionist, N. Y. State Dept. Health; **7:45 P. M.,** Concert, Columbia County Philharmonic Orchestra.

(Continued on page 6)

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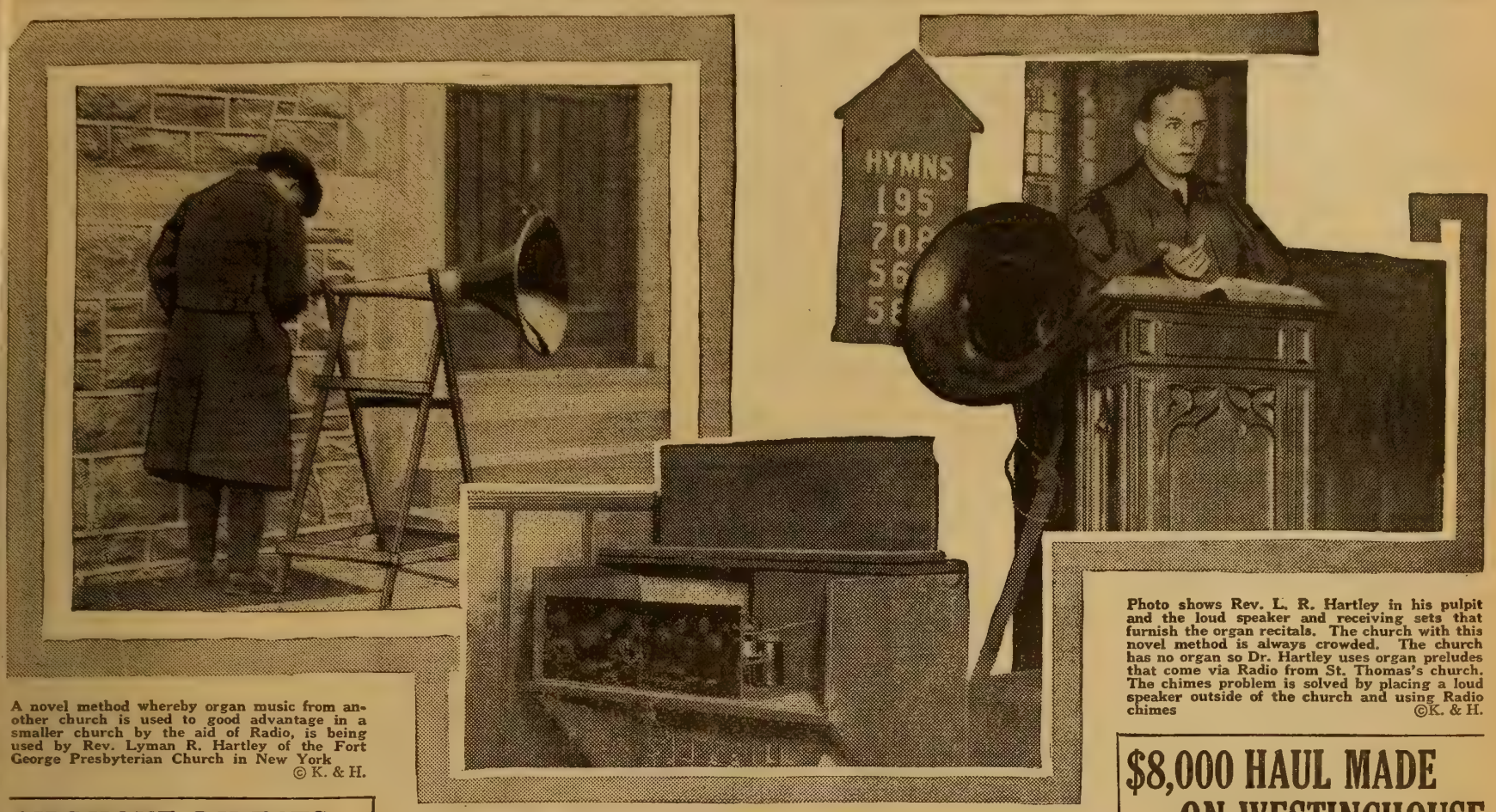

A novel method whereby organ music from another church is used to good advantage in a smaller church by the aid of Radio, is being used by Rev. Lyman R. Hartley of the Fort George Presbyterian Church in New York
© K. & H.

Photo shows Rev. L. R. Hartley in his pulpit and the loud speaker and receiving sets that furnish the organ recitals. The church with this novel method is always crowded. The church has no organ so Dr. Hartley uses organ preludes that come via Radio from St. Thomas's church. The chimes problem is solved by placing a loud speaker outside of the church and using Radio chimes
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Three and four stages of amplification and two special type loud speakers are used. Some of the Sunday evening services are devoted entirely to Radio
© K. & H.

AIRPHONE DIRECTS WEIRD OPERATION

ADMINISTER TREATMENT FROM MOVING SHIP

After Ether Communication with Doctor Ship's Cook Is Operated Upon by Unskilled Officers

NEW ORLEANS, LA.—One of the strangest stories ever brought into port, a drama of the sea, complicated surgery and the newest marvel of communication, Radio, was told by witnesses when the United States Shipping Board vessel Elkhorn docked here.

The officers of this vessel witnessed the weird phenomenon of a first mate performing a surgical operation on the ship's cook at the direction, by Radio, of the surgeon of another steamship, while both vessels were traveling farther and farther apart as the operation progressed.

The cook of the Elkhorn, Samuel Thompson, was washed aft during a storm at sea, striking obstructions on the deck and sustaining a horrible wound where a chunk of flesh weighing several pounds was torn away from his thigh. There was no ship doctor aboard. Radio Operator Nugent was on the job, however, and he sent an appeal through the air asking any surgeon within hearing to communicate with the Elkhorn's Radio. Doctors Wood and Croft of the S. S. American, enroute to England, answered. The Elkhorn was on her way to France, but the American was so much speedier than the freighter that the distance between them was constantly widening. A description of the wound was Radioed to the surgeons, who replied:

"Has bleeding stopped? Wire pulse."

First Officer Edgerly and Third Officer Ziess Radioed back:

"Yes. Temperature 102. Pulse 100. Unable to sleep. Pains around spine."

Instructions for washing the wound, for injections to deaden the pain, and for bandaging came back immediately from the America's surgeons. Later diet instructions came. The wound failed to improve and the two mates, dreading instructions to operate, reported faithfully. The wound turned black, and the ether conveyed instructions to cut the dead flesh away. With a sterilized razor blade the operation was performed by First Officer Edgerly, with laudanum administered as an anaesthetic.

Anxiously awaiting the result, the next morning the America's surgeons received the report that the operation had succeeded. The cook recovered rapidly and the freighter's officers and crew celebrated the first day he was able to go on deck. He went ashore at Le Havre and went to a hospital to convalesce. The ship finished its voyage to Antwerp and made its return voyage to America, which just ended with her entrance at this port.

While on her way here the officers received word that the cook contracted a complication of diseases while at Havre, and died there at a hospital. The unfortunate denouement, the ship's officers feel, does not detract from the immensity of the discovery that Radio operations can be successfully performed, since the healing of the wound for which the Radio-directed operation was put in effect, was both prompt and complete. The Elkhorn landed at Havre late in January.

Accounting Examination Is Given Over Broadcast

Feasibility of Unique Plan Opens New Method for Quiz

NEW YORK.—Students in the Haaren High School of New York had the unique experience of receiving their lessons by Radio, on April 4, between 1:15 and 1:45 p. m., when Station WJZ at Newark broadcast a series of accounting problems, which was received by Radio in the class room of the high school, where adding machines were used in the solution of the problems.

This is the first experiment to be made with a view of determining the feasibility of conducting a course of instruction by Radio in an educational institution of New York or elsewhere.

At a recent conference, which was attended by the officials of the Board of Education, it was decided that the experiment should first be carried out at the Haaren High School, under the direction of R. W. Burnham and Fred Siegel, of the faculty. Accordingly, a high power receiving set was installed in the building with a power amplifier attachment, so that the pupils in all parts of the classroom will be within easy hearing distance. In order that the officials of the Board of Education might know the character of the instruction broadcast and witness the demonstration, they were in full hearing of the instructor's voice at headquarters, where an installation was made. A skilled accountant at the board headquarters performed the problems given from the broadcast station and checked the final results of the students.

More than 1,000,000 acres of timberland are now patrolled daily in the vicinity of Spokane by an airplane fire patrol. The plane is equipped with Radio. One plane covers in two and one-half hours the same territory that required the constant attention of a large force of foresters.

White Star Liner Has Powerful Set

Sending Machine Enables Operator to Work at Rate of 100 Words a Minute

NEW YORK.—The White Star liner Majestic, the largest ship afloat, is equipped with a Radio set which is not only more powerful than that usually to be found on a passenger vessel, but which in itself marks an innovation in ship Radio.

On such a huge vessel, carrying as it does a human population larger than that of many a small town, the problem of handling Radio messages calls for extraordinary ingenuity and resourcefulness, and so it happens that the Majestic's Radio office is the only one employed on an ocean liner that is equipped with a machine for sending messages.

100 Words a Minute

It is the use of this remarkable machine that makes it possible to send Radiograms at the rate of one hundred and more words a minute, a speed which no Radio operator could reach or ear recognize, a speed never before attained on a ship.

Once a message is filed for transmission on the Majestic, but little human effort is required to flash it to its destination.

The passenger's Radiogram blank is handed in by the purser and by him to one of the operators. On other ships the operator pounds a telegraph key, but on the Majestic he pounds a typewriter instead. Each stroke of a key perforates a paper tape, and thus the message is converted into a series of holes. This perforated paper tape is then passed through a transmitting machine which is a marvel of ingenuity—an electrically driven machine which does its work almost noiselessly and which never makes a mistake.

350 Messages a Day

In a single trans-Atlantic voyage her operators will handle 3,000 messages, aggregating about 40,000 words. Even the city branches of land telegraph companies handle no more. In a single day the Majestic has handled 350 messages in ten hours.

Gets Brazilian Reports

NEW ORLEANS, LA.—The New Orleans Green Coffee Association members are now offered an opportunity to get prompt reports on the new Brazilian market at first hand by Radio through the enterprise of Clarence Fox, of the S. A. Levy Co., Importers, here, who has just installed one of the finest receiving sets in the city.

$8,000 HAUL MADE ON WESTINGHOUSE

THIEVES TAKE VALUABLE APPARATUS

Dealers All Over United States and Canada on Lookout for Stolen Merchandise

SPRINGFIELD, MASS.—Automobile thieves and stolen automobile smugglers have done an enormous business for several years, their operations extending to all parts of the United States and Canada and to many foreign countries. Criminals apparently keep up to date as well as honest folk, for the latest type of criminal, following hard on the heels of the auto thieves, is the Radio robber. And they are going into the game wholesale, too, with prospects of large returns unless speedily caught.

Recently a gang stole from the Westinghouse Electric and Manufacturing Company's storehouse here 807 Radio head sets, 1,000 radiotron bulbs, type WD 11 and 133 loud speaker units. A haul worth, at a low estimate, around $8,000. Not so much as the value of two or three high-powered cars, but perhaps more easily disposed of, to dishonest dealers or individual buyers.

A reward of $200 has been offered by the Westinghouse company, and the Springfield police have sent out a broadcast and circularized every Radio dealer and second-hand store as a warning. The tubes were not packed in the ordinary carton used for retail stores, but smaller ones, 2½x2½x6¼ size. The loud speaker units should not be found on sale anywhere as a separate article, but are sold only in the Radiola Grand Radio Set. Dealers and others having such Radio units offered to them will thus know they are stolen.

Japan Asks 30,000,000 Yen to Develop Ether Traffic

In order to develop commercial Radio on a large scale, the Japanese Department of Communications has requested an appropriation of 30,000,000 yen, which, it is said, will be granted by the government, according to a report received by the Department of Commerce from Commercial Attache Abbott, at Tokio. The Organization of a private company to manufacture Radio apparatus, build stations and do a general communication business, has been suspended, as it conflicts with existing Japanese law. If the appropriation is secured, the Department of Communications hopes to become a party to the agreement in regard to exchange of patents existing between the Marconi, Telefunken, Telegraphie sans Fils, and the Radio Corporation of America.

A Philadelphia high school boy has built a set in a corncob pipe that gives good results.

ADVANCE PROGRAMS

(Continued from page 4)

WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Ezekiel;" Musical program, instrumental trio, double violin quartette, female chorus, girls' glee club; "Just Among Home Folks" from Louisville Courier-Journal; Daily short story, Louisville Times; **7:30-9:00 P. M.,** Dance music, Franklin orchestra; Three-minute digest of International Sunday School lesson for April 22, T. F. Gordon; Child welfare talk, "Truant," Frederick Hess; Reading, "An Interesting Historical Episode;" Setting-up exercises.

WJZ (Eastern, 360), 2:00 P. M., "Book Reviews," Grace Isabel Colbron; **7:00 P. M.,** "Jack Rabbit Stories," David Cory, New York Evening Mail; **9:00 P. M.,** "Sports," W. J. Slocum, Sporting Editor of the New York Tribune.

WLW (Central, 360), 10:00 P. M., Concert, Iota Chapter of Sigma Alpha Iota Sorority, Cincinnati Conservatory of Music.

WMAQ (Central, 400), 4:35 P. M., Dramatic program; **7:00 P. M.,** Talk for Boy Scouts; **7:15 P. M.,** Talk, Mrs. W. G. Bennett, International Order of King's Sons and Daughters; **7:30 P. M.,** "The Irish Minstrel," Cathal O'Byrne; **9:15 P. M.,** Cosmopolitan String Quintette.

WOC (Central, 400), 3:30 P. M., Talk, Karl G. Stephan; **7:00 P. M.,** Concert, Hawkeye orchestra, Clinton, Iowa, Gladys Muerling, pianist; **8:00 P. M.,** Lecture, "Our National Parks," Carl Balcomb, Davenport, Iowa.

WSB (Central, 400), 7:15 P. M., Concert by Edna Mae West, soprano; Chalmers Shumate, pianist; John Hannoules, saxaphone; **10:45 P. M.,** Georgia Serenaders Singing Syncopators.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by woman's editor; **7:00 P. M.,** The Town Crier; Detroit News orchestra; two piano duet, Agnes Jackson and Deora Wolfe; Soprano, Edna J. Sylvester; Baritone, C. F. Gesley.

Friday, April 20

KDKA (Eastern, 360), 6:15 P. M., Concert, KDKA Little Symphony Trio; **7:15 P. M.,** Special farm features by the National Stockman and Farmer; **7:30 P. M.,** "Why I Hold on to My Illusions," as answered in Rostand's "Chanticleer."

KGW (Pacific, 400), 7:00-7:30 P. M., Univ. of Oregon extension course lecture; **8:00-8:15 P. M.,** Scotch songs, K. B. Meeker; **8:15-9:00 P. M.,** George Olsen's Portland Hotel Orchestra; **11:00-12:00 P. M.,** Meeting of Hoot Owls.

KSD (Central, 400), 8:00 P. M., Soprano, Louise Heimueller; Piano, Marguerite Heimueller and I. Esther Wright; Reader, Thelma Duckworth; **11:30 P. M.,** Piano, Catherine Carmichael; Baritone, W. F. Davie; Tenor, Waldo Finke.

KYW (Central, 400), 8:00-9:00 P. M., Baritone, R. G. Ball; Accompanist, Gertrude G. Perkins; Piano, Amy Degerman; Reader, Margaret H. Miller. Dance music, Isham Jones orchestra; **9:05 P. M.,** Book review, Llewellyn Jones.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Booker T. Washington Negro High School, Cleburne, Texas; **9:30-10:30 P. M.,** Coronation of "Queen Ater from Decatur," assisted by the Home Brew orchestra of Decatur, Texas.

WGI (Eastern, 360), 9:30 P. M., Travelogue, David M. Cheney; Concert, Amrad Banjo-Mandolin Club, W. Eugene Hammett, Director.

WGY (Eastern, 370), 2:00 P. M., Fashion talk, "Monograms on Smart Apparel," courtesy Modern Priscilla; **7:40 P. M.,** Health talk, "Start Hay Fever Prevention Now," N. Y. State Dept. Health; **7:45 P. M.,** Concert, N. Y. State Dept. the American Legion; Talk, "American Legion and Its Future," A. S. Callan; Talk, "The Disabled and the War," Col. Cornelius W. Wickersham; Address, "The Three Hundred Year Struggle Toward the Pole," Capt. Donald McMillan, arctic explorer.

WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Daniel"; Piano solo, Margaret Hammerstein; Recitation, Mary Angela Sweeney; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story, from Louisville Times; **7:30-9:00 P. M.,** full concert auspices Mrs. Jane Webster Murrell, dedicated to all grandmothers, music prior to 1860; Reading, "An Interesting Historical Episode"; Setting-up exercises.

WJZ (Eastern, 360), 3:00 P. M., Concert, Steinway Piano Company, direct from Steinway Hall; **5:30 P. M.,** "Foreign and Domestic Commerce Report" issued by United States Department of Commerce; **5:50 P. M.,** Conditions of Leading Industries, by Magazine of Wall Street; **7:30 P. M.,** Dance music, Vincent Lopez "Red Cap" orchestra, direct from Hotel Pennsylvania Grill; **8:30 P. M.,** Program arranged by Columbia Musical Club; **9:30 P. M.,** Literary evening conducted by the Outlook, Harper Bros., and Scientific American.

WMAQ (Central, 400), 4:35 P. M., Program by Columbia College of Expression; **7:00 P. M.,** Musical, "Hearing American First"; Lecture, Mrs. Marx E. Oberndorfer; **9:15 P. M.,** Concert, Buddie William's orchestra, Univ. of Chicago.

WOC (Central, 400), 3:30 P. M., Talk, C. C. Flanagan; **7:00 P. M.,** Concert, P. S. C. orchestra; **8:00 P. M.,** Lecture for farmers, Hon. Smith W. Brookhart, U. S. Senator from Iowa.

WSB (Central, 400), 7:15 P. M., Concert, Ritz Harmony Boys; **10:45 P. M.,** Concert, Atlanta Kiwanis Club.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by woman's editor; **7 P. M.,** The Town Crier; Detroit News poet; Detroit News orchestra; Vocal recital furnished by Mrs. Earl F. Chase.

Saturday, April 21

KGW (Pacific, 400), 3:30-4:00 P. M., Children's Program; Violin, Grace Astrup; Accompanist, Dorothy Clark; Stories by Aunt Nell.

KHJ (Pacific, 400), 8:00-10:00 P. M., Dance music, Donald Campbell's orchestra.

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, Cameo Motion Picture Theater; **7:00 P. M.,** "One Day Trip by Automobile," Pittsburgh Automobile Club; **7:15 P. M.,** "Under the Evening Lamp," stories of the Youth's Companion, including "In the Pound," "Hospitality to Ideas," "Till the Day of Judgment," "Baseball for all the Family," "Not on the Time Table"; **8:00 P. M.,** Men's fashions, furnished by J. G. Bennett Co., Pittsburgh, Pa.; **8:15 P. M.,** "Spring House Cleaning Your Automobile," by Ray McNamara, of the Pittsburgh Post; **8:30 P. M.,** Concert, Whistler, Elizabeth Drake; Violin, Oscar Schwarm; Piano, Mrs. Edwin Denham.

KSD (Central, 400), 8:00 P. M., Concert, Gallergher orchestra; **8:30 P. M.,** Piano, Helen Peeck; Reader, Marie LeMaster; Soprano, Mrs. Hazel Epping Herligers.

KYW (Central, 400), 8:00-9:00 P. M., Concert, W. W. Kimball Co.; Selections on Kimball pipe organ; Dance music, Isham Jones orchestra; **9:05 P. M.,** "Under the Evening Lamp," articles and humorous sketches furnished by Youth's Companion.

WDAP (Central, 390), 10:00 P. M.-2:00 A. M., Popular music program, Jack Chapman's orchestra.

WGI (Eastern, 360), 8:00 P. M., Talk on New England Problems, direction of New England Business Men; Concert, Coyne's orchestra of Lawrence, Matthew T. Coyne, Director.

WGY (Eastern, 370), 9:00 P. M., Dance music, Cain's Castle orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Syrus, the Great"; Concert, Georgetown College orchestra; "Just Among Home Folks," from Louisville Courier-Journal; Daily short story from Louisville Times; **7:30-9:00 P. M.,** Concert, the Town Club of Louisville Conservatory of Music; Readings, Mrs. Billy Nash Perry and Martha Frances Brantley; Setting-up exercises.

WJZ (Eastern, 360), 1:15 P. M., Concert, Bill Stanler's Novelty Orchestra of East Orange, N. J.; **2:00 P. M.,** "Pung Chow," a Chinese Game, by Harper Bros.; **7:00 P. M.,** "Uncle Wiggily Stories," by Howard R. Garis, author; **8:30 P. M.,** "Fashions," by Harper's Bazaar; **8:45 P. M.,** Concert, by Elfrieda De Roda Helmuth, coloratura soprano; **9:00 P. M.,** Program by Good Housekeeping Magazine; **9:30 P. M.,** U. S. Army night.

WMAQ (Central, 400), 7:00 P. M., Lecture, "Worlds in the Making," Arthur D. Carpenter; **9:15 P. M.,** Piano, Emil Borg; Violin, Elmer Swansen.

WOC (Central, 400), 3:30 P. M., Talk, C. C. Hall; **6:30 P. M.,** Sport News; **6:35 P. M.,** Sandman's visit; **7:00 P. M.,** Concert, Kiwanis Club of Rock Island, Ill., Soprano, Mrs. J. T. Mordy; **9:30-10:30 P. M.,** Dance music, P. S. C. orchestra.

WSB (Central, 400), 7:15 P. M., Special for Shut In Invalids; Concert, Old Maid Artists.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner"; Talk by woman's editor.

Sunday, April 22

KDKA (Eastern, 360), 10:45 A. M., Church services, Emory Methodist Episcopal Church, Pittsburgh, Pa., Rev. W. Wofford T. Duncan; **2:30 P. M.,** Bible story for children, Rev. W. A. Logan, of Alpha Lutheran Church, Turtle Creek, Pa.; **4:00 P. M.,** Organ Recital, Dr. Charles Heinroth, direct from Carnegie Music Hall, Pittsburgh, Pa.; **4:45 P. M.,** Vesper Services, Shadyside Presbyterian Church, Pittsburgh, Pa., Rev. Percial H. Barker; **8:30 P. M.,** Concert, Carnegie Tech Symphony orchestra, direction of Vick O'Brien, direct from Carnegie Music Hall.

WBAP (Central, 400), 11:00-12:15 P. M., Church service, First Methodist Church, Fort Worth; **3:30-4:30 P. M.,** Sacred concert.

WDAP (Central, 390), 9:00-10:00 P. M., Concert, Henry Sellinger and Drake Hotel concert ensemble, assisted by other artists.

WGI (Eastern, 360), 8:30 P. M., Federation Church Service, Rev. Fred Alban Weil, Pastor of First Parish Church of Quincy; **9:00 P. M.,** Musical, Quartette of First Parish Church of Quincy.

WGY (Eastern, 370), 10:30 A. M., Church service; Sermon, Rev. Frank T. Rhoad, Second Presbyterian Church, Amsterdam, N. Y.; **4:00 P. M.,** Concert, WGY symphony orchestra; Boy soprano, William DeMorest; Accompanist, Mrs. Katherine Chamberlayne; **7:30 P. M.,** Church service; Sermon, Rev. Frank T. Rhoad, Second Presbyterian Church, Amsterdam, N. Y.

WHAS (Central, 360), 10:00 A. M., Church services auspices First Unitarian Church of Louisville, Rev. R. Ernest Aikin, pastor; **4:00-5:00 P. M.,** Sacred concert Ella Sharrard violin quartette.

WJZ (Eastern, 360), 11:00 A. M., Church services, St. Thomas' Church, New York City, sermon by Rev. Ernest M. Stires; **3:45 P. M.,** Concert by Ruth Beard Addis, contralto; **4:15 P. M.,** Concert, Abraham Goldberg, violinist; Mr. Gain, pianist; **6:30 P. M.,** Readings and Records from the "Bubble Books That Sing" by Ralph Mayhew, Harper Bros.; **7:00 P. M.,** "Coming events cast their shadows before—what present world shadows augur," an analysis by the New York Times Analyst; **7:15 P. M.,** Organ recital direct from Estey Auditorium; **8:00 P. M.,** Betty Blythe, motion picture star, will sing a selection; **8:15 P. M.,** Symphony Concert by American Orchestral Society, Inc., Chalmers Clifton, conductor.

WSB (Central, 400), 5:00 P. M., Musical program, Senior Christian Endeavor; **7:30 P. M.,** Church services, Wesley Memorial Church.

WWJ (Eastern, 400), 2:00 P. M., Detroit News orchestra; Tenor, Walter Bates; Soprano, Edith Pickles; Pianist, Harrison Burch.

Monday, April 23

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Hawaiian guitars, Edith and Grace McDowell, Dallas, Texas; **9:30-10:30 P. M.,** Dance music, Owen Crockett's Texans Supreme Dance Orchestra.

WGY (Eastern, 370), 7:45 P. M., Concert, violin, Alexander Koszalka; Reading, "Cohan on the Radio," Lillian Fisher; Humor from "Topics of the Day," courtesy Pathe Exchange; **9:30 P. M.,** Program St. George's Society, Albany, N. Y.; Baritone, John Dick; Address, "Your Australian Cousins," Capt. Kilroy Harris; Piano, T. Frederick Candlyn; Address, "Mutual Relationship Between United States and Great Britain," Judge Frederick Crane; Address, "The Heritage from the Motherland," Rev. Paul Hickok; Tenor, Samuel Whittam.

WHAS (Central, 360), 4:00-5:00 P. M., Alamo Theater organ, H. C. Conrad; Three-minute biography of Old Testament characters, "Zerrubbabel;" Piano, Julia Woods; "Just Among Home Folks" from Louisville Courier-Journal; Daily short story from Louisville Times.

RECEIVING RECORDS? SEND 'EM IN—

SEVERAL new records were made during the past week, but R. J. Gall, of Blythe, California, seems to have the most records in this time. Keep account of the stations you hear and see if YOU won't be the lucky one next time. Have you any records over 2,300 miles that have not been entered? See if you can't hold the record in your state for receiving the longest distance. Hurry up and send 'em. LET'S GO.

Below are the records made this week:

Station—Miles Away—Who Heard It

CFCN—2100, E. J. Cuddy, Dedham, Mass.
DD5—1550, C. V. Bell, Ottawa, Can.
KDZR—1050, W. C. Wolverton, Linton, N. D.
KDZZ—1050, W. C. Wolverton, Linton, N. D.
KFDL—1750, E. J. Cuddy, Dedham, Mass.
KFHJ—1250, J. E. Bradley, Justin, Tex.
KLS—1400, J. E. Bradley, Justin, Tex.
KNV—1725, A. C. Flint, Chicago, Ill.
KNX—1175, J. E. Bradley, Justin, Tex.
WAAM—2125, R. J. Gall, Blythe, Calif.
WDAH—1025, Paul Glaister, Napanoch, N. Y.
WFAM—1025, J. H. Wall, Rensselaer, N. Y.
WGAF—1100, Kenneth Steele, Northumberland, Pa.
WGAQ—1025, W. J. Wolverton, Linton N. D.
WHAH—1100, Paul Glaister, Napanoch, N. Y.
WHAY—1700, R. J. Gall, Blythe, Calif.
WIAF—1325, C. V. Bell, Ottawa, Can.
WJAQ—1200, Paul Glaister, Napanoch, N. Y.
WKAS—1075, Paul Glaister, Napanoch, N. Y.
WLAG—4150, H. A. Crowe, S. S. Ethan Allan, South of Hawaii.
WLAK—1575, Vinson Crowder, Houston, Tex.
WLAZ—1950, R. J. Gall, Blythe, Calif.
WMAY—1400, R. J. Gall, Blythe, Calif.
WOAW—1100, Louis Raymond, Pullman, Wash.
WOS—1625, G. L. Harms, Portland, Ore.
WPAC—1325, L. C. Hopkins, Enfield, Conn.
WQAM—1400, C. V. Bell, Ottawa, Can.
WTAC—2025, R. J. Gall, Blythe, Calif.
WWI—1800, R. J. Gall, Blythe, Calif.

Admiral Freemantle Sets Up Ship Cabin to House Set

LONDON ENGLAND.—Admiral Sir Edmund Freemantle has had the old captain's cabin of his former flagship "Impregnable" taken ashore and set up on the premises of the Autovoyers, Ltd., as a Radio demonstration theatre. He formally opened it recently. The cabin was carefully restored with the aid of naval experts and makes a unique rendezvous of both historic and scientific interest, with its fine acoustic properties for the reception of Radio broadcasts.

The Impregnable was built and launched in 1840 as The Howe, and was the largest and last of the "wooden walls of England."

RADIO
At Cut Prices

Standard parts only in original packing. Sold on a "money-back" basis.

PHONES

$ 8.00 Brandes Superior	$ 5.95
12.00 Nathaniel Baldwin Type C. Double	8.95
7.50 Modell's special	3.95

TUBES

1½ Volt Peanut Tube	2.00
U. V. 201	5.50
1½ Volt Mercury	4.95

CABINETS
Made in our factory

7" x 10"	1.45
7" x 18"	2.15
7" x 24"	2.95

MISCELLANEOUS

Solderall, Tube	.25
$12.00 Amplitone, Nickel Horn	4.95
25.00 Aerex Crystal Set	9.95
DURaTEK Permanent Crystal Detector	2.00
W.D.-11 Adapter	.65
$1.50 Lightning Arrester, Indoor and Outdoor Type	.95
5.50—180 Degree Variocoupler on Bakelite, Silk Wound Wire	2.45
2-inch Bakelite Dials	.25
4-inch Electros Dials	.75
3-inch Bakelite Dials	.35
$ 1.00 Freshman Variable Grid Leak and Condenser Combined	.75
1.00 Bakelite Socket	.50
5.00 W. D. 12 Audio Frequency transformer	3.75
3.00 Owl Radio Frequency transformers	1.50
5.50 Coto coil Radio frequency transformer	3.45
5.00 Sleeper Radio frequency transformer	1.95
5.00 Acme Audio and Radio transformer	3.45
8.00 Dayton Variometer	5.45
8.00 Dayton Variocoupler	5.45
5.50 Murdock variable condenser, 23-plate	2.95
6.50 Murdock variable condenser, 43-plate	3.25
132.00 Radiola R. C. set	79.50
The new Morrison Siren loud speaker	18.50
5.00 Multi-Radioscope	1.50
Little Gem set	6.50
50.00 Turney single tube set	18.50
1.25 Western Electric Ammeter for testing B batteries	.49
2.00 22½ volt B. battery	1.00
New radio map	.35

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YOU—YOU—YOU
T-Tell—Tell 'Em I-I-I Use the Famous Neutrodyne Circuit

Because

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3. It is a four-tube reflex, too—2 RF. Det. 2 AF.
4: It is convenient, using only a 50-ft. indoor aerial.
5: Squeals and howls of regenerative circuit neutralized.
6: Same station always gotten on same dial settings.

18 Stations From Coast to Coast brought in in 3½ hours with Loud Speaker intensity.

Parts for $5.00
Send only money orders—no checks

3 Four to 1 SUPERAMPLIFIERS
2 "Neutrodyne" Special Condensers
Instructions and Blue Print of Circuit in Detail

Superamplifier Co. 514 FULLERTON PKWY. CHICAGO

RADIO COPS WATCH AIRPHONE TRAFFIC

A.R.R.L. TO HELP CONTROL BROADCAST JAM

300 Volunteer Deputies Stationed Through Land to Turn "Stop and Go" Signs on Signals

By Kenneth Bolles

If you can imagine the panic that would exist in the principal streets of New York City should all traffic squads be relieved from duty, when traffic was at its highest point of congestion, you can imagine the chaos that exists in the air traffic as a result of the unprecedented popularity of broadcasting.

You are not aware, ordinarily, of course, of the air traffic, because the telegraph messages and the music passing over your head are of a too high rate of vibration for human ears. This is known as Radio frequency. It is not until you, like a million others, have obtained a Radio receiving set which can be tuned to these higher frequencies, that you begin to appreciate the problem that faces the modern Radio engineer—the need for a traffic man of the air.

They "Get in Way"

Then you realize that Radio transmitting stations get in each other's way in the same manner that one automobile blocks another.

It is for reasons such as the foregoing that the American Radio Relay League, the national organization of telegraphing amateurs, has a traffic manager. His work may be compared to the city traffic expert, who studies the peculiar conditions that exist in the territory under his jurisdiction and suggests regulations for the orderly movement of motor vehicles and pedestrians. The striking difference is that where one is dealing with a tangible problem that can be seen and recognized by the layman, the other faces what at the outset would appear an even more difficult situation since he is dealing with a medium which the most learned students of Radio science are not sure exists—the ether.

Many Work Simultaneously

The chaotic condition of the ether is obviously due to the fact that it is being used simultaneously by thousands of naval, commercial and private telegraphing stations in addition to about 600 broadcasting stations. It is generally admitted that the growth of Radio has been an unhealthy one. There is not a corner of the United States that does not have a transmitting station sending out its quota of waves.

As its contribution to the general scheme to make the ether an efficient medium for the broadcast listener, the amateur and the various classes of transmitting stations, the American Radio Relay League through its traffic manager, F. H. Schnell, and its operating department, is about to launch a plan for gathering data on interference by establishing 300 official observing stations. The operators of these stations will listen for and record interference on broadcast waves of every description, government, commercial, private and atmospheric, as well as conflicts between broadcast transmitters and broadcast receivers themselves.

Information Gathered

The problems of 1912, when the first Radio law was enacted, are not by any means the problems of 1923 and the Radio "stop and go" signs for controlling the ether are not adequate, for the original law failed to take into account the huge traffic that was to develop in the air. With Radio legislation still pending, a number of commercial organizations and the A. R. R. L., which is a non-commercial organization of amateurs who regard Radio as a hobby, are doing their utmost to relieve ether traffic with present legislative backing.

WGY RUNS VOICE FILM BACKWARD AS NOVELTY

Listeners In Hear Queer English from Pallophotophoned Speech

SCHENECTADY, N. Y.—Listeners of WGY who had never heard English spoken backward heard this unique demonstration by Radio recently, when WGY, the Schenectady station of the General Electric Company broadcast two paragraphs of an inspirational speech by Dr. Frank Crane on a Pallophotophone film by reversing the film.

The Pallophotophone is an instrument which photographs or records sound on motion picture film. The film looks just like motion picture film but the photographed image consists of a series of up and down lines of varying degrees of amplitude and frequency. Everyone is familiar with the result obtained by reversing the motion picture; falling buildings are rebuilt; the man jumping off the wall is seen jumping back when the film is reversed. The same thing occurs when a speech film is reversed, the speech is given backward.

POLA NEGRI, PARAMOUNT STAR, TURNS FAN

Pola Negri, beautiful Paramount Star, spends all her spare time listening in on the ether waves. Her first interest in Radio was awakened when she arrived on the coast recently and found a beautiful set installed in her bungalow

THIRTY-FIVE CENTS COST OF THIS SET

Boston Fireman Builds Cheap Vest Pocket Receiver with Low Expenditure

BOSTON, MASS.—Firemen at the Mason street fire station, in the downtown shopping district here, are obtaining much enjoyment as the result of the ingenuity of one of their number, James J. Harrington, who has built a number of miniature Radio sets. These are able to pick up concerts from stations WGI and WNAC. The set developed by Harrington is remarkable for its small size and low cost. Exclusive of the headset the material for each set cost 35 cents. The completed set is no larger than a watch.

The good results obtained with this set are attributed to the winding of the coil which consists of twelve feet of No. 26 wire wound on a piece of a cigar box wood, three-eighths by one-eighth inch thick. There is about one-eighth of an inch space between each parallel wire and each layer is wound in the opposite direction. The coil is contained in a box one and one-half inches long, one and one-half inches wide and seven-eighths of an inch deep, made of cigar box wood.

The crystal holder, bought for ten cents, is on top of this box, the holder being made of fiber, with the usual cat whisker and two binding posts. A third binding post (double) is placed between the two single posts. Harrington's home is at 19 Rowell street, Dorchester, Mass.

Conductors Call WHN as Stop

NEW YORK.—"Cypress Avenue, WHN Broadcasting Station" is the new announcement of the Brooklyn Rapid Transit street car conductors on the Myrtle Avenue line in Ridgewood, this city. Especially on Thursday evenings when WHN listeners go to the station in large numbers, there have been so many requests for directions to the broadcasting studio that the carmen have decided upon the new plan as easier for themselves.

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60 E. Roosevelt Rd., Dept. L, Chicago, Ill.

975 Meters Used in Turkish Waters

The United States Shipping Board has given the information that by agreement of the Allied Communication Officers the wave length of 975 meters is assigned to United States naval vessels operating in Turkish waters. This wave length and no other is used by United States vessels. In view of this fact, it is believed that the difficulties which have appeared from time to time will disappear. The station at Constantinople does not call, receive, nor send on any wave length other than 975 meters.

Japan to Permit Private Owned Broadcast Plants

Licensed Companies Will Charge Subscribers for Ether Service

WASHINGTON, D. C.—Public broadcasting in Japan has been placed in the hands of private enterprise due to a relaxation of the Government's policy governing communications, according to a report from Commercial Attache Abbott, at Tokyo.

Many applications to operate stations have been received by the Government but for the present only three or four financially sound companies in the larger cities, such as Tokyo and Osaka, will be licensed. These companies will be required to pay a tax and will be permitted to collect for their service direct from subscribers. The Government will charge users a yearly registration fee and turn over a part to the broadcasting companies.

The Bridgeport (Conn.) Telegram says that the newspapers should welcome Radio as a useful ally, rather than a dangerous rival.

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"ALLOW the ear to hear what it likes, the eye to see what it likes."
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The Grebe Receiver delights both ear and eye, for the ear enjoys good music,—the eye beautiful craftsmanship.

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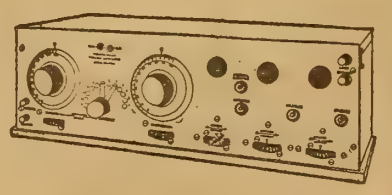

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Radiophone Broadcasting Stations

Corrected Every Week—Part I

AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.

AV7, St. Paul, Minn. 400 only. 500 mi. 6th Inf. Minn. Nat'l Guard, St. Paul Armory. Daily ex Sun, 2-2:30 pm, music, announcements. Tues, 8:30-10 pm. Thurs, 8:30-9:15 pm. Central.

BE, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 6-7 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd., (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 5:45-7:30, 7:45-8:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Vancouver Daily Province. Daily. 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCN, Calgary, Alta., Can. 275, 440 only. 1500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co.

CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHVC, Toronto, Canada. 410 only. 200 mi. Metropolitan Motors Co. Daily ex Sat and Sun, 5-5:30 pm, news, concert. Eastern.

CHYC, Montreal, Que., Can. Northern Elec. Co.

CHXC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.

CJBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Mountain.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. Daily ex Sat and Sun, 4-4:30 pm, concert. Sat 12-12:30 pm, concert. Eastern.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm. Fri, 8-10 pm. Alternate Sun, 8:30-10 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 2 pm, weather; 4:30-4:35, reports; 4:15-5:15, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.

CKOC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DM7, San Antonio, Tex. 200 mi. U. S. Army, Brooks Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. Savoy Theater.

KDYQ, Portland, Ore. 25 mi. Oregon Institute of Technology. Tues, 9-10 pm, educational lectures. Pacific.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Tues, Fri, 3:45-4:30 pm. Sun, 11 am-12:15 pm, 5-6, Church services, 120th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal.) Wed, Fri, 7-8 pm. Pacific.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFAD, Phoenix, Ariz. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.

KFAE, Pullman, Wash. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7-9 pm, lectures, music, readings. Pacific.

KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Thurs and Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. Standard Pub. Co.

KFAQ, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.

KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW, Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Special programs other days. Pacific.

KFAZ, Reedley, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.

KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upsou Co. Daily ex Sun, 3-4 pm, 6-6:45, concert, news, codes. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.

KFBL, Everett, Wash. Leese Bros.

KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. 485 only. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCP, Ogden, Utah. Ralph W. Flygare.

KFCQ, Casper, Wyo. Motor Service Stn.

KFCV, Houston, Tex. 300 and 600 also. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.

KFCY, Le Mars, Ia. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.

KFCZ, Omaha, Neb. Omaha Central H. S.

KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories. Pacific.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. 485 also. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.

KFDH, Tucson, Ariz. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDO, Bozeman, Mont. H. Everett Cutting.

KFDP, Des Moines, Iowa. 300 mi. Hawkeye Radio & Supply Co. Wed, 8-9:30 pm, music, entertainment. Sat, 9-10:30 pm, music, entertainment. Central.

KFDR, York, Neb. Bullock's.

KFDS, San Francisco, Calif. John D. McKee.

KFDU, Lincoln, Neb. Neb. Radio Elec. Co.

KFDV, Fayetteville, Ark. Gilbrech & Stinson.

KFDX, Shreveport, La. First Baptist Church.

KFDY, Brookings, S. D. S. D. State College of Agri. & Mech. Arts.

KFDZ, Minneapolis, Minn. Harry O. Iverson.

KFEB, Taft, Calif. 200 mi. City of Taft. Mon, Wed, Fri, 6:15-7 pm, music, news. Pacific.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music; 6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.

KFEJ, Tacoma, Wash. Guy Greason.

KFEP, Denver, Colo. Radio Equipment Co.

KFEQ, Oak, Neb. J. L. Scroggin.

KFER, Fort Dodge, Ia. Auto Electric Service Co.

KFEV, Douglas, Wyo. 485 also. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.

KFEY, Kellogg, Ida. Bunker Hill & Sullivan Mining & Const. Co.

KFEZ, St. Louis, Mo. American Society of Mech. Engrs.

KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.

KFFE, Pendleton, Ore. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.

KFFO, Hillsboro, Ore. Dr. E. H. Smith.

KFFP, Moberly, Mo. First Baptist Church.

KFFQ, Colorado Springs, Colo. 250 mi. The Markheffel Motor Co. Daily, 4-5 pm, concert. Mon, Wed, Fri. 8-9:30 pm, special program. Mountain.

KFFR, Sparks, Nev. Jim Kirk.

KFFV, Lamoni, Ia. Graceland College.

KFGB, Pueblo, Colo. Lowenthal Bros.

KFGF, Mt. Vernon, Wash. 50 mi. Buchanan, Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Sun, 2-3 pm. Pacific.

KFGL, Arlington, Ore. Arlington Garage.

KFHA, Gunnison, Colo. Colorado State Normal School.

KFHB, Hood River, Ore. P. L. Boardwell.

KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule

KFHH, Neah Bay, Wash. Ambrose A. McCue.

KFHJ, Santa Barbara, Calif. Fallon Company.

KFHR, Seattle, Wash. Star Elec. & Radio Co.

KFI, Los Angeles, Calif. 400 only. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.

KFIF, Portland, Ore. Benson Tech. Student Body.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. No regular schedule.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 and 485 also. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30, weather. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 250 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHJ, Los Angeles, Calif. 400 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.

KJR, Seattle, Wash. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri, 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9, concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLS, San Francisco, Calif. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 3:30-4:30 pm, 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.

KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.

KMJ, Fresno, Calif. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. Temporarily discontinued.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 5-6 pm, 7-8, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KNX, Los Angeles, Calif. Elec. Lighting & Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 300, 400 and 600 only. 1,500 mi. Hale Bros., Inc. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sat, 3-4:30 pm. Sun, 11-12:30 pm, church services. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. Apple City Radio Club.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.

KRE, Berkeley, Calif. 200 mi. Maxwell Elec. Co. Wed, 9-10 pm. Sun, 5:30-7:30 pm, concert. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Fri, 11:30 pm, concerts. Central.

KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 5:15-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather reports. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, 2-4 pm, 5-6, concert, news. Pacific.

KUS, Los Angeles, Calif. 300 mi. City Dye Wks. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 3-4 pm, reports, music, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. 485 also. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 710 only. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3, (Tues. only) Dept. Interior; 3:25-4:40, 5:05-5:20, markets, weather; 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:40 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs. 8:05-9:40 Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 only. 1,500 mi. International Tel. & Telg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAI, Dayton, O. McCook Field, U. S. Army.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

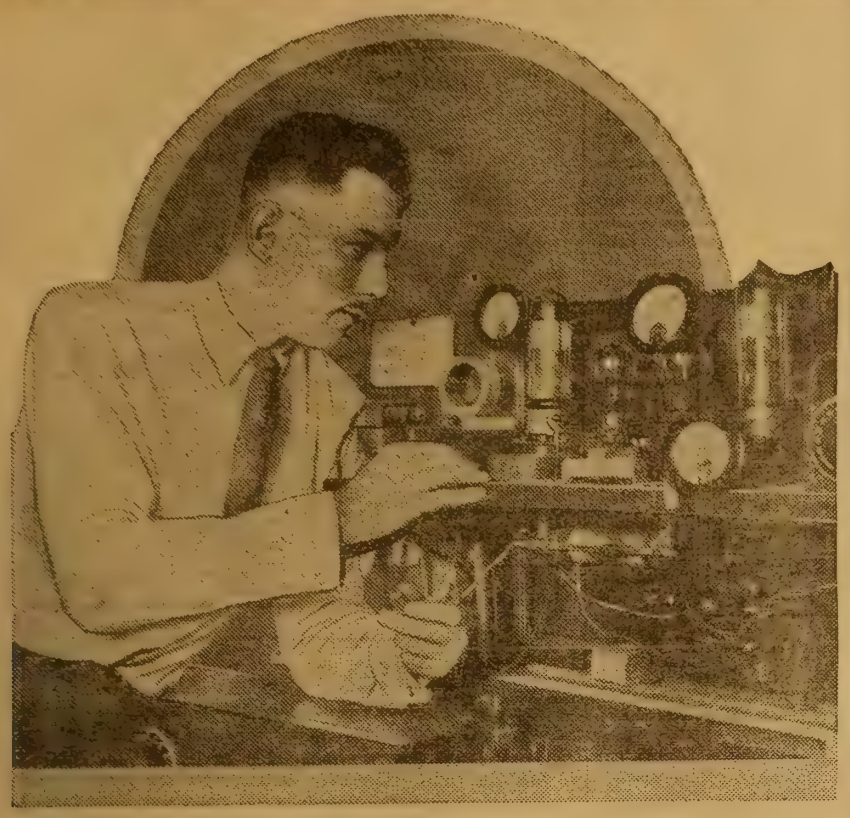
WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. No regular schedule. Central.

WAAF, Chicago, Ill. 485 also. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program at 3 and 4:30 pm. Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.

(NOTE—The second part of the station schedule list will appear next week.

FREDRICK B. OSTMAN WINS CUP



The Hoover cup, awarded annually to the owner of America's best amateur Radio station, under the auspices of the American Radio Relay League Board of Direction, this year went to Frederick B. Ostman of Ridgewood, N. J. Mr. Ostman is shown in the above photo making a repair on his station 2OM. This plant is one well known to amateurs and it is a safe bet that you can pick him up any night

© K. & H.

NEW JERSEY FAN WINS HOOVER CUP

Operator of 2OM to Keep Coveted Trophy for One Year

HARTFORD, CONN.—The Hoover cup, awarded annually to the owner of America's best amateur Radio station, under the auspices of the American Radio Relay League Board of Direction, this year went to Frederick B. Ostman, of 180 Broad street, Ridgewood, N. J. Announcement that 2OM, his station, had been chosen as the winner for 1922, was made at the league headquarters here today by the committee of three judges selected by Hiram Percy Maxim, president of the A. R. R. L.

This trophy is the highest honor in amateur Radio and is awarded by the Department of Commerce through Secretary Herbert Hoover to the best all-around amateur station, the major part of which is home-made. The entries are judged not alone on station arrangement or equipment, but on nine factors which the A. R. R. L. Board of Direction considers necessary in an ideal station.

The essentials considered in making the award include extent to which apparatus is home-made, ingenuity in design, construction and arrangement; efficiency of transmitter, consistent transmitting range, efficiency of receiver, obedience to United States laws and local co-operative regulations, quality of operator's sending, amount of traffic handled, accuracy, completeness and neatness of station log.

In making the award two other stations among the list of entries were considered particularly, 2FZ, operated by F. Frimerman, of 740 Prospect avenue, New York, and 5ZA, operated by Louis Falconi, of Roswell, N. M. The latter was the winner of the Hoover cup last year. Any licensed amateur Radio station in the United States or its possessions is eligible to participate in the contest.

A movement is under way to provide Toledo, Ohio, with a radio broadcasting and receiving station for its police department.

Mrs. Edward M. Munzer Is Only Woman Radio Engineer

HEWLETT, L. I.—Mrs. Edward M. Munzer, of this city, enjoys the distinction of being the only woman Radio engineer in the world. She is a graduate of the Massachusetts Institute of Technology with the degree of electro-chemical engineer.

During the war Mrs. Munzer took a special Radio course at Hunter college, New York, and was granted a grade "A" license as Radio operator. She later was appointed government inspector at the DeForest Radio station at Highbridge, N. Y., where she remained through the war making various experiments and tests.

Mrs. Munzer now is affiliated with the Davidson Radio corporation and is engaged in special research work in the Radio field.

AERIOLA SR. STYLE TUNER UNIT
Green silk on Bakelite Tubes with diagram $5.65.

REINARTZ ULTRA CIR. ALL PARTS $29.90
Ultra Reinartz Tuner Unit & Diag. $4.95 wound to H. J. Marx' specif. March 24th Radio Digest. Ruby Mica-Copper-Bakelite mounted Condensers N. P. binding posts .00015 50c; .0015 60c; .0025 70c. Reinartz coil Doub. green silk-Bakelite Spider $1.65. Reinartz plate circuit chokes (triple adjustable) $1.70. Complete set Reinartz tuner & detector parts $10.65. Tuner, Det. & 2 Stage $17.95. Two stage outfit $8.35.

GOV'T RADIO STORAGE BATTERIES
New Signal Corps Edison 3 cell type BB-4 $4.50; Single Cells for W. D.-11 tubes $1.50; 60 A. H. for W. D.-11 tubes $5.25; 6 Volts Edison $7.75; Edison "B" battery single elements 4c ea.; double 10c.

HI-POWER AMPLIFYING TRANSFORMERS
Best! Loudest! No-burn-outs. $2.65 with spec'l diagram.

GENUINE PEANUT TUBES
Wonderful Det. & Amplifier. Smallest tube made (aeroplane style) 1 V. ¼ amp. ½" dia. x 2¼" long.

FLEWELLING .006 COND'RS & PARTS
.006 Bakelite-Ruby Mica-Copper Calibrated Cond. 85c. Spider coils, green silk on Bakelite, $1.75 ea.

NEW SPECIALS
20 OHM RHEO. FOR 201-A OR W. D.-11 tubes $1.00. Variable grid leaks 1/10 to 5 Megohms 75c. HI-POWER LOUD SPEAKER & PR. BALDWIN PHONES $10.90. Variable grid Cond. .00025 or .0005 max. 45c. Vernier Attachment for any Var. Condenser 95c. Armstrong Super. New 3 tube outfit. Owner sacrificing.

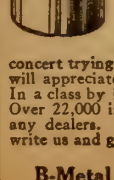
QUALITY RADIO SHOP, RICHMOND, IND.

CONGRESS RADIO CO.

503 So. State St., Chicago, Ill.

Brandes Superior Phones	$5.95
Baldwin "Mica Diaphragm" Units	4.65
Master Baldwin Headsets	7.25
Grebe Type Dials, 2 and 3 inch	.25
V. T. Composition Socket	.37
Glass Enclosed Crystal Detector	.40
Fada Switch Levers	.25
CRL Adjustable Grid Leaks	1.20
CRL Leak and Condenser	1.70
CRL Rheostats, 75c List	.45
Burgess Large 22½ volt B Bat	2.45
90 degree Variocouplers	1.10
3-Plate Variable Condensers	1.00
11-Plate Variable Condensers	1.25
23-Plate Variable Condensers	1.45
43-Plate Variable Condensers	1.65
23-Plate Vernier Condensers	3.35
43-Plate Vernier Condensers	3.75

Mail Orders Receive Immediate Attention
EVERYTHING GUARANTEED AS REPRESENTED



SOMETHING NEW
B-Metal
Guaranteed
SUPER CRYSTALS

Anyone who has spent most of an evening and lost the best part of a concert trying to find a live point on a cheap crystal, will appreciate B-Metal. It is the king of crystals. In a class by itself. Fully guaranteed loud talking. Over 22,000 in use in Detroit. Buy one today at any dealers. If your dealer hasn't B-Metal yet, write us and get one.

B-Metal Refining Co.
3134 Trumbull Ave.,
DETROIT, MICHIGAN

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Solid Copper Aerial Wire, 100 ft.	35c	Lightning Switches	$2.65
		Hydrometers, now at	45c

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Radion Loop Aerial	7.00	5.95
Cunningham C301-A Tube	9.00	5.95
Grewol Glass Inclosed Detector	2.00	1.65
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All American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
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9x10½ Formica Panel	1.42	1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, April 21, 1923 No. 2

Stolen Goods

How to Keep Equipment Well Locked

NATURALLY the petty burglar picks up goods that are readily turned into money. Recently there have been many complaints about stolen apparatus. A super set gone, a loud speaker stolen. These things are "as good as gold" to the pilfering person or shoplifter. There is no special reason why Radio materials should be made the object of these thefts, only that they are now a ready means of exchange for money.

While this equipment is so desirable at present dealers should use some care where it is stored and keep the most expensive apparatus in vaults or in well-protected storage places.

Tired Typists Get a Rest

Broadcasting Keeps the Weary Worker at Home Evenings

MUSICAL shows are usually dedicated to the "tired business man," but entertainment by Radio is claimed as a boon of the "weary" working woman, who is characterized no longer as the "poor working girl" since the listening privilege came to her.

Many tired workers stay home nights and rest up while listening in. Before the Radiophone many of these workers took enjoyment in dancing or at the movies, adding more fatigue to the tired eyes and constitution. It is now easy to get entertainment staying at home, obtaining rest as well.

Working Out Its Own Future

Who Knows What Is in Store for Radio?

A REVIEW of the accomplishments of Radio the past year and of the prophecies of experts for its future but cause one to ponder upon the inadequacy of any possible foretelling of what this great gift of nature is to accomplish. We can but gasp and wonder.

In view of the fact that Radio has always been with us, excepting for the invention of some apparatus of importance small in comparison with the natural elements used, who can answer the question, "What of the future?" Radio for the transmission of power has such tremendous possibilities within its scope that the most confirmed dreamer and the scientist of the widest vision can only guess in a feeble way.

Radio, now that it has been recognized in the abstract, will work out its own destiny. Such a force once started at work is not to be stopped, but it will go on and on, along its destined course. We can only hope that the course will run along smoothly and in peaceful channels, and for the benefit of the greatest number of the world's people.

Farmer's Growing Interest

Much Equipment Found in Rural Homes

ACCORDING to a survey recently conducted by the United States Department of Agriculture, Radio market news is proving of national practical use. Almost 50 per cent of the hundreds of returns to an inquiry sent out by Radio were from farmers who had Radio receiving apparatus, the remainder were from grain dealers, mills, elevators, banks, telephone companies, co-operative organizations, farm bureaus, and other agencies which disseminate the reports among large groups of farmers.

Greatest interest was shown in the grain market reports, which inform farmers of wheat, corn and oats prices at the leading grain markets. Next in importance came the livestock reports of prices and movements at the principal livestock markets of the country. The weather reports came next, following by reports on poultry products, fruits and vegetables, dairy products, hay, cotton and other farm products.

The first survey made by the department was to determine how widely its Radio market reports are being received and used by farmers, and it afforded much valuable information for developing the service to the maximum of efficiency. It had been known in a general way that the service has been of value to producers and other agricultural interests in the marketing of crops and to consumers through the regulating of market supplies, but definite data were not available until developed by this survey.

Condensed

By DIELECTRIC

We have not reached the point in this country yet where we have our members of legislatures inspired by the Radio reception of some light dance music or talks on dressmaking. There has been some suggestion of the advisability of letting our representatives listen in, in preference to so much broadcasting on their part. But then we are no more backward in this respect than are our English cousins. Members of the House of Commons recently requested the installation of a receiving set and were denied this privilege, on the ground that it would serve as a counter attraction and seriously interfere with the orderly processes of law. Not so very long ago it was announced that one of the largest manufacturers of Radio sets was gratuitously supplying our Senators at Washington with receiving sets—for what reason? Of course, I for one do not venture to say, because while the White bill was reasonably sure of coming before the last session of Congress it stood a good chance of being passed, still a set or two in the hands of a novice can produce considerable interference. It would seem preferable to provide a receiver rather than a transmitter though, and then it would be desirable for we amateurs to do the transmitting.

A great many fans are experiencing considerable difficulty in tuning in the Government broadcasting station, NAA. This is unfortunate. That station is giving some excellent service in the form of talks by the United States Bureau of Education. Its period of broadcasting is not a long one in the evening but is very much worthwhile. The inability to tune in is not due in every instance to the wave length of 710 meters, for many able to reach that wave length cannot seem to select the station. It is just as true that there are stations on the lower wave lengths which fans find difficulty in getting in spite of being favorably located with reference to these. Perhaps someone can supply a formula to be followed that will insure the reception of these illusive broadcasters.

Among a certain class of people in this country the broadcasting station is looked upon as a most convenient and cheap means of sending news. They consider a transmitting station as a specially constructed apparatus for giving to the world exactly the information they conceive to be most appropriate. Hence we learn of some very amusing incidents connected with broadcasting. No one doubts the sincerity of the proud father's wish to announce all over the land news of special importance to himself, yet it would hardly cause a real "ham" to hold on to a station which gave the color of hair, eyes, weight and chest tones of a new infant. Just such a request was received by Station WGY, and they also had a letter asking the station to broadcast news of the state of health of an entire family for the benefit of aged parents in the West, not once but three times for, as was explained, the parents might be out on two of the nights. This seems a trifle ridiculous to the majority of us and yet it tends to show the feeling of intimacy between the listener in and the announcer. The voice from the air carries a conviction to some that it is speaking solely to that individual.

One large group of Radio concerns has been annexing all the patented features of any value obtainable and it is not yet through acquiring. John Hayes Hammond, Jr., has been devoting his inventive genius to developing several important devices which have a great value to our Government. These he has sold to the group referred to, although the Government retains an option on all of them for military and experimental uses. What principally concerns us as amateurs is the system Mr. Hammond is said to have perfected to eliminate our old enemy static. If this actually works and is really OWNED by certain interests, how much will it cost the average fan to avail himself of its service? There is one consolation for you and me and that is Dr. Steinmetz's assertion of several experts about to succeed in establishing a static remover. We may have the advantage of knowing what to do to rid our sets of this evil without riding our purses as well.

Several fans have confessed to me that the most alluring part of owning a receiving set was to be able to tune in stations which gave lectures on various subjects of a truly educational character. Many there be who keep their tubes warm for the lighter features and turn a cold filament toward the oncoming waves of brain exhilarators. Yet the numbers will increase of ardent seekers for knowledge, and to them the educational programs from many of our universities and colleges will present valued opportunities for securing it. Another of our schools has entered the list of broadcasters, Washington State College, and while the usual entertaining features will appear on their programs, lectures will also be given in a regular educational course. My prediction of several months back is being realized today, which was that the colleges would see the tremendous possibilities latent in the use of Radio for educating the masses and avail themselves of this large lecture room.

There is still one suggestion which has been repeatedly made by listeners in to the broadcasting stations that remains disregarded by them. I refer to the custom of announcing the station immediately following a number. It is usually a long intermission between numbers and the listener likes to know to what station he is listening. Compliance with this request will be appreciated by the DX fans.

RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

The Radio Tramp

By Walt Drummond

(Continued from April 14 issue)

"The other night I had a dream.
A strange form came to me
And said, 'You've rambled all your life;
Your punishment shall be—

" 'When Death calls time your spirit shall
In no one place abide,
But with the speed of light shall move—
The Radio shall ride.

" 'And all your friends upon the earth
Will hear a g-r-r-r! and clack!
Each time you start to go somewhere
And when you're coming back.' "

Now, Jack thought this a happy fate,
And when he said good-bye,
His heart was in his hand-clasp and
A glad light in his eye.

That night he fell beneath a train
Out on the Santa Fe.
A trackman found his lifeless form
At dawning of the day.

* * * * *

So, when you hear these noises queer,
It's my friend, Happy Jack—
He's either on his way somewhere,
Or else he's coming back.

Now Lil, You Stop It

Indigest—The first taxi driver to equip his cab with Radio deserved success. "None but the brave deserve the fare."—LILLIAN G.

It Was Black Bawled

"We want to keep our eyes open for dis class legislation," said Rastus, at a meeting of the Sons of Africa. "I see they's a White Radio bill bein' introduced in Congress."

Maybe It Doesn't Oscillate?

Indigest—One fan wrote to a broadcasting station that he had the "bug" so bad that his head was beginning to resemble a vacuum tube. Sort of light-headed, probably.—Don A.

Betcha There's Alota QRM

Dear Indi—I fear that Radio weddings may lead to bigamy. While women are as attractive as they are and proposals as easy as that by Radio, man will certainly be sorely tempted.—Spark Gap.

We'll Say You Do

Dear Indi—A couple a nites ago I thought I'd horn in on the atmosphere, and the first thing I heard was "The ushers will now collect."

Right away quick, I plugged in two more bottles, and was just in time to hear an announcer at Jefferson City, Mo., saying that the convicts' band of the State Pen. would now play.

And here's what they played—

"The land of the free, and the home of the brave."

Do I "make" it? —Baker.

You're Bad as Lillian G.

Dear Indi—"It is more blessed to give than to receive" is a good motto for a broadcasting station.—SPIDER WEBB.

A. B. C. Lessons for Radio Beginners

Chapter XVI—The Reflex Circuit

By Arthur G. Mohaupt

THE REFLEX circuit is a form of amplifier circuit that has recently come into use and been found very effective and satisfactory. In the reflex circuit an entirely new principle is employed, for here the amplifier tubes are designed to serve a double duty—the same tubes act first as amplifiers of the Radio

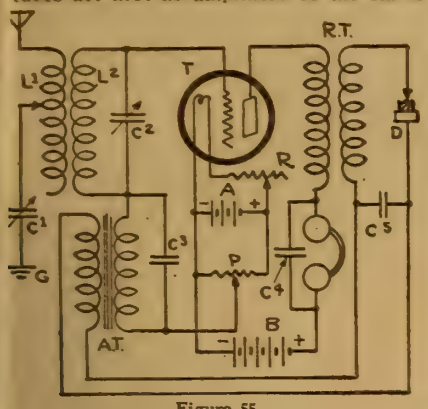

Figure 55

frequency oscillations and then as amplifiers of the rectified audio frequency oscillations. In this manner great economy of tube operation is effected, because, instead of having to use one tube for intensifying the incoming oscillations before they are impressed upon the detector circuit and another tube for amplifying the audio frequency oscillations from the output circuit of the detector tube, the same results are accomplished by "reflecting" the latter oscillations back through the first tube and having this single tube do the work of both.

Comparison of Circuits

The reflex circuit differs from the regenerative circuit in that in the latter the

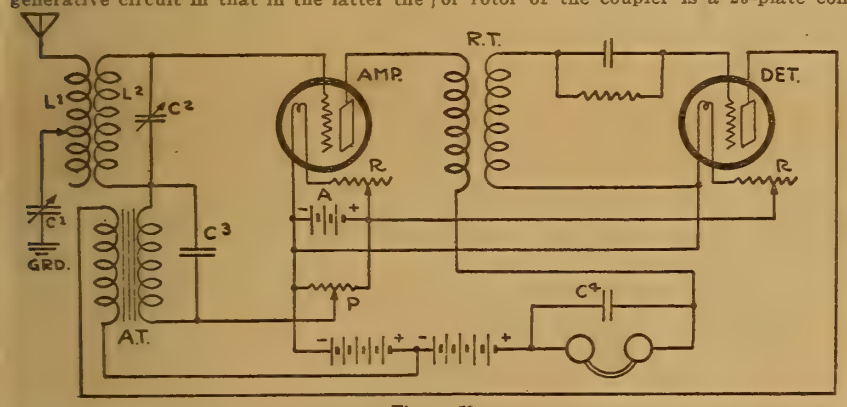

Figure 56

oscillations of the output circuit of the detector tube are tuned into synchronism with those in the input circuit, with the result that one group reinforces the other. In the reflex circuit, however, two groups of oscillations, one at a Radio and the other at an audio frequency, actually flow through the same tube at the same time. In this manner the number of tubes required is greatly reduced, and the drain on the A battery is also greatly decreased.

Furthermore, it is known that the crystal detector, if properly adjusted, gives excellent rectification with a minimum amount of this distortion. If a detector of this type is thus used in connection with a single amplifier tube, a circuit can be arranged consisting of one step of Radio frequency amplification, a detector, and one step of audio frequency amplification, and all this is accomplished with a single tube. If two amplifier tubes are used in connection with a crystal detector the equivalent of a five-tube set can be arranged, consisting of two stages of Radio frequency amplification, a detector, and two stages of audio frequency amplification. The use of dry cell tubes in connection with a reflex circuit thus forms a very economical and efficient Radio receiver.

Although the reflex circuit employs no really new fundamental principle or idea, it merely employs the facts already known in a more novel and economical manner. We will now consider a few interesting reflex circuits and observe how the various effects just described are obtained. The circuits presented here are not original with the writer, but have been tried out and found quite satisfactory and effective.

A Single Tube Reflex

The simplest form of reflex circuit is that employing a single amplifier tube in conjunction with a crystal detector. A circuit of this type is thus equivalent to a standard three-tube circuit employing one tube for Radio frequency amplification, a detector tube, and one tube for audio frequency amplification. The general scheme of connections is illustrated in Figure 55.

As shown, the receiving circuit is tuned to the wave length of the incoming signals by means of the antenna series condenser C-1, and L-1 the primary of a standard variocoupler. The series condenser C-1 should be of the 43-plate variable type. Shunted across the secondary or rotor of the coupler is a 23-plate condenser C-2. This should preferably be of the vernier type in order to make very close adjustments possible. The terminals of this condenser are also connected to the input circuit of the amplifier tube T. In series with the wire leading to the filament, however, is the secondary of an audio frequency transformer AT. This transformer secondary is in turn shunted by a fixed condenser C-3 of .002 mfd. capacity. This condenser serves as a by-pass for the Radio frequency oscillations circulating in the input circuit of the tube.

Radio Frequency Transformer

Into the output circuit of the tube is connected the primary of a standard Radio

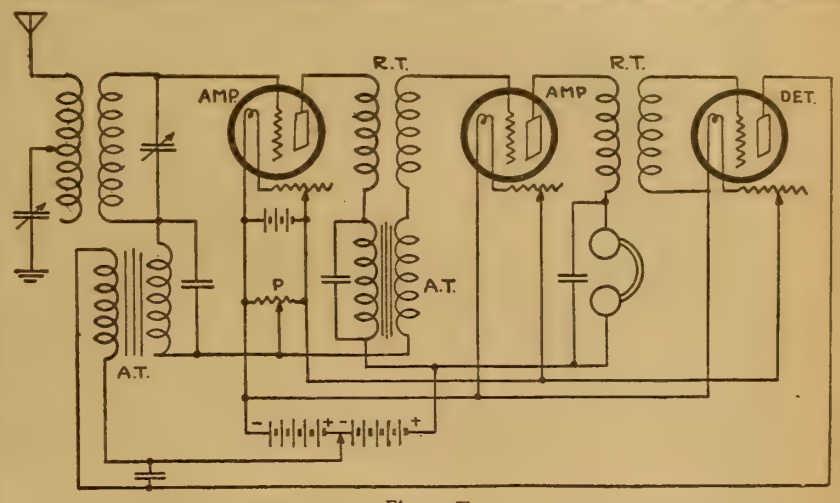

Figure 57

frequency transformer RT. In series with this primary are the telephone receivers and the 45-volt B battery which supplies the positive potential to the plate of the tube. The phones are also shunted by the by-pass condenser C-4 of .002 mfd. The secondary of the Radio-frequency transformer contains the crystal detector D. The entire secondary circuit is shunted by another fixed condenser C-5 of .002 mfd. capacity. Across C-5 finally is connected the primary of the audio frequency transformer AT. Across the A battery is connected a 200- or 400-ohm potentiometer for obtaining the necessary stabilizing voltage for the grid circuit of the tube.

The single tube reflex circuit is tuned in the following manner. After the crystal detector has been properly adjusted, and the tube has been lighted to the proper

(Continued on page 16)

Carter "TU-WAY" Radio Plug

take two head sets and all types cord tip terminals. Price $1.50. Write for Bulletin on Carter "HOLD-TITE" Jacks and other products.
CARTER RADIO COMPANY, 209 South State Street, CHICAGO

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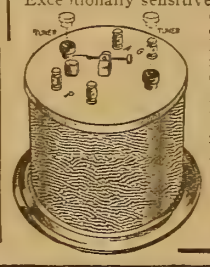
CRYSTAL SET

Receives plainly 10 to 25 miles. All wires concealed by handsome leatherette cover. Exceptionally sensitive crystal. Easily and accurately tuned by concealed rods and sliders. Most compact and neatest appearing receiving set made. Easily installed. 5 inches high. Price $4.50, Postage Prepaid. Sold on money-back guarantee. AGENTS WANTED.



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Minneapolis, Minn.

Just Consider

—the essential features necessary to make an audio frequency transformer a good one—

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3. *Low Interstage Linkage.*
4. *Convenient Mounting.*
5. *Compactness.*

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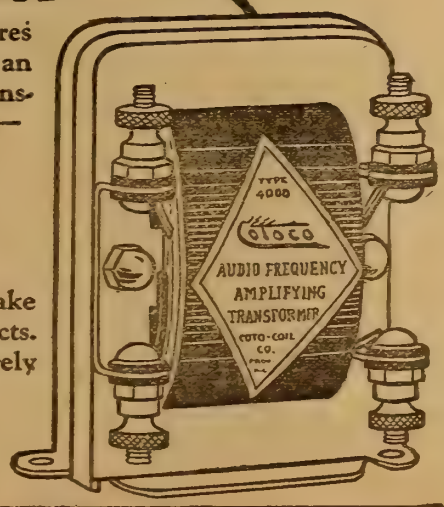

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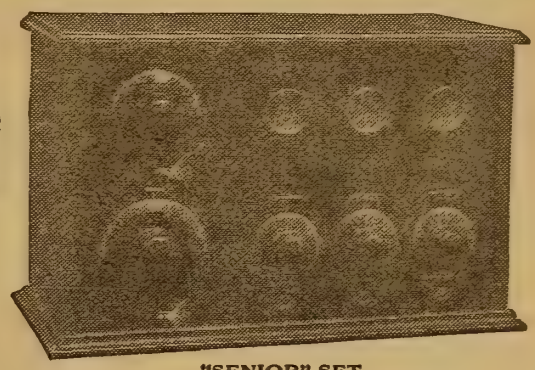

"SENIOR" SET

When you buy a Michigan "Senior" Regenerative Receiver for $125.00 or a "Junior" Receiver for $57.50, you get the clearest, most satisfactory long distance service that an equal investment ever brought.

These sets are licensed under Armstrong U.S. Pat. 1,113,149 and pending Letters Pat. No. 807,388. This means that they represent the highest achievement in Radio Engineering.

"JUNIOR" SET

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MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

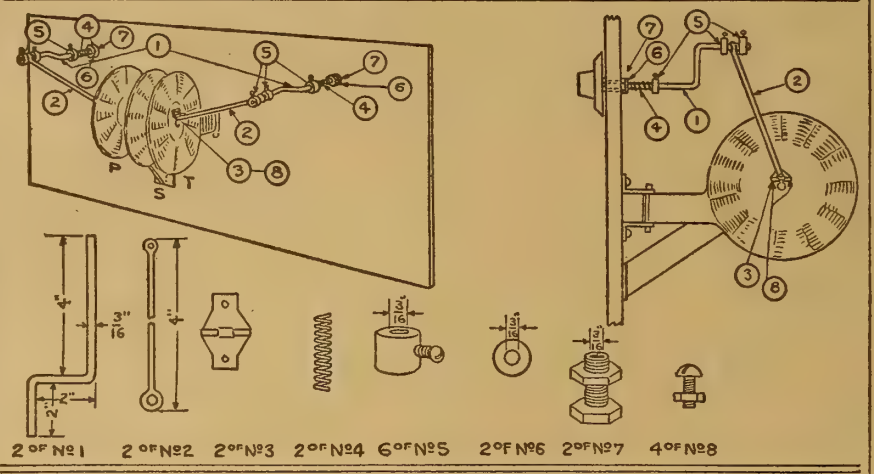
Dial Mounting for Spider Web Coils

External Controls for Internal Inductances

This way to mount coils is exceedingly efficient and the coils are controlled by knobs on the panel front. I am using this style mounting on my three-circuit tuner and get excellent results.

The two outside coils are actuated by the crank on the rod 1 and through the pitman 2. A hinge 3 allows the pitman to work freely. A small spring 5 keeps the shaft and dial snugly in place. Small collars with set screws 5 are used on the rod 1 for adjusting the parts. A regular panel bushing is used for the rod bearing. Small machine screws 8 are used for the hinge mounting. The parts used and manner of construction is clearly shown in the illustration.—Chas. A. Cothran, Covington, Tenn.

ASSEMBLY OF MOUNT AND PARTS



WORKSHOP KINKS? EARN A DOLLAR—

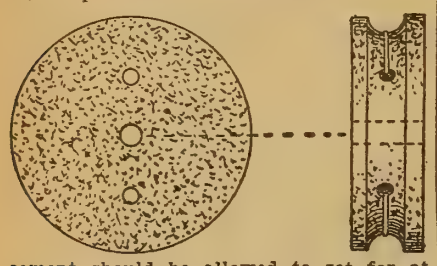
THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

Home Made Rheostats

The following home made rheostats have been used throughout a four step amplifier and detector and have proved very economical and efficient.

The form is made of plaster of paris mixed with water. In mixing stir the cement into the water until it is quite thick, then pour this into an old baking powder can cover, previously painted with melted paraffine and allowed to cool. The



cement should be allowed to set for at least thirty-six hours. It will appear to be quite dry and hard in much less time, but experience has taught me that it is not safe to work until absolutely hard. After allowing this to dry, it may easily be removed from the tin by heating until the paraffine is melted.

The form may be shaped as follows: Bore a hole in the center, and screw it down to a board or bench. The form should fit loosely on the bench that it may be turned by hand while cutting it. It is cut by turning with one hand and holding a knife or file against the plaster of parts. It will turn down very easy and quickly. It should be turned down to ½-inch in thickness and 2 inches wide. A groove is cut in the side a trifle nearer the top than the bottom to a depth of ¼ inch. This is to hold the resistance wire.

The resistance wire is the same as that used in electric toasters, etc. A piece 4¼ inches may be bought or salvaged from any electric shop's repair box for a few cents. At one end of the element turn one of the spirals to right angles with the other turns thus forming a loop. Bore two ⅛-inch holes in the circular groove in the form 1 inch apart. Put a 6-32 bolt ½ inch long, through the loop on the wire and plaster it into one of the holes in the form, allow this to set four hours and then fasten the other end of the wire to the other hole in the same manner.

The shaft is made of an 8-32 bolt, 1½ inches in length. The contact arm is made from a piece of spring brass ⅝ inch in width and 1½ inches in length. A hole is bored at one end to fit over the shaft, and it is held on the shaft by an 8-32 nut. The other end of the contact arm is bent over to make contact with the element.

A strip of sheet brass ⅓ inch wide is bent around the shaft to form a bearing. This bearing is fastened in the form by means of a thin plaster of paris cement. It has been found to make the rheostat more sturdy to extend this bearing through the panel also.

The rheostat is fastened to the panel by means of 6-32 bolts through the rheostat and the panel. A brass strip 1½ inches long and ⅝ inch wide is bored at one end to fit loosely over the shaft. Place a washer on the shaft, then this strip, and the shaft through the rheostat and panel and fasten just tight enough that the shaft will turn smoothly. It is fastened on the front of the panel by means of a washer and an 8-32 nut. The washer and nut will be hidden from view by the knob. The last mentioned brass strip is used for the connection with the shaft and also for a stop for the contact arm.—E. A. Johnstone, Pocatello, Idaho.

Holding Dials on Shafts

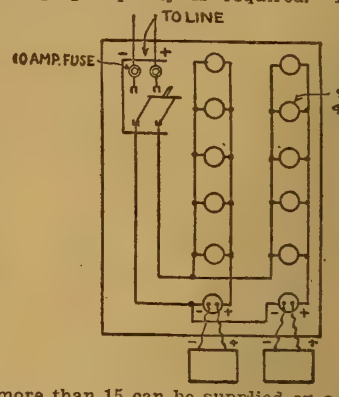
Remove the dial from the shaft and cut a piece of emery paper the proper size to fit in the dial as a bushing. Insert the emery paper so that the abrasive side will face the shaft, then tighten the set screw.—J. Hovey, Sylvan Beach, N. Y.

There are 33 Radiophone stations in the United States broadcasting religious services. The territory covered, it is estimated, represents 65.2 per cent of the total area of the country.

Diagram Shows Method for Charging Battery

The accompanying hook-up should prove valuable to the many Radio enthusiasts who live in several large cities where D. C. current is available. By screwing a 100 watt 32 candlepower, carbon filament lamp into one of the sockets, allows about 1 amp. of current to pass. If ½ amp. is required, use a lamp of one-half the capacity mentioned. This is seldom necessary as 1 amp. is sufficiently close for this kind of work.

More sockets can be added if a greater charging capacity is required. But not



more than 15 can be supplied on a number 14 wire. Number 12 wire will handle 20 amperes of current.

To determine the polarity of the wires, dip the ends into a glass containing a little electrolyte. The one which gives off the bubbles is the negative.—Lloyd W. Symons, Laurium, Mich.

The Radiophone is becoming a serious "menace" to the safety of the herring off the Swedish coast. The fishermen out at sea soon will be told from the Gothenburg Radio central the exact location of the herring schools, which will tend to eliminate wasteful waiting on the part of fishermen and doubtless mean a considerable increase in the catches of herring.

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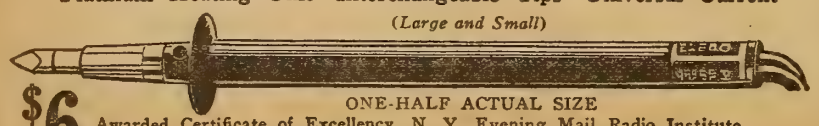

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Memo Pad

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A Kellogg No. 605 variable condenser
A Kellogg No. 2 tube socket
A Kellogg No. 505 miniature condenser
A Kellogg No. 503 mounting
A Kellogg No. 609 radio resistance
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A Kellogg No. 69A head set
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How to Construct a Variable Grid Leak

Contact Relieves Wear on Variable Resistance

The large cylinder A is made of wood or some other insulating material with cardboard glued around the periphery. In the center of this cylinder an India ink line B is drawn almost around the block. At one end of the ink line, as shown in the diagram, a metal strip is held down with the screw C which serves also as a stop. The metal strip D is then brought down to the screw E.

Another small cylinder F is made to face the first one. This cylinder is made of brass with an ⅛-inch shoulder turned down on each end. Both of these cylinders are mounted on the back of the panel G. The large cylinder is held against the panel with the shaft of the dial H. The small cylinder is held in place with the screw I. It is adjusted so that it will turn freely.

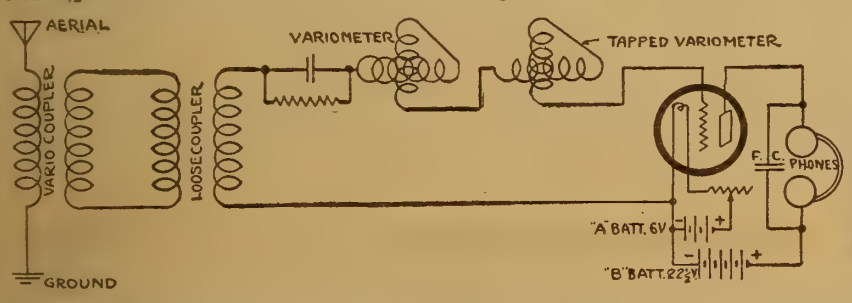
To keep a slight tension on the two rollers a fiber strip is employed with a binding post on each end, J and K. Under each post is a spring brass strip which presses and against the rotor screw on each of the cylinders. Between the panel and the rollers are washers L and M.

When the knob is turned to the left the large cylinder rotates with it and the brass roller rotates towards the right as if they were geared together, causing the leak to become smaller.—R. H. Van Buskirk, Detroit, Mich.

Regenerative Hook-Up

This regenerative hook-up was evolved after considerable experimenting. The variometers are made as follows:

Procure a cardboard tube 3 inches in diameter and wind on 40 turns to make the stator. Either make or purchase two rotors 2½ inches in diameter. Each should

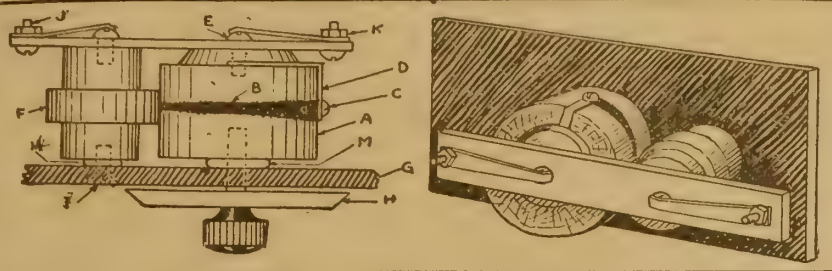


be wound with 40 turns of wire. One of the variometer stators is tapped at every 10 turns. The other stator is untapped.

The loose coupler can be of any ordinary type of from 150 to 2,000 meters. The variocoupler has 80 turns of wire on a 4-inch stator tube. The rotor can be made or purchased and should be wound with 60 turns of wire. Tap the stator of the coupler every 10 turns. Make the connections as shown. There is no variable condenser in the circuit, but a fixed condenser of .001 mfd. capacity is placed across the phones.—Ellsworth E. Myers, Oregon City, Ore.

Use a mat under your storage battery unless you are boss around the house as the acid might get on the rug and ruin it.

PLAN OF ROTARY GRID LEAK



Mica Diaphragms

Secure enough mica to make two diaphragms. The mica can be purchased in sheets 3 by 5 inches. A sheet of this size will make two disks. Secure the mica about the same thickness as the metal diaphragms.

Take the metal diaphragms out of the phone and make a circle on the mica, using the metal diaphragm as a templet. In the center of the mica make a hole about 3/16 inch in diameter.

Procure a piece of tin, the thin kind used in cartons, and cut out a piece the size of a dime. Tin one side of this and place it tinned side up on the top of the work bench. Place the mica disk over the tin disk with the small hole in the mica disk over the center of the tin disk. Weight the mica disk down in place so that a soldering iron can be used easily with both hands.

Drop a small ball of solder in the 3/16-inch hole large enough to cover it. After it has cooled off hit it several times with a small riveting hammer to make the contact tighter.

The small tin disk extends below the surface of the mica when in place in the phone. In order to keep this from touching the magnet poles use a large cardboard or fiber washer the thickness of the small tin disk. Insert a washer in the phone with the mica diaphragm on the small disk side of the diaphragm. If it does not function right heavier or thinner cardboard washers must be used until the proper distance between the magnets and tin disks has been found.

The first night I tried this out I received Havana, Cuba, and Los Angeles, using the phone containing this mica diaphragm and a small portable talking machine horn for a loud speaker with three stages of audio frequency.—Leo C. Krell.

Paraffin Used in Sets

Paraffin is less used in Radio work than in almost any other branch of electrical work. The beginner who makes his own set would profit by the use of more paraffin. Its insulating properties are well known, especially to those in the telephone industry. It repels moisture, is an excellent insulator, and very inexpensive.

Wooden rotor balls and paper tubes should be boiled in paraffin before winding to prevent shrinkage and to further improve their insulating properties.

Gives Advice on How Best to Operate Set

Forget everything you ever knew about the art, doubt anything that is told to you, light up your tubes and turn everything that is turnable. You will probably get just as good results as the expert, while they last, but if you want steady, consistent reception, get busy and work for it! No detail is too trivial to overlook. Study the theory of Radio, find out just what each part does when you give the knob a turn to the right or left and why it does it. If you assemble your own set, solder everything tight. Shield your set, not just on the back of the panel, but each separate piece of tuning apparatus, every transformer, and, to make it complete, every tube. Then shield the sides and top of the cabinet. Keep the A and B batteries in perfect condition. Install the aerial high and make connections to the ground as deep and wet as possible.

Place the set on a solid foundation to prevent vibration, then and not until then can you invite your friends in for a given concert and give it to them.—J. Hovey, Sylvan Beach, N. Y.

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"How" of Flewelling Super

Part XI—Inductance vs. Capacity

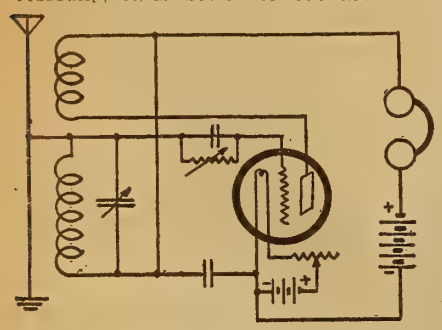
By E. T. Flewelling

IT IS not a bad idea to branch out a little in our discussion about the Flewelling Circuit. We might, for instance, consider why we have specified 50 and 75-turn coils for the set. While these values were selected as giving the best all around results, yet it will be found that with an antenna or ground system of small capacity, for instance, that we can very profitably use coils of a larger size.

Coils of a Larger Size

It is suggested that when the set is first tried out, to use neither antenna nor ground. Try at this time to use a 100-turn tickler coil and a 65 or 75-turn tuning coil. The 65-turn coil is easily made by removing 10 turns from a 75-turn coil. You will find such a coil of value many times, even if not used in the Flewelling Super.

In order to use these larger coils successfully, it is better to cut down the



size of the variable condenser from a 23-plate to an 11-plate. This change too, will be found of general value.

Use More Inductance, Less Capacity

The point that we are trying to bring out is this:

It is of importance in any Radio receiver to use as much inductance and as little capacity as possible. Much better results are obtained in this way, but of course it cannot be carried too far, and the values that we speak of above have been found to be about the limit; that is, a 65 or 75-turn tuning inductance, a 100-turn tickler coil and an 11-plate variable condenser. The values are given for the ordinary honeycomb coil, so that if you wind your own coils on larger diameter tubing, you will have to use a smaller number of turns on, say, a four-inch form, in order to get about the same value that you would obtain on the two-inch honeycomb form. A Flewelling set, using values as given should, without any antenna or ground, give reliable reception over a distance of from 100 to 200 miles at night. It is possible to carry the set around in your hand and comfortably listen to nearby local stations.

Long Distance Receiver

The Flewelling is essentially a long distance receiver. On local stations that are easy to bring in, it is not much superior to a good regenerative receiver, but where the regenerative receiver weakens, because of distance, you will find that the Flewelling will be at its best. This does not mean that an antenna is useless with the set. Best results will always be secured by using a good antenna. An interesting point may be of help here.

The Flewelling will give excellent results when connected to the ground alone or to the antenna alone. Why not, then, connect the antenna and the ground together, and then by connecting them to the set, secure the benefits of both? It really does prove of value to do this, and greatly increased results have been reported by those that are using such a connection.

Energy Collector

No appreciable results are secured by connecting an energy collector to the bottom or filament side of the turning inductance; so our connection is always to the grid side of the inductance, as shown in the sketch.

If you find that upon connecting your set to the energy collector (antennae and grounds are energy collectors) that the little whistle stops and the set refuses to work, then you may be sure that you are using a tuning inductance with the wrong number of turns. In such a case simply change this coil until you find the correct value. Then, in tuning, be careful to turn your condenser dial slowly, and carefully adjust the distance between the two coils. Slow, careful adjustment will give much better returns than a quick or rapid manipulation of the control knobs.

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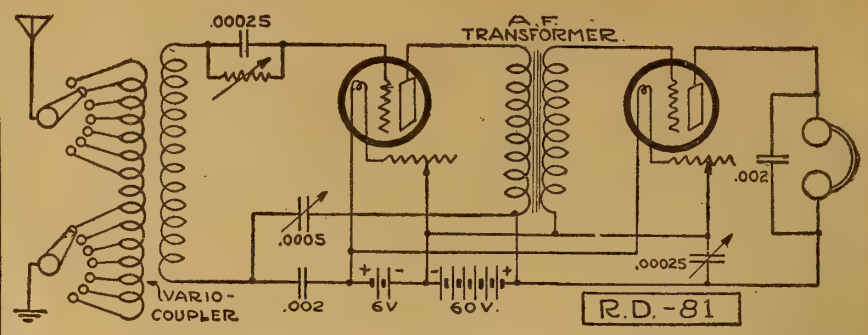

THIS rather unusual form of regenerative hook-up has the additional feature of using regeneration, to a certain extent, not only in the plate circuit of the first tube, but also in the plate circuit of the second tube. Its amplification power is exceptionally good, but it requires considerable practice before the skill of the Radiophan is sufficient to get the full benefit of its possibilities.

A variocoupler is used with a double tap switch arrangement on the primary circuit. A condenser can be placed in series, shunt, or omitted, depending upon the conditions under which the set will operate. A variable grid leak is used in order to obtain maximum results on the grid potential. The grid condenser has a capacity of .00025 mfd.

A .002 mfd. blocking condenser is used in the lower side of the secondary circuit. If a 1½-volt tube is used, the dry cell battery should be substituted in place of the 6-volt battery indicated in the diagram. Sixty volts are used in the plate circuits of both tubes. Because of the high plate voltage, naturally a hard or amplifier tube is necessary for both stages.

A 23-plate variable condenser is connected in series between the plate circuit of the tube and the grid circuit. This controls the regenerative feed-back and in this way reinforces the grid circuit with all the energy that can possibly be thrown into it. A similar plan with a smaller condenser is followed in the first audio frequency tube where the plate circuit is connected to the grid circuit, again feeding back the plate energy in its secondary or grid circuit.

This method of regeneration makes the grid adjustments rather critical but at the same time takes advantage of every opportunity of reinforcing the grid control in each tube.

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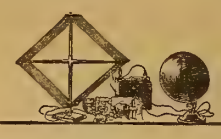

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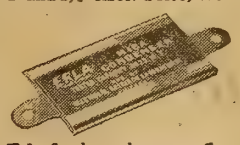

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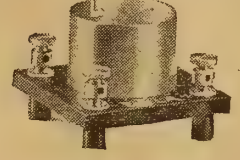

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ERLA

How to Construct Good Loud Speaker at Home

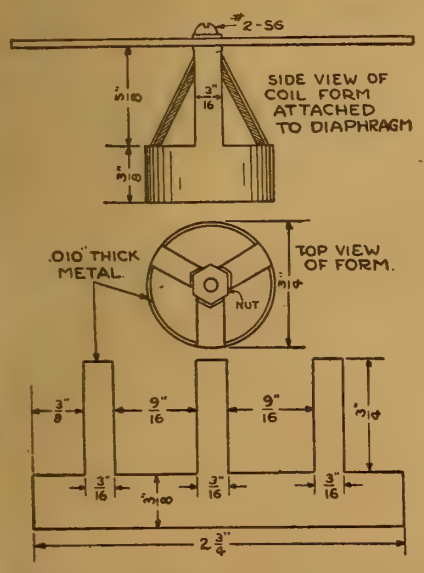
A Design Embracing Moving Coil and Mica Diaphragm

Thomas W. Benson

THE POPULARITY of Radio entertainments has in a sense created a demand for loud talking receivers to the end that a number of persons may be entertained without the necessity of each one wearing a headset. The use of the so-called loud speaker also permits of dancing and exercising, pastimes practically impossible when headsets are used. There are numerous methods for making a gramaphone serve as a loud speaker by connecting the headset to the tone arm, but these are at best but makeshifts and render impossible the use of the phonograph as a source of music.

On the other hand, the idea of constructing a loud talker apparently presents many difficulties that seem to discourage the otherwise clever constructor or experimenter. There is but little available data on the subject. Even books purporting to give full details are too indefinite for the average man. However, with a little experimenting and not a little search of the technical press, the loud speaker pictured herewith was built and works very satisfactorily.

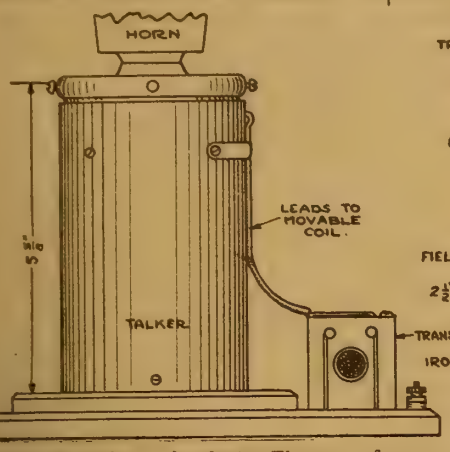
The appended data and dimensions are

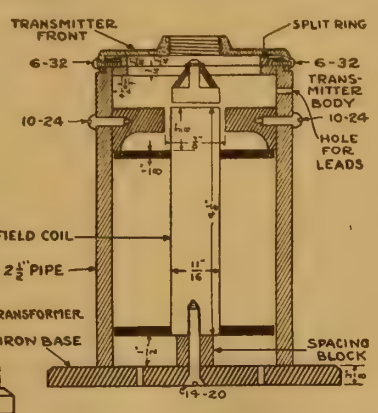


given not in the sense that they represent the ideal design for this type of apparatus but simply as the details of a device that works, is easily constructed with limited facilities and is inexpensive.

Action of Loud Speakers

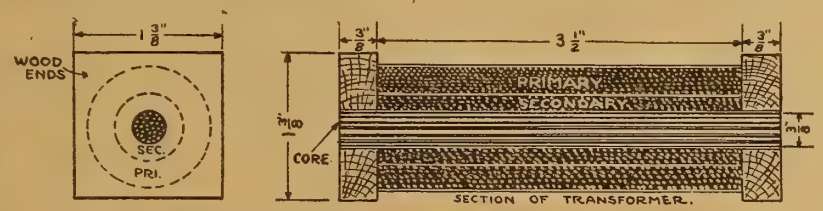
The various details of the construction are given in the illustrations and are complete enough to serve as working drawings. The loud speaker is of the electro-dynamic type that employs a coil suspended in a dense magnetic field as in the best types of loud talkers. The suspended coil is connected to the output circuits of the vacuum tubes and any variation in current strength resulting from an incoming signal will result in the coil moving back and forth across the magnetic field. The coil being rigidly attached to a mica diaphragm, imparts the motion to the diaphragm and thus to the column of air in the horn, thus producing sound.





Housing for Mechanism

The housing for the mechanism is made from standard 2½-inch wrought iron pipe 5⅝ inches long. The ends of the pipe should be squared up in a lathe if possible. A disk of soft iron ⅝ inch thick has a hole ⅞ inch in diameter drilled in its center and is turned down to fit into the pipe. A recess is cut in one side to make the pole pieces ⅜ inch thick. This disk is slid into the pipe and fastened with its top face 1 inch from one end of the pipe as shown.



Field Magnet

The field magnet for the speaker is wound on a soft iron core 11/16 inch in diameter and 4⅛ inches long. Heads cut from fiber are mounted on the core leaving one end of the core project ⅝ inch. After insulating the core with two or three layers of fish paper or heavy waxed paper the winding is put on. This consists of nearly two pounds of Number 20 D. C. C. magnet wire. Eighteen layers of wire are wound on with twenty turns to the layer. This completes the field winding which should then be laid aside, and the housing for the speaker finished.

Mounting for the Diaphragm

As a mounting for the diaphragm an old telephone transmitter was used. It is usually possible to pick up one such from the repair department of the local telephone company. The inner ring supporting the transmitter diaphragm is turned down a little and the inside of the pipe is turned out so that the ring will fit inside the pipe as shown in the illustration. The outside of the pipe is then turned down so that the front of the transmitter will fit over the outside of the pipe. To hold the diaphragm rigidly a narrow split ring is made so that when it rests on the diaphragm it will touch the front of the transmitter. Details of this arrangement will be made clear by the illustrations.

Base Plate and Assembly

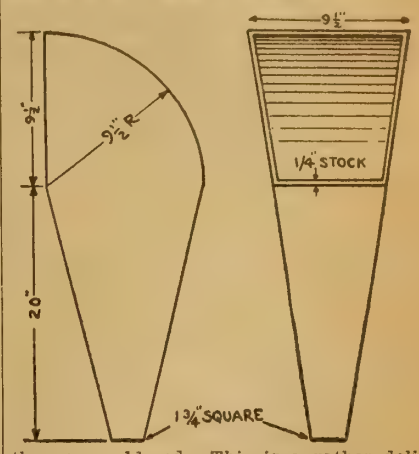
A base plate is necessary for the speaker. In this case one having a base ⅜ inch thick and 5 inches in diameter was used. Holes are drilled through this plate to pass the leads from the field winding and a center hole countersunk to pass the long flathead screw holding the device together. It will be noted that a ½-inch square block is placed between the coil and the bottom or base plate. This block is long enough to reach across the pipe and machine screws pass through the side of the pipe into the ends of this block.

It will then be clear that when the coil is inserted in the pipe, the block slipped into place and fastened with the screws into the ends of the block, the unit can be assembled with the long screw up through the base into a solid unit. A hole ¼ inch in diameter is drilled in the side of the pipe above the pole pieces to pass the leads to the small moving coil. This hole should be bushed with a short length of soft rubber tubing glued into place.

Moving Coil Construction

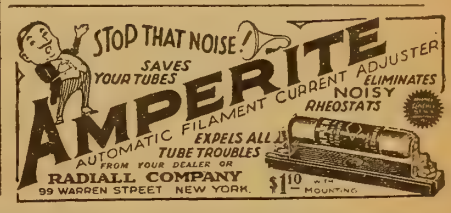
The moving coil will be next to receive attention. Details of its construction are given in the illustration. From .010 inch thick brass or copper a piece is cut as shown. This is wrapped snugly around a mandrel ¾-inch in diameter and the ⅛-inch overlap on the ends is soldered, using as little solder as possible to sweat the ends together.

The three strips are then bent together and the ends bent so that they will fit around a 2-56 hexagon brass nut to which they are soldered. This is a rather delicate job and care should be taken to do it right. The top of the nut should be close to 1 inch from the bottom of the form, filing the nut if necessary and being careful not to get solder into the threads of the nut. The threads may be filled with clay while soldering to protect them.



A thin strip of waxed paper is then glued around the form and the winding started. Leaving a long end of the wire

(Continued on page 16)



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A. B. C. LESSONS

(Continued from page 11)

brilliancy by turning the rheostat to the right, the antenna circuit is tuned by means of the coupler primary L-1 and the antenna condenser C-1. The potentiometer P is then adjusted until all noises have disappeared. Finally the tuning condenser C-2 and the coupler secondary L-2 are adjusted until the desired signals or music are heard in the phones. In the meantime, of course, it will constantly be necessary to make slight readjustments of some of the various controls in order to bring in the signals with maximum clearness.

Principles of the Reflex Circuit

The underlying principles upon which this reflex circuit operates are these. After the tuning circuit is in resonance with the incoming oscillations, the Radio frequency potential variations set up across the condenser C-2 are impressed upon the grid and filament of the amplifier tube T. In order that the secondary of the transformer AT, which is also in this circuit, cannot choke these high frequency pulsations, it is shunted by the by-pass condenser C-3.

In the tube the oscillations are amplified and relayed to the output circuit in which are the primary of the Radio frequency transformer RT and the head phones PH. But since the windings of the phones have a high inductance and would thus choke the high frequency pulsations, they must also be shunted by a by-pass condenser so as to provide an easy path. In the secondary circuit of the Radio frequency transformer the induced oscillations are rectified by the crystal detector, and finally sent into the primary of the audio frequency transformer AT. This also is shunted by a fixed condenser which serves as a low resistance by-pass.

Through Amplifier Tube Second Time

In the transformer AT the oscillations are stepped up to a higher pressure and again sent through the closed oscillation circuit and into the amplifier tube for a second time. But this time they enter the tube at an audio frequency. In the tube they are again amplified and relayed to the output circuit. The transformer primary RT, however, offers no opposition to these audio frequency oscillations, and hence they are free to flow and operate the telephone receivers. None will this time pass through the condenser C-4, because the phones form a path of lower impedance than does the condenser, and an electric current we know will always take the past of least resistance.

It is evident that in several parts of the circuit both Radio frequency and audio frequency oscillations flow at the same time, but these two groups are entirely independent and hence will in no way interfere with each other.

The potentiometer P is a very important factor, but by means of it the necessary stabilizing potential is impressed on the grid, and the tube is thus prevented from oscillating.

Operation of Reflex Circuit

The successful operation of a reflex circuit depends to a great extent upon the arrangement of the various parts. The transformers and other apparatus should be so arranged that all connecting leads will be as short as possible, and so that all inductive interference will be minimized. It is advisable to use parts only of the best material and workmanship, for inferior apparatus may cause endless trouble and bother.

In the two-tube reflex circuit one tube is used as an amplifier and the second tube as a detector. The principles of operation are very similar to the single tube circuit, except that instead of a crystal detector a tube detector is used. The amplifier tube should be of the 201 or hard type, while the detector should be a 200 or soft tube.

Two-Tube Reflex Circuit

The circuit arrangement of such a two-tube reflex circuit is illustrated in Figure 56. As in the previous case, the receiver is tuned to the frequency of the incoming waves by means of the series condenser C-1 and the coupler primary L-1. The circuit is then thrown into resonance by adjusting the tuning condenser C-2 and the coupler secondary L-2. In order to provide a low impedance path for the Radio frequency oscillations in the grid-filament circuit, the secondary of the transformer AT is shunted by a fixed condenser. The value of this condenser will depend to a great extent upon the transformer used, and the correct value needed can be determined best by experiment.

From the output circuit of the amplifier tube the oscillations enter the input circuit of the detector tube through the Radio frequency transformer RT. The phones which are in series with the primary of this transformer are again shunted by a by-pass condenser in order to reduce the high frequency impedance. From the output circuit of the detector tube, the audio frequency oscillations are again fed back into the amplifier tube through audio frequency transformer AT. The amplifier tube thus at the same time acts as an amplifier both for the Radio frequency and audio frequency oscillations. But, as was stated before, these two groups act entirely independent and do not interfere with each other.

A very important adjustment, it must be remembered, is the potentiometer P which controls the stabilizing potential on the grid of the amplifier tube.

A Three-Tube Reflex Circuit

A very desirable three-tube reflex circuit is illustrated in Figure 57. Here we have employed two amplifier tubes and a detector tube. The entire circuit is thus equivalent to a five-tube set. The incoming oscillations, after being received through the tuner, are passed through the first two tubes and here undergo amplification at a Radio frequency. They then enter the detector tube where they are rectified and reduced to an audio frequency. Finally these audio frequency pulsations are again sent through the two amplifier tubes and again undergo amplification, but this time at an audio frequency. The three tubes thus perform the same functions as are ordinarily accomplished by means of five tubes. It is due to this economy in the number of tubes required that has rapidly brought the reflex circuit into such great favor. The details of operation of the circuit illustrated in Figure 57 are very similar to those given for the previous circuits and hence need not be reviewed again at this time.

It will be noticed that between the first and second amplifier tubes the Radio and audio-frequency transformers are connected in series. This is permissible and the operation is satisfactory for the following reason. The inductance of the primary and secondary of the Radio frequency transformer is sufficiently low so as not to offer any serious opposition to the passage of the audio frequency pulsations coming from the plate circuit of the detector tube. Similarly the distributed capacity existing between the windings of the secondary of the audio frequency transformer is sufficient to permit the passage of the Radio frequency pulsations without any serious opposition. Across the primary of the audio frequency transformer, however, it is necessary to shunt a by-pass condenser in order to provide a path of low impedance for the high frequency pulsations. Likewise the phones must be shunted by a similar condenser. A capacity of .002 mfd. will generally be found quite suitable for these by-pass condensers, but since different makes of transformers have somewhat different characteristics, condensers of different capacities should be tried out until the best results are secured. As with the previous circuits, the potentiometer should be remembered as a very important element in the tuning process.

Another Two-Tube Reflex

The three-tube reflex circuit just described can readily be converted into a two-tube circuit which is equivalent to an ordinary five-tube circuit by replacing the detector tube with a crystal detector. It is true that with a crystal detector, although a better quality of rectification is secured, considerable signal strength is lost, and it is for this reason that it is more advisable to employ a tube instead of a crystal where tone volume is sought.

It is never advisable to employ more than two stages of audio-frequency amplification with a reflex circuit, for otherwise the resulting distortion will be too great, and the quality of the tones received will be very inferior.

In general, however, a reflex circuit, if properly arranged and constructed of good quality apparatus, will give surprisingly good results and is well worth being tried out by the person in search of a new circuit to experiment with.

Chapter Seventeen

Chapter seventeen, which will appear next week and will be the last article of the A-B-C's of Radio, will be devoted to the subject of Radio storage batteries—their operation, construction, selection, and care.

With a variocoupler, two variometers and a couple of variable condensers, most any kind of hook-up can be experimented with when the set is not in a cabinet.

A 25-turn inductance has been satisfactory as a loading coil for the short-wave regenerative sets in order to pick up NAA on 710 meters.

HOW TO MAKE SPEAKER

(Continued from page 15)

for a lead, 360 turns of Number 40 enameled wire are wound on the form in as even layers as possible, fastening the wire in place with liquid collodion. A coating of this substance should be applied to the entire coil, after it is wound, to hold the wires firmly in place. The leads are run halfway up two legs of the spider and tied with fine silk thread fastening finally with a few drops of collodion. Winding on a nail the leads can then be coiled into a small, close spiral.

Making the Diaphragm

The diaphragm is cut from a clear sheet of mica .004 inch thick and a small hole is punched in the exact center. The coil is then attached to the diaphragm by a short 2-56 brass machine screw. Before assembling the speaker it is well to construct the trasnformer and wire it into place.

Reason for Transformer

A transformer is necessary with this device for the following reason. It is well known that the resistance of the output circuit of a vacuum tube should approach that of the plate to filament resistance of the tube itself. This implies the use of a 2000 or 3000-ohm headset. In our case were we to connect the movable coil to the plate circuit of the tube it would have to be of that resistance, which, to say the least, would mean a bulky coil.

The disadvantage of a large movable coil lies in the increased interia of the cell and diaphragm from the additional weight and that the air gap would be longer, requiring a larger field coil and heavier currents to force the same number of magnetic lines of force across the gap. Therefore a transformer is used having a primary with a high resistance to be connected into the tube circuit and a low resistance secondary to match the low resistance of the movable coil which in this case is fifty ohms.

Constructing the Transformer

In constructing this transformer use was made of an old telephone coil of the dimensions shown in the illustration. A coil of this size can be readily made if an old telephone coil is not available. The windings are all taken from the coil. For the secondary winding there will be required 225 feet of Number 38 S. C. C. magnet wire wound into smooth layers and with leads brought out at one end of the coil.

Wrap two or three layers of paraffined paper over the secondary and wind on the primary. For this winding an old 1000-ohm ringer was obtained and wire wound onto the transformer to form the primary winding. These ringers can be bought very cheaply and serve the purpose nicely. Leads from the primary are likewise brought out to terminals on the coil.

Mounting the Loud Speaker

The speaker proper and the transformer are mounted on an oval wood base 6 inches wide and 8 inches long. Two wires run direct from the secondary of the transformer up the side of the talker and through the bushed hole in the talker shell. These should be fairly heavy wires, say Number 20, enclosed in soft rubber tubing clipped to the side of the talker shell with a strap held under the screws fastening the outer pole piece in place. The ends of the wires are bared inside the shell and the fine wires leading from the movable coil are soldered to them.

Then the diaphragm can be dropped into place. The split ring is placed on top of the diaphragm and last, the cover is put on. The cover is held firmly in place, holes are drilled through the outer edge as shown, and 6-32 screws are tapped into place. This holds the cover in place. Terminals are arranged on the base to connect to the field coil of the talker and to the primary of the transformer.

Making the Horn

The horn can be purchased or made from thin wood as in the one described. Dimensions are given for the horn, although they may be changed to suit the constructor's taste. A brass transmitter mouthpiece is cut off and inserted into the throat of the horn, fastening it with machine screws. This mouthpiece screws into the transmitter face and holds the horn securely.

It is important that the moving coil should not touch the pole pieces. This can be detected by pressing lightly on the diaphragm with the finger. The friction between the coil and pole pieces, if present, can be easily felt. If the device is assembled carefully, being sure that the center pole pieec is in the center of the hole and that the coil is directly below the center of the diaphragm, no trouble will be encountered.

Battery Connections

The field coil is connected to a 6-volt storage battery and will draw about 1 ampere. No resistance is necessary in the circuit. The primary winding of the transformer is connected into the circuit in place of the phones by means of a plug or other switching arrangement.

This device will be found to function entirely satisfactorily when properly constructed and is well worth the trouble and expense of construction. The music is clear and free from metallic sounds and with two stages of audio frequency amplification quite loud. It would appear that slightly louder signals might be obtained if the resistance of the transformer primary was wound to 2000 ohms, but since the device is working up to expectations the change has never been made.

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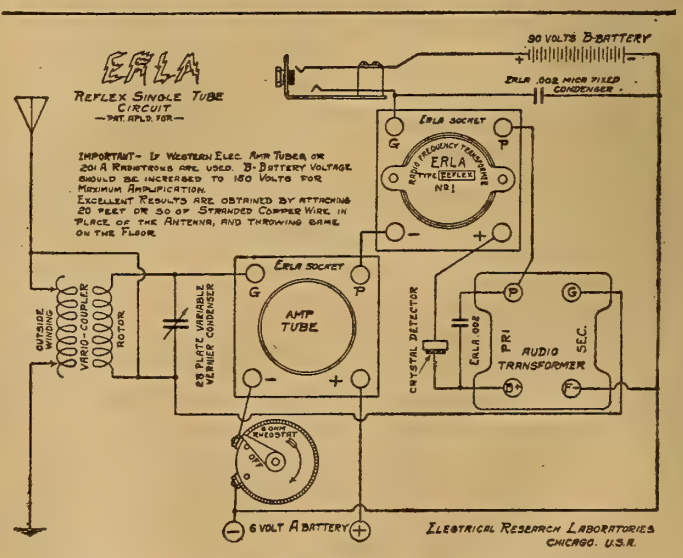

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Practical, Easily Made Single Tube Reflex Set

Part I—Circuit and Panel Layout

By H. J. Marx

ALTHOUGH much is being published about reflex circuits, it is quite evident that most of the things said are but a rewrite of previous material. Multi-stage reflex circuits are rather difficult to balance, and considerable experimental work must be carried through before such can be put on a sound, practical basis for amateur use. The greatest percentage of Radiophans have but little patience to experiment with a complicated circuit in order to develop its working efficiency. For this reason the fan is advised to start low with reflex circuits and after working for a time, more thought can be placed towards building multi-tube sets.

Unfortunately, after a short period of Radio reception the new fan begins to dream about one of the nine-tube outfits with an elaborate switchboard control, all the developments of circuits incorporated, and a world-wide receiving range. Possibly the only check rein on his plans is the immediate cost, and the least thought of is the circuit to be used. These are the fans who are always writing for more circuit. The more apparatus required the greater will be their delight.

LIST OF PARTS

1 Cabinet
1 Panel 7x9x¼ Inches
1 Variocoupler
2 Inductance Switches
1 Vernier Variable Condenser (.0005 Mfd.)
1 Tube Socket
1 Amplifier Tube
1 Rheostat
1 Crystal Detector
1 R. F. Transformer (Reflex Type)
1 A. F. Transformer
2 Fixed Condensers (.002 Mfd.)
1 Open Circuit Jack
8 Binding Posts
25 Ft. Tinned Wire

For the sake of the fellow who would like to do a little distance work with a simple circuit, without incurring unnecessary expense in purchasing apparatus the following single tube reflex panel is recommended.

The Single Tube Reflex Circuit

The hook-up diagram is shown in Figure 1. A variocoupler is used for the tuning unit. The primary circuit is tuned by means of a double set of taps for both rough and fine adjustment. The secondary is tuned by means of a variable condenser shunted across the rotor. Six volts are required for the A battery inasmuch as 1½-volt tubes are not always efficient in reflex circuits. The plate voltage should be about ninety, but if 201-A, VT-2 or 216-A tubes are used, the voltage can be increased considerably. In this way the volume is improved.

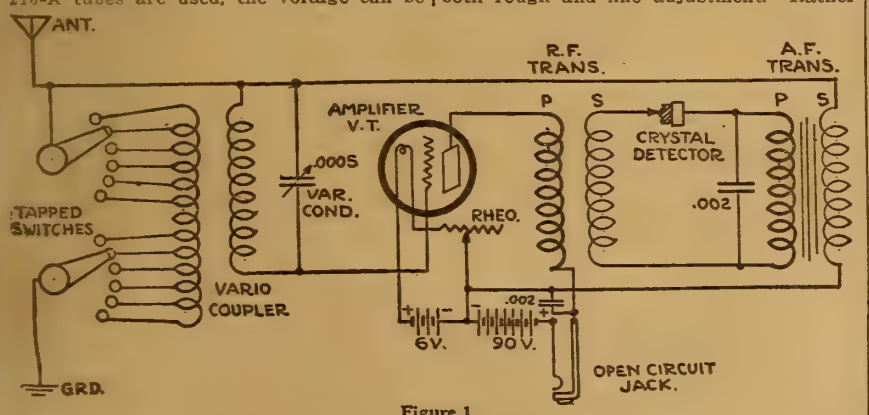

Figure 1

The primary of the audio frequency transformer is shunted with a .002 mfd. fixed condenser which acts as a Radio frequency by-pass. Likewise the phones and the B battery are by-passed with a fixed condenser in order to avoid the choking action of the phone impedance on the Radio frequency oscillations.

Apparatus Required

As was said, the variocoupler used in the original set has two sets of taps for both rough and fine adjustment. Rather than put the usual form of contact points and lever switches on the panel, the form of inductance switches with the contact points assembled on the unit in the rear of the panel, were used.

The variable condenser should be of the vernier type for selectivity in tuning. No potentiometer is required in this circuit.

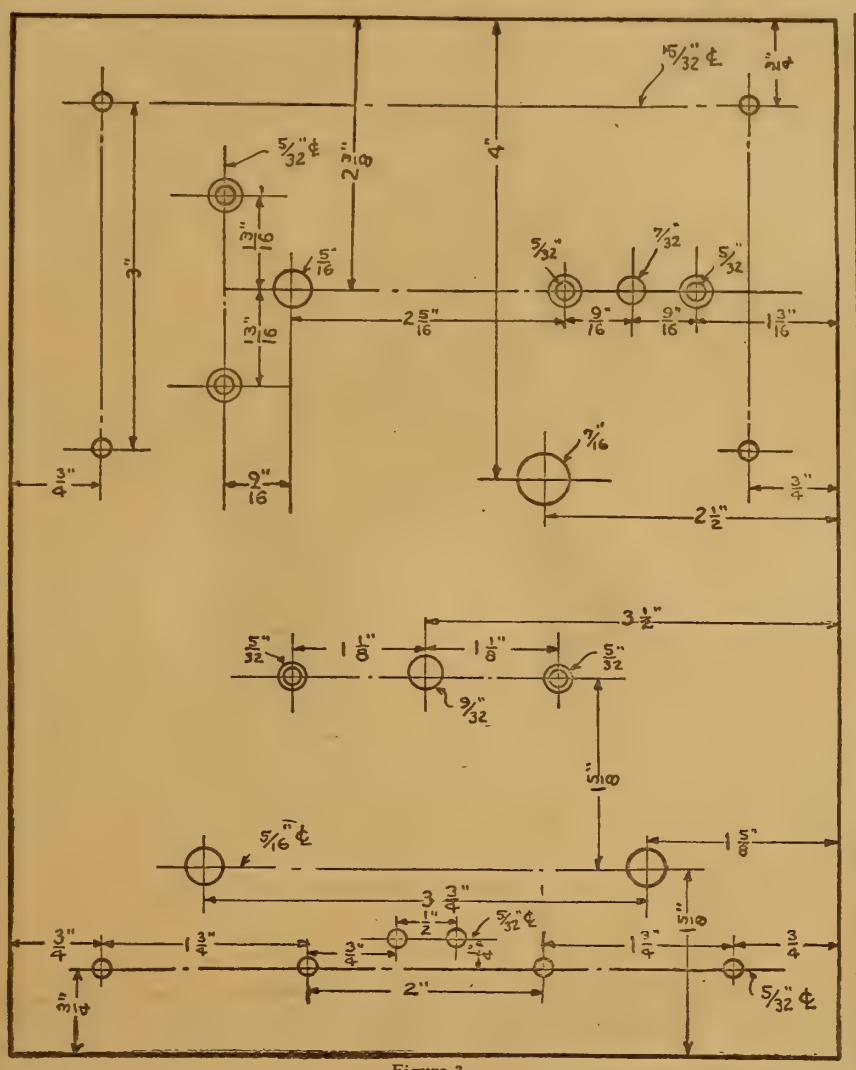

Figure 2

If a UV-201, VT-2 or 216-A tube is used, the usual form of 6-ohm rheostat is required, but with 201-A tubes it is necessary to use a 25-ohm rheostat for proper control of the filament current.

The panel required can be either formica, hard rubber, or any other good panel stock. The dimensions are 7 by 9 by ¼ inches. The cabinet should be constructed to suit oneself. The one described for the Flewelling set will also serve here.

Panel Layout

The layout of the panel for the mounting of the apparatus is given in Figure 2. Part two of the article will show a view of the rear of the set with the apparatus in position.

The two 5/32-inch holes in the left upper side are for the antenna and ground binding posts. The two in the right upper side are for the phones or loud speaker if it is desired rather than plugging in on the jack. The four holes along the lower edge are for the battery connections. Reading from left to right these should be A—, A+, B—, and B+. No holes are indicated for fastening the panel to the set, as these will depend on the cabinet construction employed by the builder.

The two 5/16-inch holes, one in each of the lower corners, are for mounting the inductance switches on the panel. The two 5/32-inch holes between the latter two are for the crystal detector mounting.

The variable condenser is mounted in the upper left corner and the rheostat in the upper right corner. The large 7/16-inch hole is for the jack. The variocoupler is mounted in the center of the panel.

Variations in the make and type of apparatus used may necessitate alterations in the mounting holes. The shaft locations in most cases can be kept as indicated. In the set the main purpose in mind was simplicity, compactness and reasonable cost of construction.

The second article, describing the completion of the single tube reflex set, will appear next issue.

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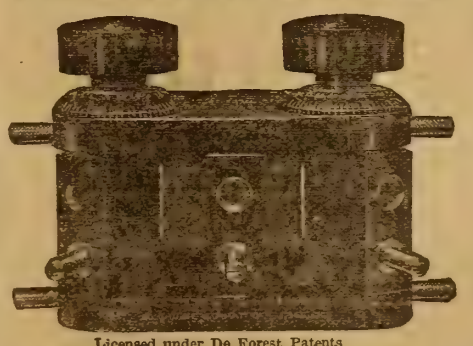

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The Reader's View

Use of Telephone Batteries

V. H. of Geneseo, Ill., in question and answer No. 2209 of March 17th, Radio Digest, in criticising your statement in regard to plate voltage said: "Do not use ignition or telephone batteries for the construction of B batteries on account of the High Amperage."

How does he get that way?

I can't see it, as my idea of it is that the resistance of the circuit will take care of the current flow. He wouldn't need to worry about that "High Amperage" if he will just keep his eye on his voltage.

Would suggest Mr. V. H. that you study ohms law.

Am I right, answer man?—John Davison, St. Petersburg, Fla.

Silent Night

In response to your inquiry as to how I like the "Silent Night" I will say that I am very greatly enthused with it and if I were inclined to be selfish, would wish for a number of "Silent Nights" every week; not that our Chicago programs are not just as good as the out of town programs, but I have a number of far range sets and naturally like to try them out. However, I consider the rights and desires of the users of crystal sets and am thankful for the one "Silent Night" a week.

I wish that some of our local broadcasting stations were as considerate of the people of Chicago as they are of the residents of distant parts. They are anxious to be heard at a great distance and to get messages and telegrams from far away stations, but they make it almost impossible for Chicago fans to get any but the most efficient and powerful distant stations by their almost incessant broadcasting at night. I suppose that the gentlemen of the Chicago Board of Trade have too much "pull" to have anybody make any effective criticism of the broad wave on which they are apparently transmitting, but they ought to be good enough sportsmen not to want to take up the whole ether and leave something for somebody else.

I am curious if there is any "under the surface" reason for restriction of broadcasting by the various stations to 360 and 400 meters. It seems to me that with the hundreds of wave lengths available, more than two wave lengths could be given over for the enjoyment of probably not less than two million owners of receiving sets in this country.

As to my suggestion for a "Silent Hour" each day instead of an entire "Silent Night," I can see that it might be a difficult innovation to inaugurate all over the country but I notice Alderman Tolman, to whom I also wrote, has broached the matter to the fans, and I really think that even if restricted to Chicago, it would possess obvious advantages over the "Silent Night." However, rather than complicate the issue, I am willing to "sing low" on the subject.

In concluding this long letter, I wish to congratulate your publication to which I am a subscriber. In my humble opinion it is really the best of them all. I am not saying this because I am writing to you but I really mean it.—Oscar C. Miller.

Reinartz Receiver

Having built a Reinartz receiver complete as described in one of the November numbers of Radio Digest, I thought you might be interested in learning of my success. I am using only the detector unit, but expect to build the amplifier soon. I certainly like the set, and I think its performance is exceptional.

With my detector set, during a period of four weeks, I have received one hundred and fifty-five stations in the United States and Canada, and PWX at Havana, Cuba. Of these, at least twenty-five are over one thousand miles distant from Rapid City.

I have an aerial thirty feet high, 90 feet long with a thirty-five foot lead-in, and a thirty-five foot ground to a water pipe. I am using a Radiotron tube and 22½ volts on the plate. I am not using a phone condenser, but with Ft. Worth, Kansas City, Chicago, Davenport and Denver, I can hear and understand words plainly ten feet away from the phones. This is with the detector. With St. Louis I can hear music plainly twenty feet away from the phones, and can hear the beat of it at the other end of the house. The music often comes in so loud that it is painful to keep the phones on the ears.

Without a ground I have received Schenectady, N. Y., and with ground but without aerial have received Davenport, 700 miles away. With neither aerial nor ground I have received the Night Hawks at Kansas City. Using a davenport spring for aerial, I have received Los Angeles, Portland, Ore., and Atlanta.

I considered my results so remarkable that I thought I would write Radio Digest about it, and let you know what results can be achieved with a Reinartz detector. I certainly am more than pleased with my set. Incidentally, I wound my coil myself.

I would be extremely interested in knowing the results others are getting with Reinartz sets, especially those using only detector.—Harold C. Nystrom.

Book Reviews

Radio Receivers for Beginners. By Snodgrass and Camp. Answers the universal question, "How can I receive Radio?" Price, $1.00.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete authentic and informative work on Radio. Fully illustrated. Price, $1.50.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Lefax Radio Handbook. A loose-leaf handbook. This book never grows old or out of date. All of the latest apparatus and hook-ups are added as time goes on. Anything that grows old is taken out and new leaves substituted. Price, $3.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

Radio Simplified. By Kendall and Koehler. New developments of Radio described in non-technical terms. The latest and most efficient hook-ups. Tells about vacuum tune, loose couplers, variocouplers, variometers and everything necessary for those who aim to get the best results in building or operating a Radio outfit. Price, $1.00.

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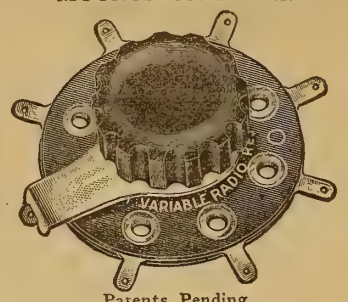

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REINARTZ CIRCUIT
EVERY PART COMPLETE
1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD variable condenser, 1 13-plate .00025 MFD variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD phone condenser, 23 feet bus bar wire, 1 high-grade Radion panel and diagram and complete instructions **$10.00**

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2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade RADION panel, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... **$11.00**

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1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver. **$11.00**

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FILAMENT RHEOSTAT—Condensite base; value, $1.10; special at..... .70
FILAMENT RHEOSTAT with 2⅛" dial; value, $1.50; special at..... .85
TELEPHONE PLUGS ..... .60
FRESHMAN VARIABLE RESISTANCE LEAK and MICON CONDENSER Combined .75

Every article advertised above is guaranteed both by the manufacturer and by us—Mail orders filled immediately—transportation PREPAID on all orders of $5.00 or over east of the Mississippi River. All others include postage.

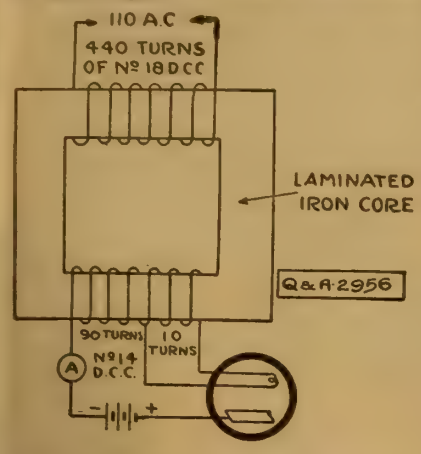
Questions and Answers

The Radio Digest Q. & A. Department does not consider it ethical to divulge the circuits of manufactured sets. We would request that all inquiries in such cases be mailed to the manufacturers.

Tube Rectifier

(2956), JWK, Marion, Ind.

Please send me diagram for installing a tube rectifier for charging storage batteries, for Radio use. If you wish you may publish same as I am a weekly reader of Radio Digest.



A.—Complying with your request we are giving on this page a diagram of a rectifier for charging storage batteries. Details of windings are given.

Tubes

(2662) AJR, New York City.

The Flewelling booklet received yesterday. I note in the drawing 3 that you would place the variable grid seal with condenser on the bottom opposite the condenser. Also I see in the illustration on the cover that you have a 3-inch dial for its regulation. I would like to follow your dimensions, therefore will you please let me know the brand used?

Do you think that my range will be larger with a Radiotron 202 than with a 201 or a VT1?

A.—With reference to the Flewelling circuit, would advise that any standard 3-inch dial may be used and are obtainable at any Radio supply dealers.

Would advise using a VT2. If not possible to obtain, then a VT1, rather than the tubes you suggest.

Commutator Interference

(2412) DDC, Madison, S. D.

We have a very good homemade set here in our office, which is situated all on one floor. We have 3 h. p. Kimble variable speed motor on one of our presses. Whenever the motor is running all you can hear in the receivers is a steady roar. We also have ½ and ¼ h. p. Kimble motors which do not seem to affect Radio reception, also two or three other small motors. I am working on aerial and counterpoise, but when I switch over to ground the noise is much worse. I have tried a loop aerial so we could get markets from WFAL, but it works just the same as the other aerial. I discovered today that I could hear the motor with no aerial or ground connection, which would seem to indicate that the sparks from the motor, if this is the cause, were going direct to the set.

Do you think that a shield placed around the motor and grounded would help it any? For a while after I put up my counterpoise about two months ago it was all right, but electricians did some repair work on the motor and since then I have had the trouble on either counterpoise or ground.

If you can give me any idea of how to get away from this trouble I will certainly be very grateful.

A.—Carefully noting the difficulties you are experiencing through proximity of electrical appliances, would advise that it is caused by the sparks given off between the brushes and commutator of motor. While shielding, and grounding shield, will reduce the interference to a great extent, it is doubtful if you will be able to entirely eliminate it. Believe that by shielding it can be reduced to a minimum so that reception may go on with reasonable satisfaction.

B Batteries

(2377) CIW, Washburn, N. D.

Please advise why our B batteries are exhausted after about a week, using two to three hours each night. They are the 22½ volt, used three units on my Reinartz two stage set for detector and amplifiers, disconnected while idle.

The current number of Digest advises recharging dry cell B batteries with rectifier (used as with A batteries) charging three cells at a time. We assume that negative connection and third of positive taps are charged first, then negative and last tap. Is this the proper procedure? What sort of ammeter is used to determine state of charge of B batteries? What amperage should constitute a full charge for 22½ volt B battery?

A.—Noting your experience with batteries would advise that this is not as it should be. Your B batteries should last for several months. There is some faulty connection in your set which short circuits batteries. To test for this, turn tube out and by means of a volt-meter connected in series with B batteries notice if the meter registers. If it does, go over set for faulty connection.

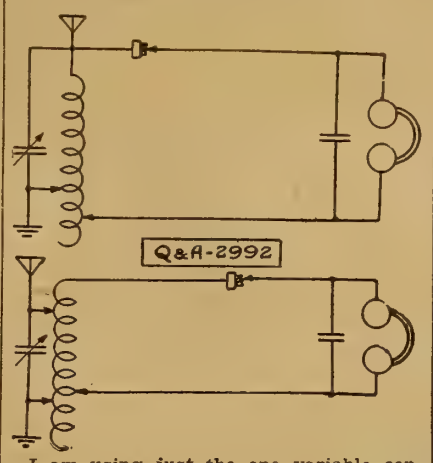
The article to which you make reference has to do with charging of storage B batteries. The dry cell type cannot be recharged.

Test battery with a voltmeter only. Never use an ammeter as that would vitiate life to almost nothing. In using a voltmeter it should register not less than eighteen volts while the batteries are being used.

Crystal Circuits

(2992), HCH, Fresno, Cal.

Kindly send me two or three hook-ups for a three slide tuning coil, and a two slide tuning coil. What should be the length of these coils?



I am using just the one variable condenser, either across the detector and ground, or across the aerial and ground. Which is best?

Do you think a variable condenser and loading coil is as good as a honeycomb coil?

A.—We are giving herewith diagram of crystal detector circuit which under favorable conditions of electrical perfection should have a range of one hundred miles.

Coil should be ten inches in length.

One variable condenser, twenty-three plate, is indicated.

There is no necessity of using a loading coil as tuner will accomplish eight hundred meters wave length.

Plate Battery Voltage

(2310) STD, Houston, Texas.

I have a receiving set which is regenerative, using a variable condenser, two variometers, a variocoupler, W. D. 11 tube and a socket, fixed grid leak and condenser (condenser .00025 M. F.) condenser .0025 M. F. across the phones, 22½ volt B battery and dry cell. I find it necessary to burn the filament so high that the noise is excessive to bring in out of town stations. What shall I do?

A.—Noting specifications and condition experienced in lighting the filament of the tube would advise that it is indicated that your B battery is low. Add about four volts potential, making a total of twenty-six volts, and you will probably overcome the difficulty.

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Radio Illustrated

Here she is again—Ganna Walska singing over WJZ via a microphone located at the Waldorf Astoria, New York City. Harold McCormick's new bride has now returned to the continent where she has several opera engagements

The Radio Phonolamp, a new invention by F. W. Hochstetter of Dayton, Ohio, is the latest idea in talking machines and Radio combined. This arrangement is neat and practicable © Fotograms

Judge John Rounds, of the conciliation Court in St. Paul, Minn., with Robert Otte, clerk of the court, is probably the first judge in the world to try a case by Radio. The case being tried was that of Frank Yost suing C. E. Kopp for a Radio set © International

One way of reducing the panel cost is to build a set like this one. This unique set has been constructed on an ordinary twelve inch disc phonograph record. Front and back views are shown

APR 25 1923 ©CIB575358

New Kaufman—Single Tube Reflex—Flewelling

Radio Digest

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ASSURE POPULAR MUSIC

Above is Violet Palmer and her reflection. It is a hard matter to decide which is the more attractive, isn't it? Miss Palmer was on a recent program of Station WOR, of the L. Bamberger and Company, Newark, N. J. Her part of the program kept several postmen busy next day bringing letters of appreciation from fans who had listened in

Broadcast Boosts Sale of Records

Knight-Campbell Music Company Has Large Returns as Direct Results of Radio

By A. S. Hall

DENVER, COL.—Should the broadcasting stations be assigned any specific sum monthly or yearly by the songwriters, as suggested at the Washington conference on March 21? Does the broadcasting of popular music cut into the sales of phonograph records and player-piano rolls, as claimed by the song writers?

From the roof of the continent, the "Mile-High City," comes an emphatic "NO," voiced by no other authority than KFDL, through it's operator, "Shorty" Gegg. The Knight-Campbell Music Company, of Denver, Colo., owners and operators of KFDL, refute the statements of the songwriters and phonograph record manufacturers that Radio is putting the record business "on the bum."

"There's nothing to this talk about the

(Continued on page 2)

WILL REMAIN AS PART OF BROADCASTS

Unite to Supply Songs

Broadcast Owners Call Conference to Fight Music Society Ruling on Copyright Features

CHICAGO.—As a result of a preliminary conference held here recently between interests representing Westinghouse Stations WJZ, KDKA, KYW and WBZ, the Daily News station, WMAQ; the Drake Hotel, WDAP, and station WJAZ of the Chicago Radio Laboratories, together with the Crosley company plant WLW, of Cincinnati, Radiophans are assured that popular music will be a part of all programs on all broadcasting stations in the country de-

(Continued on page 2)

Jessie Royce Landis (below) played one of the principal roles in "Bargain Day," which was recently broadcasted from the studio of KYW. She is a daughter-in-law of Kenesaw Mountain Landis, famous baseball arbiter

Jane Cowl, in the Selwyn's production of "Romeo and Juliet," Shakespeare's immortal love story at Henry Miller's Theater, produced under the direction of Frank Reicher, was recently heard from Station WJZ, Newark, N. J.

BOSTON FAN TUNES IN KYQ, HONOLULU PLANT

Reception Proves Successful Two Days at Same Time

BOSTON, MASS.—Marcy H. Hall of 136 Federal street, Boston, reports that on Saturday March 24, at 1.15 A. M., Boston time, he tuned in on Station KYQ, an electric shop in Honolulu, H. I., and listened in for about ten minutes, during which time phonograph records were played. On the following day, in company with a friend, he again tuned in on the same station at the same time and held them for 35 minutes, until 1:50 A. M., Boston time. They first heard a bedtime story and then two phonograph records, "When Hearts Were Young" and "Running Wild." This was all done with a regenerative detector and two stage amplifier, one transformer having an open secondary.

WGY TO HAVE DANCE ORCHESTRA ON ETHER

SCHENECTADY, N. Y.—Through the remainder of April and every week during May, WGY here, will broadcast the Saturday evening dance music of Cain's Castle Orchestra from 9 to 11 o'clock, Eastern time. This feature is introduced especially for isolated communities which cannot get a dance orchestra and which now, with the aid of loud speakers, will be able to hold weekly dances.

ASSURE POPULAR MUSIC

(Continued from page 1)

spite the demand of the American Society of Composers, Authors and Publishers, of New York, that their copyright selections be eliminated from the air unles a substantial license fee be paid them by the broadcasters.

The conferees agreed to resist the unreasonable attempt of the music organization to hold them up for fat fees for the broadcasting of their copyright selections by refusing to pay the assessment or to broadcast the society's music. A call was sent to all broadcasting stations in the country to attend a meeting at the Drake Hotel, Wednesday, April 25, for the purpose of organizing the broadcasters and to furnish them with music from the independent publishers, authors and composers that are not members of the society.

Action Culminates Long Controversy

This action of the local broadcasters followed quick on the broadcast announcement from Stations KYW, WDAP, WJZ, and the other stations over the country that no more music controlled by the New York society would be broadcast from these stations. The whole was a culmination of a controversy that has been on for months between the station owners and the music society, for the assessment of license fees for broadcasting copyrighted musical selections.

The subject was first broached at a conference held in New York in September of last year, between the Music Society, the Authors League of America, Music Chamber of Commerce, Music Publishers' Association of the United States, the Music Publishers' Protective Association, the Department of Commerce, American Telephone & Telegraph Company, Radio Corporation of America, General Electric Company, Westinghouse and the National Radio Chamber of Commerce.

Broadcasting Not for Profit

The music publishers demanded that the Radio interests recognize their right to collect fees for the broadcasting of their copyrighted selections as constituting a public performance for profit. The broadcasting interests resisted this interpretation and took the stand that broadcasting was ont a public performance for profit and further that the music publishers were more than adequately compensated by the publicity given their music by broadcasting resulting in additional sales of sheet music, music rolls and phonograph records from which the publishers made a profit. The initial conference resulted in a deadlock and adjourned until the latter part of October when a second meeting of the same interests were held. The discussions of the second conference were much like the first and resulted in an agreement that a test suit would be brought to determine whether the broadcasting of a copyrighted musical selection constituted a public performance for profit and as such an infringment of the rights of the copyright holders.

Digest and Drake Query Plants

No test suit being instituted, the controversy dragged along until just recently the music society sent out an ultimatum letter demanding copyright fees or the discontinuance of the broadcasting of their music. This was met by a standpat refusal on the part of the broadcasters and many stations announced the withdrawal of the society's music from their program.

To determine what effect the order would have on broadcasting and how generally the revolt against paying the assessments was among the broadcasting stations telegrams were sent by Radio Digest and the Drake Hotel station WDAP to most of the important broadcasters throughout the country. The replies were almost unanimous in refusing the payment of license fees to the music society.

"WSB does not propose to pay American Society license," wired Lambdin Kay, the famed "Voice of the South," director of the Atlanta Journal station.

"The Detroit News has received no ultimatum from any composers' society demanding we pay license for copyrighted music. Station believes it is not required to pay royalties because station is not operated for profit. We believe license fee could not be collected from Station WWJ," replied Charles D. Kelly, editor and supervisor of the Radio Department of the Detroit News.

Plants Show Fight

"We are advised that we are not infringing copyright laws by broadcasting without first securing a license, and until we are advised to the contrary we shall not take out a license," telegraphed Credo Harris, director and manager of the Louisville Courier-Journal station, WHAS.

"As owners of Staiton KGW we have declined to buy license from American Society of Composers. We look upon the demands of society's lawyers as offer to sell us immunity from litigation over a fantastic issue," said the Portland Oregonian.

"We shall not buy license if necessary," says the spunky woman director of WLAG, "The Call of the North." "If necessary we will boycott all compositions under control of American Society of Composers. This is the opinion of our backers and my personal opinion as a professional musician."

"Approve action of broadcasting stations. I am with you 100 per cent. Have discontinued American Society of Composers' compositions," Powell Crosley, Jr., Cincinnati, WLW.

"We think position taken by American Society toward Radio broadcasters is unreasonable and we are opposed to it," W. A. Dealy, Dallas News, Station WFAA.

WGY Statement

Martin P. Rice, director of broadcasting for the General Electric Company station, WGY, says: "WGY does not use the music which the American Society of Composers, Authors and Publishers purports to control. The installation of a broadcasting station like WGY involves an expenditure of one hundred thousand dollars and the annual operation costs as much more. At the resent time there is no operative plan for collecting any definite revenue from those who listen to the program and no assurance that the listeners will purchase apparatus from the manufacturer who pays for the broadcasting. As everyone knows thousands enjoy broadcasting received on homemade sets without contributing a penny to broadcasting stations producing the programs. With such an arrangement the demand of the society that broadcasting stations pay a license fee based on the number of listeners in seems unreasonable.

"It is not practical to place the broadcaster with his non-paying audience in the same class as the moving picture theater with its very definite capacity for collecting revenue. This is particularly true in view of the fact that even if licenses were purchased, a modern station's broadcast programs would include relatively few of the society's compositions."

KFAF and Others Join Fight

"We will not submit to demands of American Society of Composers for broadcasting music. They have about as much legal claim as the manufacturers of patented washing machine would have in case a purchaser took in washing for pay. The purpose of copyright is to protect holder from infringment by other authors or publishers putting out music already copyrighted. If American Society of Composers have legal right to enforce their demands we will close down rather than submit," Western Radio Corporation, Station KFAF.

"Acting on advice of legal department, we have declined to secure license from American Society of Composers," Star-Telegram, Fort Worth, Texas, WBAP.

"Will not take out license for broadcasting copyright music. American Society of Composers should pay for the widespread publicity gained by them through broadcasting instead of we paying them;" Amrad, Medford, Mass., WGI.

"The attitude of KSD as to copyright music will depend on report of its attorneys who are giving great care to the study of this unusual legal question," Post-Dispatch, St. Louis.

Broadcast Refusal of License Purchase

"WMC, broadcasting station of the Commercial Appeal, Memphis, does not intend to apply to the American Society of Composers for license to broadcast copyright music. As owners of one of the big Radio broadcasting stations of the country, the Commercial Appeal will give unhesitatingly its moral support to any project to fight this move on the part of the American Society. Our refusal to apply for license and pledge of moral support to fight them is being broadcast," G. P. Newbern, Radio editor.

"We absolutely refuse co-operation with American Society of Composers," Richard Johnson, Alabama Power company, Birmingham, Ala., WSY.

"Our attitude same as Westinghouse and Drake Hotel," F. G. Wickersham, engineer, Atlanta and Westpoint Railroad, WDAJ.

"Why Should We Pay?" Asks WOO

"Wanamakers does not expect to take out license for broadcasting copyright music. Why should they charge us anything. There is a legal aspect for the lawyers to settle, but as a matter of moral right we should not be charged a license fee. Broadcasting is an expense entirely; it is not done for profit. The awakened interest in music will benefit the composers more than anything else. We have to buy the scores of music we broadcast anyway," says Gordon H. Culley, Philadelphia, Station WOO.

Philadelphia stations, accordiing to the Public Ledger, will continue to send out copyright music until it is legally shown they are violating copyright law in so doing. This includes Stations WFI, Strawbridge & Clothier; WDAR, Lit Brothers; WIP, Gimbel Brothers and WOO, Wanamakers.

Replies to Donnelly Telegrams

The following replies were received by Thorne Donnelly, WDAP, Drake Hotel, Chicago, to his wire of inquiry:

"Yes, we will stand with you and other stations on copyright matter," WOC, Davenport.

"We will back organizing independent publishers," WGAT, Lincoln, Neb.

"We heartily agree with sentiments," Doubleday Hill Electric Co., Washington, D. C., WMU.

"Will back you," WCAY, Milwaukee.

"Willing to co-operate within reason. Willing to send representative if personal action necessary to these demands," WCK, Stix, Baer & Fuller, St. Louis.

"With you. Will send representative," Peoria Radio, WJAN.

"We are certainly with you," Doubleday Hill Electric Co., Pittsburgh, Pa., KQV.

"Cannot send representative to confer about music composers' demands. This being a state institution prevents very active participation in this movement. It has our hearty approval," A. H. Ford, WHAA, Iowa City.

"We are interested. What date will meeting be held?" Deseret News, KZN, Salt Lake City, Utah.

"Interested and agree broadcasters should co-operate," Register Tribune, W. W. Waymack, editor, Des Moines.

"Will do everything possible to co-operate," Lee J. Meyberg.

"Will co-operate in any way possible to frustrate demands Society of Composers," Scranton, Penn., WQAN, J. D. Keator, Mg. editor, Scranton Times.

"We are with you," Electric Equipment Company, WQAM, Miami, Florida.

"We will send representative," Western Radio Co., Kansas City, Mo.

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Looking Ahead

Tell Your Beginner Friends—that Thomas W. Benson, a man in Radio for over a score of years and well acquainted with every scientific development the wonder science has ever had, will begin a series of "first reader" articles for novices next week. His general topic will be what every Radiophan should know, and his first article will tell of the fundamental facts of electricity as applied in Radiophony. Start with the May 5 issue.

A Three-Tube Set Reflexing on Two Tubes—is the title of a series by H. J. Marx starting with the May 5 issue. The set does with three tubes what normally is accomplished only by the use of six, and does it better. Developed after three months' research; exceptional volume and long distance reception are obtained by this set, which can be used with either a loop or outdoor aerial. While not low in cost, the apparatus meets the popular demand for an all-around good receiving set.

The Re-Allocation of Wave Lengths for Class B Stations—an interesting article on the new wave length assignments and plan by which it is believed the interference between broadcasters will be eliminated will be given in the May 5 issue. Order a copy today so you will have the details of this great plan in a nut shell, and so you will know where, after May 15, you may expect to hear your favorite Class B broadcasters.

Advance Programs—More Every Week—With this issue of the Digest is given the week's advance programs in detail for twenty-four of the country's leading broadcasters. As with other similar features, this is available through no other source. Eventually it is planned to give advance programs for every Class B station, but this will of necessity take time until the broadcasters become so organized as to furnish these sufficient time in advance.

E. T. Flewelling's One Condenser Flivver Super Set—will be described more fully by the author and inventor in Part II of the new series next week. This interesting offspring of the original Flewelling is worthy of construction by the Radiophan who has not attempted the Flivver Super as yet. Watch for Mr. Flewelling's article telling the really correct method to secure amplification with his set. Until protected by patents he will not be able to whisper this confidence in the ears of the readers.

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BOOSTS RECORD SALES

(Continued from page 1)

sale of phonograph records falling off since the advent of Radio," said Gegg, "at least, as far as the Knight-Campbell Music company is concerned. We started broadcasting from KFDL on January 23, 1923, and while that is not such a long time ago, our books show that the sale of records in the phonograph department has increased more than thirty per cent in February and March as compared with February and March of last year.

"We use a number of records for our entertainments. The names and numbers of each record played is kept on the station log. Nearly every time we broadcast, the following day someone will come in to the store and ask for 'the third record you played last night on the Radio,' or some other such record.

"The same thing has happened at our branches at Colorado Springs and Pueblo. At Colorado Springs, our branch house furnishes records to KFFQ, and the folks drop into the store there and ask for numbers they have heard over that station the same as they do here.

Broadcast Secures Mail Orders

"The sale of records by means of Radio is by no means local. Our mail order department ships out numerous orders that were secured through the medium of the Radio.

"In Denver, we also furnish records to KFAF and KLZ and we find our sales have jumped likewise through the broadcasting of these two stations.

"The idea that Radio is cutting into the sales of phonograph records is all wrong. It's the biggest booster for records we have ever found. Any assessment against broadcasting stations is going to put a pretty bad crimp in the broadcasting game, and of course, it is going to be felt in the music business.

"Summing it all up, Radio has not harmed the music business, it has helped it wonderfully.

Excellent results are obtained from a kite antenna. Fly the kite with wire instead of cord.

35 WAVE LENGTHS FOR 30 LOCALITIES

CLASS A PLANTS GET NEW RATINGS MAY 15

Interference to Be Entirely Eliminated Under New Distribution of Broadcasting Wave Lengths

By Carl H. Butman

WASHINGTON.—Interference, the bugaboo of both Radio operators and fans, will be greatly reduced, if not eliminated, by May 15. On that date, the assignment of about 35 exclusive wave lengths to some 30 localities, where class B broadcasting stations are situated, will go into effect. Wave lengths for Class A stations will also be assigned by districts by May 15, it is hoped.

The tentative distribution of broadcasting waves will mean that anyone in the United States with a good receiving set will soon be able to pick up each and every high-powered Radio broadcasting station and most of his local stations without experiencing the interference which has been prevalent for many months.

Stations 3,000 Miles Apart

Practically every B station will have a national exclusive wave length, between 300 and 345 or 375 and 545, except where there are two or more such plants in one locality, but the waves are assigned to localities rather than stations and will have to be shared in some cities.

In four instances, New York, Philadelphia, Los Angeles and San Francisco, two or three additional wave lengths will also be assigned, but they will not be exclusive nationally. These waves all located on the Atlantic Coast will be repeated in the Pacific Coast cities. While not exclusive, these additional waves will aid in supplying additional facilities and will scarcely cause interference as the stations will be about 3,000 miles apart.

Time Difference an Aid

The difference in time across the continent of 3 hours will also tend to eliminate any interferences. As soon as the nine Radio inspectors can arrange with the class B station owners in their districts, authority to broadcast will be issued on the specified wave lengths and stations will be required to use them only. Where two or more stations exist, a time schedule will be arranged. Until the assignments are made definitely, B stations will continue to operate on 400 meters, and C stations on 360, but by the middle of May it is hoped that all readjustments will be completed and the transfers made. A few wave lengths in each district have been reserved because of anticipated interference with other lines of communication or held for new stations.

Assignment of Class A Waves

By May 15, the nine Radio inspectors of the Department will also undertake the relocation of specific waves to old class A or new class C stations in their districts now operating on 360 meters. These wave lengths, between 222 and 300 meters, will not be exclusive nationally but will be exclusive in each district, giving practically every station a selective wave. Along the borders of adjacent districts, inspectors plan to arrange the allocation of wave lengths so that no material interference will be created due to the assignment of waves in close proximity.

Class C stations now licensed on 360 meters will be permitted to continue the use of this wave length if they so desire, but they will not be permitted to vary the wave length.

Copley-Plaza Hotel, Boston, Installs Broadcast System

BOSTON, MASS.—A combination of systems for internal and external broadcasting has been purchased by the Copley-Plaza Hotel of this city, which will benefit Radiophone listeners all over the country, especially in New England, as well as the hotel management and its guests.

The main idea is the installation of a public address system in the ballroom, whereby it will be possible to broadcast voice and music so that they will be plainly heard in all parts of the big ballroom. Seven microphone pockets will be installed in this room, and one in the state suite. These will be inter-connected with a public address system so that if there is any special event or popular program taking place in the tea room, it can be broadcast in the ball room, thus permitting a greater number of people to hear it.

A special land wire between the Copley-Plaza and Station WNAC, the Shepard Stores, will be kept in connection, furnishing the outside Radio audience excellent material from the Copley-Plaza's numerous programs, and greatly increasing the evening's entertainment.

Government Considers Airphone

WASHINGTON, D. C.—A number of bureaus and departments of the government are considering, it is understood, the advisability of using the Radio to send out instructions to their field agents. The matter of using Radio in place of the telegraph is being given consideration.

"DIE MEISTERSINGER" BROADCAST BY WNAC

BOSTON, MASS.—Wagner's opera, "Die Meistersinger," was broadcast by WNAC (the Shepard Stores) recently, in its entirety, direct from the Boston Opera House, on the opening night of Boston's Wagnerian opera season. The large cast of European singers was headed by Frederick Schorr, who sang the part of Hans Sachs, the benevolent cobbler.

TALKING AUTOMOBILE PUZZLES BIRMINGHAM

BIRMINGHAM, ALA.—Automobile row in Birmingham has a mystery. It is a talking Studebaker car. Crowds have been attracted by the novelty. Supposedly the owners have it hooked up with a Radio set. But it is invisible and can't well be found on inspection. Still it talks, sings, tells all about the weather and gives the latest quotations in Standard Oil, preferred, etc.

TWINS SING FOR KYW LISTENERS

No, it is not the same young lady in two different poses—we thought so too, at first. They are twins, the Connor girls, Velma (left) and Thelma. These two attractive young ladies were the ones who entertained KYW listeners in the midnight revue recently

ETHER ENTERTAINS MILL'S EMPLOYEES

Fairhaven Mills Starts Noon Dance Idea—16 Others Fall in Line

NEW BEDFORD, MASS.—Over 35,000 men and women are being given entertainment and education through the Radio, by means of sets installed in the various welfare buildings. A special program is given each noontime from 12 to 1 o'clock from Station WDAU of Solcum & Kilburn, this city, including concerts and dance music, which are picked up by the powerful receiving sets at the mills and amplified by loud speaking devices, so that the workers may dance or just listen in, as they may desire.

This new form of education and entertainment at the mills by Radio was started at the Fairhaven Mills, and the mill electricians built the powerful receiving set, with two steps of amplification. Other mills heard of the plan and soon realized its practical benefits, so that today sixteen mills have Radio receiving systems.

At the Fairhaven Mills, John A. Gifford, James Golden and David Beanland, members of the welfare association, have charge of the Radio program and with them co-operate W. M. Newington and Irving Vermilyea of the local broadcasting station. In addition the Fairhaven Mills have motion pictures, including many reels especially made for them.

NOTED VODVIL STARS TO SING FOR EUROPE

Marion Harris, Keith-Orpheum Headliner, on WJZ Program

NEW YORK.—Marion Harris and Paul Specht and his orchestra will broadcast to Europe as official representatives of the record manufacturers at the Talking Machine Dealers' Association banquet to be held at the Hotel Pennsylvania.

Miss Harris is well remembered as probably one of the best and most favorably known stars of the Keith and Orpheum circuits and is known worldwide in every home where there is a phonograph. She is the same Marion that first sang such songs as "I Am Looking for a Bluebird," "Sweet Cookie," and "Nobody's Baby," for the records. It is a scoop indeed to have this star on the air for the entertainment of the WJZ fans.

The talking machine men have made arrangements with Station WJZ of Newark for what is to be the greatest broadcasting event in the history of the Westinghouse Company. Specht will play for the Radio between the hours of eight and ten-thirty, and also between courses of the dinner and for dancing.

Other notable artists, such as John Steale, the McCarthy Sisters, Ted Lewis, Vincent Lopez and many others are also scheduled to appear on the program.

The banquet will be held in the main ballroom of the Hotel Pennsylvania. Last year, Paul Whiteman represented the record industry, but this year Specht and Miss Harris were selected for the honor.

AIRPLANE DIRECTED FROM WGR PLANT

TEST OPENS NEW POSSIBLE AID FOR FLYERS

Success of Experiment Means Considerable Extension of Ether Industry to Equip Planes

BUFFALO, N. Y.—Station WGR has been making successful experiments in directing of airplanes by Radio telephone with L. L. Irvin of Buffalo, driver of the plane with which experiments were conducted.

Mr. Irvin's plane is equipped with a receiving set, using the usual trailing wire antennae. Every afternoon he goes up and floats about in the air above Buffalo listening to the program given by the Federal Telephone & Telegraph Company, station WGR, far below.

Pans Hear Commands

Arrangements were made for the experiment to take place one afternoon last week. At a prearranged time L. B. Weller, the announcer at the Federal station, took control of the aircraft. Radiophans were astonished to hear the directions, "Turn right!" "Turn left!" etc., breaking into their afternoon program, but those in the northern section of Buffalo who happened to be in their windows watching the airplane while listening in could understand for with every command the plane executed the proper movement within 15 seconds after the command was broadcasted.

Reception Poor in High Altitudes

The success of these experiments, which were repeated on the following afternoon, opens up a field for speculation as to the possible use of the Radio all over the United States in connection with flying, both commercial and pleasure.

Representatives of the Federal Company are of the opinion that these experiments may lead to a general broadening of the practicability of flying and more advanced experiments will be carried out in the near future. In the first attempts it was found that the directions could not be clearly received when the plane got into the higher and colder regions of the air and the subject is being studied further to see if these defects can be remedied.

Will Be of Aid to Airplanes

It is not improbable that the time may come when Radio stations all over the country will be prepared to render material assistance to visiting or transient flyers by giving them for instance landing information, local geographical "dope", local weather conditions, etc.

This in turn would mean a considerable extension of the Radio industry as it would imply the equipment of all service planes with Radio receiving apparatus.

Fast-Moving Train Picks Up Signals

For the First Time in Canada Broadcast Is Received on Trainboard

CALGARY, ALTA.—For the first time in the history of Radio in Canada, Radiophone signals were successfully picked up on board rapidly moving railway trains when the Winnipeg-Vancouver train of the Canadian Pacific railway reported reception of signals from several powerful American and Canadian stations, on its arrival in Vancouver.

Officials Co-operate

Railway officials co-operated with Raymond Wylie, Orpheum headliner and an ardent Radiophan, in the carrying out of the experiment. Mr. Wylie had a receiving set which was installed in a drawing room of the Winnipeg-Vancouver train. The aerial on the swiftly-moving train was perfect, Mr. Wylie said on his arrival at the Pacific Coast. In some places the vibration of the train rendered hearing of the concerts exceedingly difficult, but in spite of this, musical selections from Chicago, Minneapolis, San Francisco, Kansas City, and Calgary were heard. From Chicago the music of the Drake Hotel orchestra was heard, while the Naval Band at Frisco playing the soldiers' chorus from Faust was also heard.

Antioch College Station WRAV Opens as Class A

YELLOW SPRINGS, O.—Station WRAV, of Antioch college, this city, recently opened with elaborate dedication services, will broadcast concerts regularly on Wednesday and Sunday evenings. A wave length of 350 meters is used. The station has so far been heard in Ohio, Indiana, Kentucky, Illinois, West Virginia, Pennsylvania and Michigan. The outfit was given to Antioch college by the Rike-Kumler company, of Dayton.

The Week's Advance Broadcast Programs

Tuesday, April 24

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, organist. Cameo Theater; 7:15 P. M., Talk, "The Care of Furs in Summer," C. P. LeCour; 7:45 P. M., Visit to little folks by the Dreamtime Lady; 8:15 P. M., Talk, "Making Good," Louis D. Bliss, Pres., Bliss Electrical School, Washington, D. C.; 8:30 P. M., Concert, Bakule chorus of Czecho Slovakian children, auspices of American Red Cross.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Medical Sy.; Concert, Junior Music Clubs of Southern Calif.; 8:00-9:00 P. M., Concert, Egan School; 10:00-11:00 P. M., Reading, Dr. Frank Nugel of Hollywood Opera Reading Club; Programs of Matinee Musical Club, MacDowell Club and Los Angeles Music Teachers' Assn.

KHJ (Pacific, 400), 8:00-10:00 P. M., Concert, Monrovia Chamber of Commerce.

KSD (Central, 400), 8:00 P. M., Concert, South Side Jazz Orchestra; 8:30 P. M., Vocal selections, Majestic Four; Floraine Mandolin Orchestra.

KYW (Central, 400), 2:35-3:00 P. M., Concert, Lyon & Healy; 8:00-8:58 P. M., Musical program, Lyon & Healy; Dance music, Isham Jones and orchestra.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Eastland Music Club, Eastland, Tex.; 9:10-10:30 P. M., Concert, Harmony Club of Fort Worth.

WBZ (Eastern, 422), 8:00 P. M., Concert, James Clarkson Orchestra, Springfield, Mass.

WDAP (Central, 390), 10:00 P. M., Musical program, Maybelle Crockett Dodds, soprano; Ing.borg Olson, soprano; Hugh B. Marchall, Scotch songs; Englewood High School Orchestra and soloists; Dance music, Jack Chapman's Orchestra.

WFAA (Central, 400), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Recital, Mrs. O. T. Holt, Mrs. Leighton E. Cook and W. H. McRaven; 11:00-12:00 P. M., Musical program under auspices of Sanger Bros.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Recital; 6:30-7:00 P. M., Children's own half hour.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales," by Uncle David; 6:15 P. M., "Iron Trade Review"; 8:30 P. M., Business report, Rogert W. Babson; Instrumental quartet, Ida Maunch, director; Lecture, "King Tut-ank-amen and His Family Tree," John E. Pember, Boston Sunday Herald.

WGR (Eastern, 360), 7:30 P. M., Digest of news; 7:45 P. M., Talk, "Topics of Scientific Interest."

WGY (Eastern, 370), 7:40 P. M., Address, "War on the Gypsy Moth," Alexander MacDonald, Commissioner of New York State Conservation Commission; 7:45 P. M., Radio drama, "Strongheart"; Overture, "Admirals," WGY Instrumental Quartet.

WHAS (Central, 360), 4:00-5:00 P. M., Organ selections, H. C. Conrad at Alamo Theater; Three-minute biography of Old Testament characters; Vocal selections, soprano solos; "Just Among Home Folks," column in Louisville Courier-Journal; 7:30-9:00 P. M., Concert; Reading, "An Interesting Historical Episode"; Setting-up exercises.

WIP (Eastern, 400), 2:00-3:00 P. M., Song recital; 6:00-6:30 P. M., Dinner dance program; 7:00-7:30 P. M., Uncle Wip's bedtime stories and roll call; 7:30 P. M., Talks; 10:10 P. M.-1:00 A. M., Dance music, Charlie Kerr's Orchestra in L'Aiglon Cafe.

WJAX (Eastern, 360), 7:00 P. M., Dance music, Cleveland News.

WJZ (Eastern, 360), 4:05 P. M., "Fashions," from Women's Wear Daily Newspaper; 5:30 P. M., "The Music Lover," Dr. Sigmund Spaeth; 5:45 P. M., "Importance of Retaining Free Shooting in America," John D. Burnham, president of American Game Protective Ass'n, N. Y.; 7:00 P. M., "Peeps at Many Lands" series, courtesy The Macmillan Company; 7:30 P. M., Recital, Mrs. Ed. H. Graves, soprano; Russel B. Kingman, cellist.

WLW (Central, 360), 10:00 P. M., Musical program, Aichele's Novelty Dance Orchestra, with Vocal selections by Marguerite Gertig, "Fate," "Baby Blue Eyes," "Lovin' Sam," "Chicago," "Carolina in the Morning," "Wonderful World of Romance," "In the Garden of My Heart"; Ed. Decker, tenor; Lloyd Brown, accompanist; "Dondino," "Ave Maria," Mitchell Humphrey, violinist; "Irish Love Song," "I Love You Truly," Esther Fairchild; "Andante with Variations," P. H. Danforth and Mitchell Humphrey, violinists; "A Rose in Heaven," "Love's Old Sweet Song," Ed. Decker; Aichele's Orchestra, with Miss Gertig, "Somebody Else," "Old Fashioned Days," "If You Tried," "Why Can't I."

WMAQ (Central, 400), 4:35 P. M., Program by Bush Conservatory of Music; 7:00 P. M., Talk on Foreign Relations, Edward P. Bell; Gardening talk, Mrs. Jean C. Weis; 9:15 P. M., Musical program, Mrs. Jewell M. Lovejoy, soprano; Blanche L. Bonn, pianist.

WMC (Central, 400), 8:00 P. M., Musical program, fifteen artists, arranged by Mrs. G. L. Meyers; 11:00 P. M., Midnight Frolic concert.

WOC (Central, 400), 3:30 P. M., Educational talk, F. C. Walker; 5:45 P. M., Chimes concert.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., Grand organ recital and trumpets.

HERE is the third appearance of this new service for Digest Readers. It has in its third week grown to such a size that the type size had to be decreased. There are only fifty eligible station for the listing, but already twenty-four of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Directory. The following data on the stations for which advance programs are given, may be of help to the listener in:

Call Letters	Owner and Location	Wave Length
KDKA	Westinghouse Co., E. Pittsburgh, Pa.	360
KFI	Earl C. Anthony, Inc., Los Angeles, Calif.	400
KGW	Oregonian, Portland, Ore.	400
KHJ	Times, Los Angeles, Calif.	400
KSD	Post-Dispatch, St. Louis, Mo.	400
KYW	Westinghouse Co., Chicago, Ill.	400
WBAP	Star-Telegram, Ft. Worth, Tex.	400
WBZ	Westinghouse Co., Springfield, Mass.	422
WDAP	Chicago Board of Trade, Chicago, Ill.	390
WFAA	News and Journal, Dallas, Tex.	400
WFI	Strawbridge & Clothier, Philadelphia, Pa.	400
WGI	Am. Radio & Research Corp., Medford, Mass.	360
WGR	Federal Tel. & Tel. Co., Buffalo, N. Y.	400
WGY	General Electric Co., Schenectady, N. Y.	370
WHAS	Courier-Journal and Times, Louisville, Ky.	360
WIP	Gimbel Bros. & Public Ledger, Phila., Pa.	400
WJAX	Union Trust Co., Cleveland, O.	400
WJZ	Westinghouse Co., and R. C. A., Newark, N. J.	360
WLW	Crosley Mfg. Co., Cincinnati, O.	360
WMAQ	Daily News and Fair Store, Chicago, Ill.	400
WMC	Commercial Appeal, Memphis, Tenn.	400
WOC	Palmer School of Chiropractic, Davenport, Ia.	400
WOO	Wanamakers, Philadelphia, Pa.	400
WWJ	News, Detroit, Mich.	400

WWJ (Eastern, 400), 3:00 P. M., Concert, News Orchestra; 8:30 P. M., The Town Crier; News Orchestra; News Male Chorus.

Wednesday, April 25

KDKA (Eastern, 360), 6:15 P. M., Dinner Concert, KDKA Little Symphony Orchestra, Victor Saudek, director; 7:45 P. M., Visit to little folks by the Dreamtime Lady; 8:30 P. M., Concert, KDKA Little Symphony Orchestra, Prelude, "Meistersinger," (Wagner); "Walter Prize Song," from "Die Meistersinger," (Wagner); Quintet from "Die Meistersinger"; Finale from "Die Meistersinger."

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Nick Harris Detective Stories from Pantages Theater Bldg.; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Wa-Wan Club; Vocal selections, Radio Girls Quartet; Program, Musical Optimists.

KGW (Pacific, 400), 3:30-4:00 P. M., Children's Program; Piano selections, Ena Pullin; Stories, Aunt Nell; 8:00-9:00., Concert.

KHJ (Pacific, 400), 8:00-10:00 P. M., Musical program, Artists' Ensemble, The Los Angeles Trio, May MacD. Hope, pianist; Calmon Luboviski, violinist; Ilya Bronson, cellist.

KSD (Central, 400), 8:00 P. M., Concert, Mrs. Frank Howard, mezzo soprano; Mrs. Harriet H. Young, pianist; Mrs. Bessie B. Ricker, reader.

KYW (Central, 400), 8:00-8:58 P. M., Musical program, "The Nightingale's Song," "Where Blossoms Grow," Grace Z. Wallace, soprano; Selections from "Lohengrin," "Humoresque," Paul G. Hummel, pianist; "The Sunshine of Your Smile," "Love Sends a Little Gift of Roses," George Daubach, tenor; "Voices of the Woods," "Beloved, It Is Morn," The Aeolin Quartet; Dance music, Isham Jones and orchestra; "Rose of My Heart," "Sing on," Grace Z. Wallace; Selections from the "Meistersinger," Southern Melodies, Paul G. Hummel; "The World Is Waiting for the Sunrise," "I'm Always Longing for You," George Daubach; "Smilin' Through," "Medley from the South Pike," The Aeolin Quartet.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Parker County Square Dance Orchestra, Weatherford, Tex.; 9:30-10:30 P. M., Concert, Rex Maupin's Original Texas Hotel Orchestra.

WBZ (Eastern, 422), 7:45 P. M., Lecture, "The Value of Sanatorium Treatment in Tuberculosis," Dr. Summer Remmick, Director of Dept. of Public Health; 8:00 P. M., Concert, Tech Banjo Club.

WFAA (Central, 400), 12:30-1:00 P. M., Music from the Melba Theater bill of the week.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue Stratford Orchestra; 3:30-4:15 P. M., Concert to be announced by Radio; 6:30-7:00 P. M., Surprise feature for children; 7:30 P. M., Boy Scout Radio Corp; 8:00-9:55 P. M., Short talk and concert; 10:30-12:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra.

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," by Uncle David; 6:45 P. M., Camp Fire Chat, Eunice L. Randall; Talk, "Scarlet Fever," Henry C. Greene; Concert, Gitana Fabian, mezzo soprano; Telnah Fabian, pianist and reader; Talk on Farm, Garden and Lawn, furnished by Breck's.

WGR (Eastern, 360), 7:30 P. M., Digest of news; 8:00 P. M., Dance music, Dr. Knell's Orchestra, Oscar Witte, director.

WHAS (Central, 360), 4:00-5:00 P. M., Organ selections, M. C. Conrad at Alamo Theater; Three-minute biography of Old Testament characters. "Darius the Great," W. H. Wakefield, Lewisburg, Tenn.; Vocal selections, Katherine Gunther, soprano; "Just Among Home Folks," column in Louisville Courier-Journal; 7:30-9:00 P. M., Concert, Louisville Rotary Club, Robt. Montgomery, director; Address, Jas. H. Richmond, Rotary Club district governor; Vocal selections, Mrs. Newton G. Crawford, soprano; Mrs. Geo. T. Settle, contralto; Reginald W. Billin, baritone; Violin solos, J. T. Johnson, Jr.; Recitation, Nathan P. Bloom; Piano solos, Wilton Torstegge; Humorous address, Julius H. Ellis; Old folk melodies, on ocharina, Jos. T. Burge; Original verse, Chas. G. Harris; Mandolin solos, Harry G. Talmini; Piano accompanist, Carl Shackelton; Setting-up exercises.

WJAX (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories and roll call.

WJZ (Eastern, 360), 6:00 P. M., Musical program; 7:00 P. M., "Animal Bedtime Stories," Florence S. Vincent; 9:00 P. M., "Foods for Health and Pleasure," and "How the Lean Should Live," Anne L. Pierce; 9:15 P. M., Talk, "The Importance of Impurities," Dr. Jerome Alexander; 9:30 P. M., Concert, Laura Combs, soprano; Lucille Colett, violinist.

WLW (Central, 360), 8:00 P. M., "A Half Hour of Happiness for Children" Dance music, Tull's Varsity Orchestra, "Love Was Once a Little Boy," "Swing Along," "Kentucky Babe," "Little Tommy Went A-fishing," "Sweet and Low"; Vocal selections, Cincinnati Conservatory of Music Male Quartet.

WMAQ (Central, 400), 4:35 P. M., Program by Cosmopolitan School of Music and Dramatic Art; 7:00 P. M., Stories, Georgene Faulkner; 9:15 P. M., American Legion program, talk by Rev. Martin Luther Thomas.

WOC (Central, 400), 3:30 P. M., Educational talk, D. K. Kirk; 6:35 P. M., Sandman's visit; 7:00 P. M., Pipe organ concert, Erwin Swindell; Ted Sloat, baritone; 8:00 P. M., Lecture, commemorating 25th Anniversary Spanish-American War, Rev. W. J. Ferris; 10:00 P. M., Concert, J. E. Zimmerman Orchestra, Davenport, Ia.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., organ recital and trumpets.

WWJ (Eastern, 400), 3:00 P. M., Concert, News Orchestra; 8:30 P. M., The Town Crier; News Orchestra; Vocal selections, First National Bank of Detroit.

Thursday, April 26

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. R. Webb, organist, Cameo Theater; 7:45 P. M., Visit to little folks by Dreamtime Lady; 8:15 P. M., Shakespearean drama, "The Taming of the Shrew," School of Drama from Carnegie Institute of Technology.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Program, Y. M. C. A.; 8:00-9:00 P. M., Concert, Sherwood Music School; 10:00-11:00 P. M., Vocal selections, Hollywood Girls Quartette; Los Angeles Oratorio Sy.; First Congregational Church Choir; Instrumental music, Geo. J. Birkel Co.

KHJ (Pacific, 400), 8:00-10:00 P. M., Musical program, Southern Pacific Company's Band.

(Continued on page 6)

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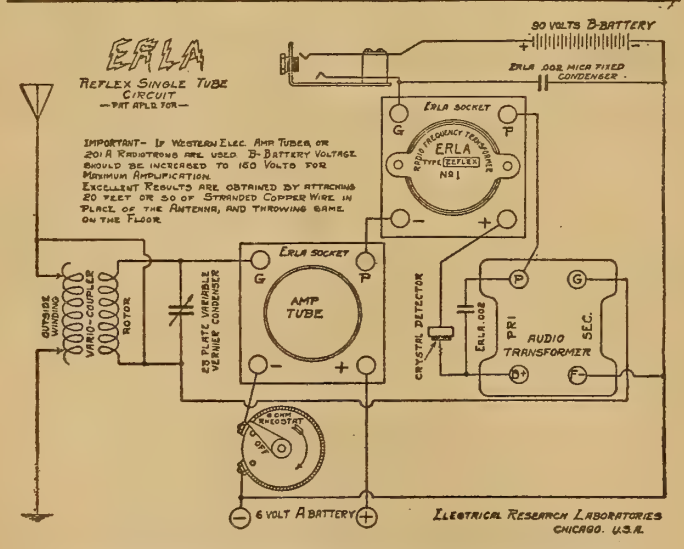

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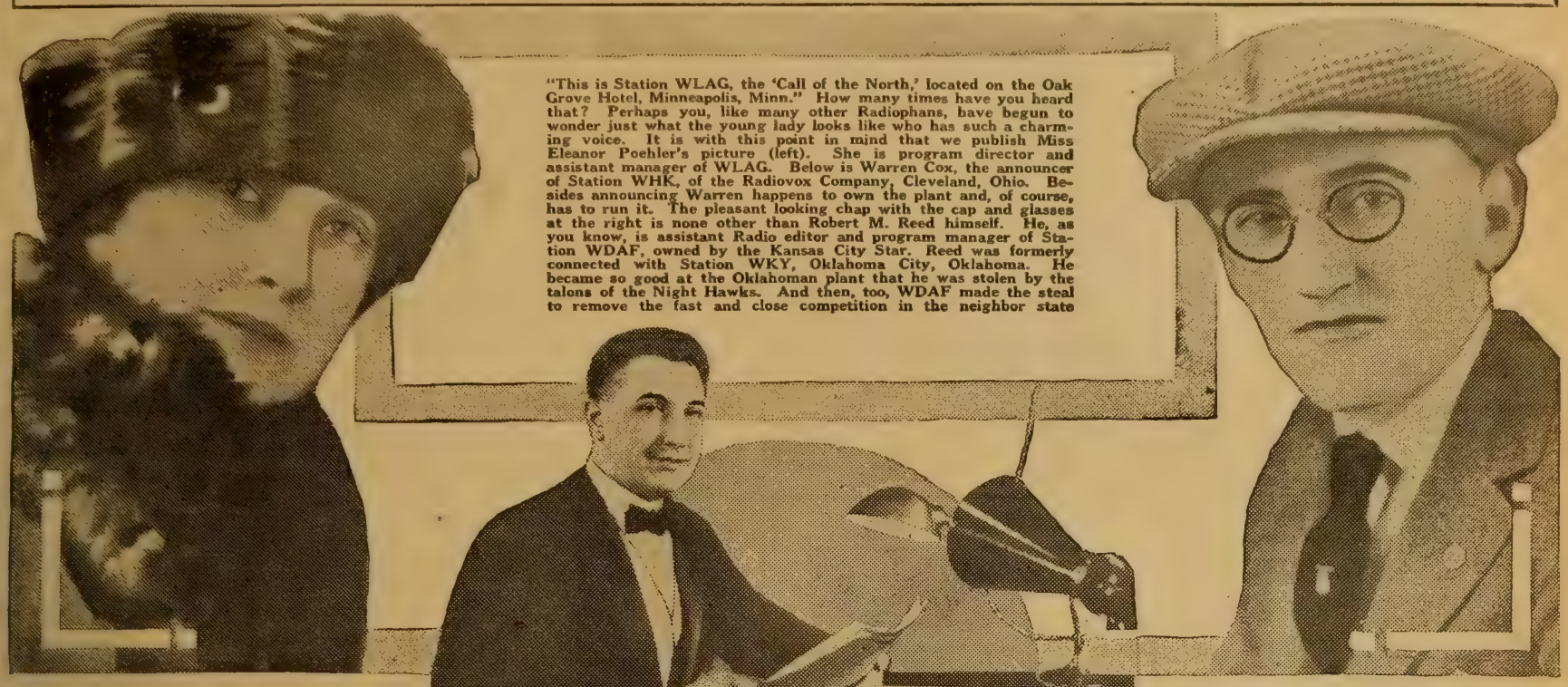


"This is Station WLAG, the 'Call of the North,' located on the Oak Grove Hotel, Minneapolis, Minn." How many times have you heard that? Perhaps you, like many other Radiophans, have begun to wonder just what the young lady looks like who has such a charming voice. It is with this point in mind that we publish Miss Eleanor Poehler's picture (left). She is program director and assistant manager of WLAG. Below is Warren Cox, the announcer of Station WHK, of the Radiovox Company, Cleveland, Ohio. Besides announcing Warren happens to own the plant and, of course, has to run it. The pleasant looking chap with the cap and glasses at the right is none other than Robert M. Reed himself. He, as you know, is assistant Radio editor and program manager of Station WDAF, owned by the Kansas City Star. Reed was formerly connected with Station WKY, Oklahoma City, Oklahoma. He became so good at the Oklahoman plant that he was stolen by the talons of the Night Hawks. And then, too, WDAF made the steal to remove the fast and close competition in the neighbor state

ARCTIC EXPLORER TO HAVE AIRPHONE

PLANS TO LISTEN IN FROM FROZEN LANDS

Crew of Seven Men to Chat with Chicago Stations from Near North Pole

BOSTON, MASS. — Donald MacMillan, the Arctic explorer, is planning to take a powerful Radio receiving and transmitting outfit with his expedition on the ship Bowdoin, next summer. No matter how far North the party penetrates, the receiving part of the outfit at least will go with them, and while they are sitting inside their snow igloos in the frozen North, they can be listening to the latest jazz broadcasts from civilization.

Not only will the explorer's ship be equipped with a powerful receiving set, but it is planned to have a powerful sending set also, and there will be daily chats between the Bowdoin, which sails from Eastport, Me., about the middle of next June and the Chicago broadcasting station at the Edgewater Beach hotel. E. F. McDonald, a millionaire Chicago Radiophan, is now on his way to Maine to oversee the installing of apparatus on the Bowdoin while she is in winter quarters.

Novelty for Esquimos

Radiophans will be asked to "stand by" each night for the voice of MacMillan from the Arctic. It is believed that he may be received better in some parts of the country than in others, owing to various forms of interference.

"If we have the same experience with the Eskimos regarding Radio that we did with the regular wire telephone, it will be interesting and amusing," said Mr. MacMillan. I found one Eskimo at one end of the wire. He would yell and then run to the other end of the wire to try to hear the sound of his own voice. When I caught up with him he explained gravely that it could not be done. There was no hole in the wire."

The next expedition will have a crew of seven men abroad, to go within 720 miles of the pole. Five phonographs will be taken, one to be given to each of the Eskimo tribes. Two thousand pounds of pemmican, a highly concentrated food, will be taken along to avoid any possible food shortage ashore.

Build $250,000 Terminal

MIAMI, FLA.—The Tropical Radio Telegraph Company, affiliated with the United Fruit Company, is building a huge Radio terminal, said to be the second largest in the United States, at Hialeah, Fla., near here. Construction was started recently. The plant is to handle the South American, Central American and West Indian business of the company, and will cost about $250,000. The towers will be 437 feet high and have a span of 1,050 feet.

Germany has a public Radiophone service with subscribers in 176 cities and towns.

Eleanor Poehler Good as Director of Station WLAG; "The Call of the North"

Woman Who Arranges All Programs for Minneapolis Plant Receives Variety of Presents from Male Listeners in Including Flowers and Sausages—Is Professional Musician

By Vera Bray Shipman

This is the Minneapolis Station WLAG, the Call of the North. There is a woman in Radio at WLAG. Eleanor Poehler, a professional musician, a soprano of distinction, is especially well equipped for her service to the Radiophans, as program director.

WLAG is operated by the Cutting and Washington Radio Corporation, on the Oak Grove Hotel, and is supported by the following business organizations of Minneapolis: the Northwest Farmstead; L. S. Donaldson Company; E. E. Atkinson and Company; The Northwestern National Bank; The Minnesota Loan and Trust Company; The Purity Baking Company; Powers Mercantile Company; Sterling Electric Company; and the Findley Electric Company.

Get Woman Director

When the business men contemplated opening Station WLAG they sought for a man to direct the programs. But there was none available. They turned to the women's clubs for suggestions for the next best thing, a woman. And a most remarkable thing happened. Three different women recommended Eleanor Poehler, and here she is.

Officially they call her associate manager. Her carefully directed programs are heard each night, far reaching even to Hawaii, where one entire program was received.

Truly a woman, she might tell her age so long as the Digest is in Chicago and she in Minneapolis, but WE shall not tell. We might want a like favor some time.

Receives Varied Presents

Eleanor Poehler (she never signs herself Mrs.) early widowed, has one son upon whom she dotes. Alarm clocks are her pet aversion. They never catch HER napping. Flowers of every kind she loves.

"If I had money enough I'd have a bunch for every dress.

"Men? Politics?

"The Radio business keeps me too busy to be seriously interested in either. I have of course interesting letters from male fans. The gifts they send me are mostly candy and sausage."

Mixed romance?

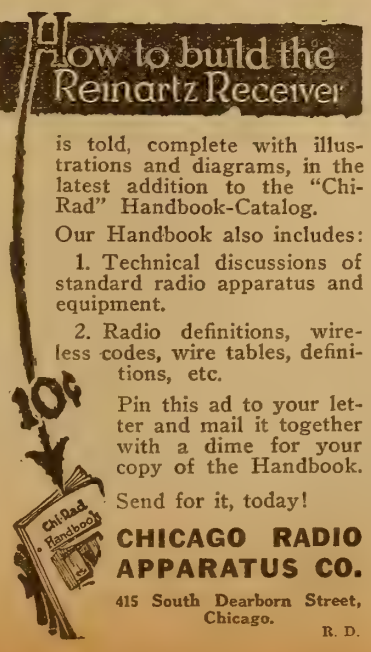
A native of Minneapolis, Eleanor Poehler's wide acquaintance and good musicianship combine to best advantage in Radio for WLAG. It takes brains to direct Radio broadcasting programs and WLAG is fortunate in having its director filling all requirements.

The ringing of three silver chimes announces programs from KFI.

Dr. Hund Gets Appointment

WASHINGTON, D. C.—The Department of Commerce has announced that Dr. August Hund of Berkely, Cal., has been appointed as Electrical Engineer of the Radio Section of the Bureau of Standards. Dr. Hund graduated from the Technische Hochschule, Carlsruhe, in 1911 and took the degree of Doctor of Engineering in 1913.

One young woman who has made a marked success of broadcasting readings has been given the graceful title of "The girl with the voice with a Radio smile."



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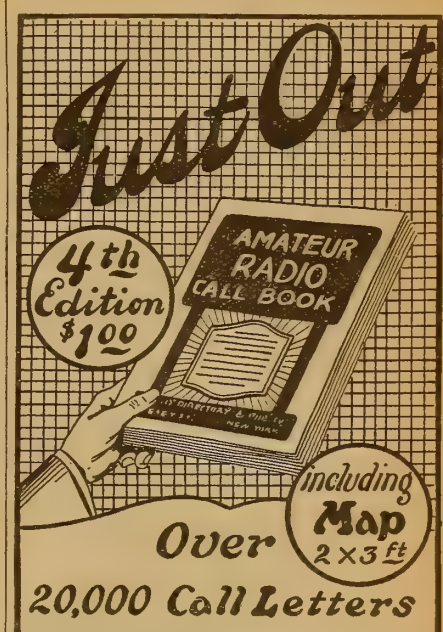

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AMATEUR RADIO CALL BOOK

THE ANTENNA BROTHERS Spir L. and Lew P. A Real Aerial Act

ADVANCE PROGRAMS

(Continued from page 4)

KYW (Central, 400), 8:00-9:50 P. M., Musical program, "So Fair a Flower," "Coming Home," "There Is No Death," "Come to the Fair," Dolly Wade, soprano, Sallie Menkes accompanist; Dance music, Isham Jones and orchestra; 9:05 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. D., Head of Dept. of English, Loyola University.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, North Ft. Worth High School Orchestra and Glee Club; 9:30-10:30 P. M., Concert, Baptist Sunday School Orchestra, Abilene, Tex.

WBZ (Eastern, 422), 8:00 P. M., Concert, Willimansett Minstrel Club.

WDAP (Central, 390), 10:00 P. M., Program by "Sun Dodgers Club"; Dance music, Jack Chapman's Orchestra.

WFAA (Central, 400), 12:30-1:00 P. M., Address, Judge E. B. Muse, on Texas Republic; 8:30-9:30 P. M., Program of music, readings and address, Mrs. J. Yancey Fincher and pupils; 11:00-12:00 P. M., Musical program under auspices of D. L. Whittle Music Co.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Song Recital; 6:30-7:00 P. M., Children's Own Half Hour, Stories by Cousin Sue.

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," by Uncle David; 9:30 P. M., Talk, "Romance of the Shoe," Harry M. Wood; Concert, Deschamps Orchestra.

WGR (Eastern, 360), 7:30 P. M., Digest of news; 7:45 P. M., Boy Scout program; Industrial employment news.

WGY (Eastern, 370), 7:45 P. M., Concert, American Locomotive Company Band, Joseph Konicek, director; Overture, "Mignonette," Band; "Faded Love Letters," John O'Rourke, tenor; "The Butterfly," Band; "A May Morning," Gladys J. Hayner, soprano; Suite, "Atlantis, the Lost Continent" 1. "Nocturne and Morning Hymn of Praise," 2. "A Court Function." 3. "I Love Thee." 4. "The Destruction of Atlantis." Band; Address, "The Broadcast Listeners' Antenna," R. H. Langley; "The Bugler," Mortimer L. Moore, bass; "American Patrol," Band; "Slave Song," "The Scarecrow," Gladys J. Hayner; "Old Timers," Band; "Wonderful World of Romance," "John O'Rourke; "Home Sweet Home the World Over," Band; "The Japanese Love Song," "April, My April," Gladys J. Hayner; "American Legion March," Band.

WHAS (Central 360), 4:00-5:00 P. M., Organ selections; H. C. Conrad at Alamo Theater; Three-minute biography of Old Testament characters. "Zerxes"; Vocal selections, Ruth Cartwright, mezzo soprano, Hazel McClellan, soprano; "Just Among Home Folks," column in Louisville Courier-Journal; 7:30-9:00 P. M., Dance concert, Shawnee Terrace Dance Combination; Three-minute digest of International Sunday School lesson, Sunday, April 29; Child welfare talk; Reading, "An Interesting Historical Episode"; Setting-up exercises.

WIP (Eastern, 400), 1:00-1:15 P. M., Talk on Selection and Preparation of the Practical Home Garden; 2:00-3:00 P. M., Artist recital; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories and roll call.

WJAX (Eastern, 360), 6:30-7:30 P. M., Concert, Cleveland Hotel Orchestra; 8:00 P. M., Concert, Music Dep't. Cleveland, Federation of Women's Clubs, and Cleveland Institute Quartet; "Life." "A Mountain Madrigal," " 'Twas April," "Before the Daybreak," "Firefly Fairies," Federation Chorus, Mrs. Zoe Long Fouts, conducting, Mrs. J. E. Hikes, accompanist. Violin solos, Etude for two violins, second violin, Quincy Porter; Berceuse for violin alone, Milon de Ribaupierre; Polonaise, Andre de Ribaupierre. Choral numbers, "By Moonlight" and "Narcissus," violin obligatos by Quincy Porter; "Land of Illusion," "The Wind on the Wold," "In the Red April Dawn," "All in a Garden Green," "This is a World of Gladness." "Prelude," Jean Binet; "Bagatelle," Roger Sessions; Ukranian Folk-song, "The Virgin of Potchair," Quincy Porter; Variations in D Minor, "Cavatina" from B flat Major Quartet, Finale from D Major Quartet, Cleveland String Quartet.

WJZ (Eastern, 360), 7:00 P. M., "Jack Rabbit Stories," David Cory; 8:30 P. M., "Old English Sheep Dogs," Frank F. Dole; 8:45 P. M., Recital, Helen S. Donovan, violinist; 9:30 P. M., Recital, Anna Todoto, soprano; Pasquole Romano, baritone, Anna Pinto, harpist.

WLW (Central, 360), 10:00 P. M., Musical program, "The Fresh Paint Orchestra," University of Cincinnati; "Farewell," "Dark Eyes Tender," Marjorie Wilson, contralto; "Calm as the Night," Mrs. H. Morris, cellist; "Silver Threads Among the Gold," "Somewhere a Voice is Calling," "A Perfect Day," Mrs. H. Morris, cellist; Ruth Draper, pianist, Corrine L. Sims, soprano, "Annie Laurie," "Old Folks at Home," Corrine L. Sims; Dance music, Hotel Sinton Dance Orchestra.

WMAQ (Central, 400), 4:35 P. M., Program by Lyceum Arts Conservatory; 7:00 P. M., Talk for Boy Scouts; Gardening talk, Mrs. J. C. Weis; "Supply and Demand," H. W. Graham, reader; Talk, "Interesting Auto Trails," Rockwell Stephens; 9:15 P.M., Program by Richard De Young and Hayden Trio.

WMC (Central, 400), 8:00 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 400), 3:30 P. M., Educational Talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:35 P. M., Sandman's visit; 7:00 P. M., Musical program, Erwin Swindell, musical director. Old-Time Fiddlers' Contest; 8:00 P. M., Lecture, "Citizens' Military Training Camps," by Capt. D. D. Dewey, Q. M. Department, Officers' Reserve Corps, U. S. A.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., Organ and trumpets; 7:50-9:00 P. M., WOO Orchestra, Robert E. Golden, director and violin soloist; 9:00-9:55 P. M., Grand organ recital, Miss Mary E. Vogt at the console.

WWJ (Western, 400), 3:30 P. M., Concert, Detroit News Orchestra; 8:30 P. M., The Town Crier; The Detroit News Orchestra; Loretta A. Haas, soprano; Joe Qualters, tenor; E. Laccohee, one string violinist; 11:00 P. M., Detroit News Orchestra; Joe Qualters, tenor; E. Laccohee, one string violinist.

Friday, April 27

KDKA (Eastern, 360), 6:15 P. M., Dinner concert. Trio of KDKA Little Symphony Orchestra; 7:15 P. M., "Why I Hold on to My Illusions," as answered in Rostand's "Chanticler," Miss Marjory Stewart; 7:45 P. M., Visit of the Dreamtime Lady; 8:30 P. M., Concert, King Haw Entertainers, assisted by trio of KDKA Orchestra.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Public School Music Teachers Ass'n.; Male chorus, 100 voices, Orpheus Club; Dominant Club; California Federation of Music Clubs.

KGW (Pacific, 400), 7:00-7:30 P. M., University of Oregon Extension Course Lecture; 8:00-8:15 P. M., Vocal selections; 8:15-9:00 P. M., Concert, George Olsen's Portland Hotel Orchestra; 11:00-12:00 P. M., Meeting of Hoot Owls.

KHJ (Pacific, 400), 8:00-10:00 P. M., Musical program, Conservatory of Music, University of Southern California.

KSD (Central, 400), 8:00 P. M., Concert, Thaleta Kronsbein, contralto; Hartzel Lyon, baritone; Mathilda Earickson, soprano; Miss McGregor, contralto; Miss DeVoltine, pianist; 11:30 P. M., Vocal selections, Bertha M. Donnelly, soprano, Mrs. George Lamke, accompanist.

KYW (Central, 400), 8:00-8:58 P. M., Musical program, arranged by Inland Elec. Co., Isham Jones and orchestra; 9:05 P. M., Book review, Llewellyn Jones.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, C. B. Brooks and family of the Southwestern Baptist Seminary, Fort Worth, Tex.; 9:30-10:30 P. M., Bi-monthly Radio concert, Texas Christian University.

WBZ (Eastern, 422), 7:45 P. M., Talk, "The Necessity of Keeping Good Records," Thomas McCarry; 8:00 P. M., Recital, Edith Nowill, soprano.

WFAA (Central, 400), 12:30-1:00 P. M., Address, Dr. Robert S. Hyer, Southern Methodist University, on Sunday school lesson; 8:30-9:30 P. M., Varied program, Edith Beilharz, violinist.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Music recital and talk; 6:30-7:00 P. M., Children's own half hour with Cousin Sue.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club, Address, Miss D. H. Goodwin; Talk, Ruth E. Newman; 5:00 P. M., Girl's story hour, Eunice L. Randall; 9:30 P. M., Travelogue, David M. Cheney; Shakespearean comedy, "The Twelfth Night," Amrad players.

WGR (Eastern, 360), 7:30 P. M., Digest of news; 8:00 P. M., Program, Buffalo Community Chorus, Address, "Motoring Preparedness," F. C. Edwards.

WGY (Eastern, 370), 2:00 P. M., Talk, "The Child in the Home," Mrs. E. P. Pressey; 6:30 P. M., Talk for children; 7:40 P. M., Talk, "Insects and Diseases." Dr. E. P. Felt; 7:45 P. M., Concert, Commercial Bank Club of National Commercial Bank and Trust Co., Albany, N. Y.; "On Parade," bank orchestra; "The Winter Song," bank quartet; "Tommy Lad," Thomas G. Kenny, tenor; "One Little Word," De Rose Orchestra; "Something from the Old Days," Jacob H. Herzog, reader; "The Day is Ended," Godfrey J. Smith, baritone; "Meditation," Willis S. Reynolds, violinist; "Laborers Night Song," quartet; "In Maytime," orchestra; "The Barefoot Trail," T. Reed Vreeland, tenor; Address, "Modern Banking," Jacob H. Herzog; "The Parting Rose," quartet; "Other Lips," orchestra; "The Two Grenadiers," Leo K. Fox, baritone; Violin duet, "Meditation Relegioso," Willis S. Reynolds and Peter Van Deloo; "De Little Sunflower Coon," quartet; "Who Cares," orchestra; 10:30 P. M., Musical program, selection from "You're in Love," WGY Orchestra; "Valse Bluette," Edward Rice, violinst; Comedy talk, "The Income Tax Collector"; "By the Side of a Streamlet," orchestra; "Elegie," Ernest Burleigh, cellist; Selection from "Maytime," orchestra; "Scene de Ballet," orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Organ selections, H. C. Conrad at Alamo Theatre; Three-minute biography of Old Testament characters. "Esther," by J. A. Buck, Stuart, Okla.; "Just Among Home Folks," column in Louisville Courier-Journal; 7:30-9:00 P. M., Vocal selections, Genevieve Tims, soprano, Carl G. Herder, Jr., tenor, Sara Gilmore, soprano; Reading, Mirion Broughton; Vocal selections, Mary Waechter, soprano; Piano solos, Helen I. Mitchell, New Albany, Ind.; Vocal selections, Rose Boden, soprano; Saxophone solos, Robert Seaton; Reading, "An Interesting Historical Episode"; Setting-up exercises.

WIP (Eastern, 400), 2:00 to 3:00 P. M., Miscellaneous musical program; 6:00 to 6:30 P. M., Dinner dance music; 7:00 to 7:30 P. M., Uncle Wip's bedtime stories and roll call.

WJZ (Eastern, 360), 8:00 P. M., Recital, Mme. Ama W. Powell, soprano; 8:30 P. M., Literary talk, Outlook and Harper Bros.; 9:00 P. M., Concert, Maplewood, N. J., Ladies' Quartet; 9:15 P. M., "Daylight Savings," Marcus Marks, Pres. of National Daylight Ass'n. of New York City; 9:25 P. M., Concert, Symphony Mandolin Orchestra of Jersey City.

WMAQ (Central, 400), 4:35 P. M., Program by Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Marx Oberdorfer; 9:15 P. M., Czecho Slovakian program; Anna Lukesova, soprano; Talk, Dr. Smetanka, consul.

WMC (Central, 400), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gasper Pappalardo, director; 11:00 P. M., Midnight Frolic concert.

WOC (Central, 400), 3:30 P. M., Educational talk, C. C. Flanagan; 5:45 P. M., Chimes concert; 6:35 P. M., Sandman's visit; 7:00 P. M., Concert, P. S. C. Orchestra; 8:00 P. M., Lecture, "Improved Order of Red Men," by Great Incohonee, John E. Sedwick.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., Organ recital and trumpets.

WWJ (Eastern, 400), 3:00 P. M., Concert, News Orchestra; 8:30 P. M., The Town Crier; News poet; News Orchestra; Vocal selections, pupils of Marcus Kellerman.

Saturday, April 28

KDKA (Eastern, 360), 6:00 P. M., Organ recital, H. B. Webb, organist, Cameo Theater, Pittsburgh, Pa.; "One Day Trip by Automobile," Pittsburgh Automobile Club; 7:15 P. M., Talk, J. L. Ray; 7:30 P. M., Talk to Boys; 7:45 P. M., Visit of the Dreamtime Lady; 8:15 P. M., "Spring House Cleaning Your Automobile," Ray McNamara; 8:30 P. M., Minstrel show by Men's Glee Club of Calvary Presbyterian Church, Braddock, Pa., Evan H. Lloyd, director.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Dental Sy.; Concert, Junior Music Clubs of Southern Calif.; 8:00-9:00 P. M., Program, University of Southern Calif.; 10:00-11:00 P. M., Vocal selections, Packard Radio Club, Harry Coe, Ben McLaughlin, Leonard Van Berg.

KGW (Pacific, 400), 3:30-4:00 P. M., Children's program; Piano Selections, Mary Harney; Stories, Aunt Nell.

KSD (Central, 400), 8:00 P. M., Musical program, DeMartini Sisters; 8:40 P. M., Vocal selections, Manon D. Methudy, contralto, May Langefort, pianist.

KYW (Central, 400), 8:00-9:00 P. M., Musical program; "I Hear a Thrush at Eve," "Elysium," Louise Joyner, soprano; Popular selections, Aarseth's Bealart Syncopators; "Bird of Love Divine," "Capricious Shepherd Maid," Charles W. Green, tenor; Dance music, Isham Jones and orchestra; "The Old Love," "Sing Me Love's Lullaby," Louise Joyner; "Mary of Allendale," "Hurrah for Maggie O'Grady," C. W. Green; 9:05-9:25 P. M., "Under the Evening Lamp," by Youth's Companion.

WBAP (Central, 400), 6:30-6:45 P. M., Sunday school lesson, Mrs. W. F. Barnum, leader of Barnum Bible Class, First Methodist Church.

WBZ (Eastern, 422), 7:45 P. M., "Under the Evening Lamp," by Youth's Companion; 8:00 P. M., Concert.

WDAP (Central, 390), 10:00 P. M., Musical program, Harrison High School Bank and soloists, James C. Goss, Basso, Ray G. Zender, Baritone; Dance music, Jack Chapman's Orchestra.

WFAA (Central, 400), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University, on Current History Comment; 8:30-9:30 P. M., Music and readings, arranged by Texas Poets' Ass'n; 11:00-12:00 P. M., Concert, Old Mill Theater Orchestra, Don Albert, conductor.

(Continued on page 9)

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Rosalind Lunceford, dubbed "Radio's Mary Pickford" by the many admirers in WSB's circle of listeners, is so successful in emulating a tiny tot when telling of the adventures of "L'il Red Ridin' Hood" and other nursery classics that many listeners are reluctant to believe this popular reader of the Atlanta Journal is quite a dignified and grown-up exponent of the dramatic art. Two of her most ardent followers are shown. These two lucky youngsters live in the first Radio apartment house to be built. It is located in Newark, N. J., and all guests are given Radio service by simply plugging receivers in a wall socket in whatever room they may be

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DR. WINSLOW AIDS DEAF BY AIRPHONE

NEW EXPERIMENTS PROVE PRACTICABILITY

Noted Specialist to Give Special Demonstrations at Clinics Within Next Few Weeks

By Lenore Stuart

Dr. Paul V. Winslow, an eminent New York specialist in nose, ear and and throat surgery, announced last week that deafness can be cured by means of Radio. Dr. Winslow bases his announcement on the results of several experiments performed by him. He states that he has given the Radio treatment successfully to a number of his patients who were afflicted with deafness.

Dr. Winslow has long been noted for his cures of deafness. Heretofore he has relieved thousands by his methods of surgery alone; but with the introduction of Radio he believes that there will come a revolution in the science as it has been practiced up to this time.

Listening in Plus Surgery

Dr. Winslow's formula is a simple one. He has equipped his office with a Radio receiving set, and as a preliminary treatment to his cure of deafness he gives his patients a prescribed course of "listening on the Radio." This is followed by a simple surgical operation. The first treatment is a complement to the second, and by this judicious combination of Radio and surgery he claims to effect a complete cure for deafness, providing it has not gone beyond the catarrhal stage.

According to Dr. Winslow the receiving apparatus has a stimulating effect on the vibratory nerves of the ear; it reawakens and reanimates the dormant sensibilities, so that by the use of this preliminary treatment the subsequent surgical operation is rendered surprisingly simple, completely restoring the impaired facilities of the auditory regions. Many cases, until now considered incurable, have shown surprising results upon undergoing the combined treatments. The doctor states that in the more severe cases surgery is at the present time a necessary adjunct to the Radio, but by further experiment he hopes soon to entirely eliminate the use of his surgical methods in curing deafness.

To Give Clinics

Several clinical demonstrations of the curing of deafness by Radio are to be given by Dr. Winslow within the next few weeks. He has also arranged special demonstrations before certain of the more prominent members of his profession for the purpose of proving to them that his theory regarding the use of Radio is practical and will produce the results he claims for it.

The hundreds of cures to Dr. Winslow's credit together with his unequivocal endorsement of the Radio as an ever increasing aid in his work open the way to a myriad of novel uses of Radio. Until now it has been considered, for the most part, an entertaining factor in life with the addition of possible educational values, but with Dr. Winslow's theory substantiated, Radio must become a unique and separate element in the vanguard of the ever growing crusade for the physical welfare of the nation.

Toronto Fans to Join Trust Fight

Experimenters Club of Canada Holds Out on Offers Made by Manufacturing Concerns

By Albert H. Munday

TORONTO, ONT.—What is being termed as the greatest blow ever sustained by the Radio trust has been launched here. It is the formation of what is to be known as the Experimenters Radio Club of Canada, and is the first of its kind in Canada. The chief aim of the new organization is to help the Radiophan in every way, and it is the contention of the officers of the club that in order to render help, the "bugbear" of the big trusts must be eliminated.

The new association, after having been organized only three days, had a membership of over one thousand members. This number is increasing every day. It is expected that within the next month every Radiophan in Canada will be a member. In this way the new organization will have practically complete control of the Radio industry in Canada.

Sells Apparatus at Low Price

The force of the blow that has been aimed at the big trusts is already being felt. This is borne out in the statement that many influential persons, and officials of large manufacturing concerns, have made a point of getting in touch with the officials of the club, and have asked them to meet them and discuss matters that will interest both the organization and the Radio trusts. But the new club is standing its ground and gaining strength with every move.

All Radiophans are eligible to join the club and are charged a nominal fee of one dollar, but they are entitled to a service, that, it is stated, will revolutionize the science in Canada. There is a sales department which sells all goods at the lowest possible price. In fact goods have been sold so low during the first three days of the club's organization that many manufacturers have phoned to the secretary and other officers asking them to supply them.

Broadcast Robin Hood

SAN FRANCISCO, CALIF.—A complete "Robin Hood" program was broadcast here recently by Station KPO, the Hale Bros. Company plant. Douglas Fairbanks gave permission for the broadcast, rights for which he owns.

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Broadcast Results in Applications from All Parts of United States

BUFFALO, N. Y.—V. A. Zimmer, superintendent in charge of the Buffalo office of the New York State Employment Bureau, is meeting with considerable success in obtaining men for local jobs by Radio.

Once a week a general survey of the employment situation and list of the jobs open in Buffalo is broadcast by Radio from Station WGR of the Federal Telephone and Telegraph Company. So far as is known, Buffalo is the first city to attempt filling positions in this manner.

Although it is difficult to check up the actual results of the work, Mr. Zimmer says that recently he has been receiving applications from all parts of the world.

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(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAJ, Boston, Mass. 50 mi. Eastern Radio Inst. Tues, 10-11 pm. Thurs, 8:30-9:30 pm. Sat, 7-8 pm, music. Eastern.

WAAK, Milwaukee, Wis. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 300 mi. I. R. Nelson Co. Daily ex Sun, 11-11:55 am, 3-4 pm, music. Wed, 7:30-8 pm, code instruction; 8-9, special program. Eastern.

WAAN, Columbia, Mo. Univ. of Mo.

WAAP, Wichita, Kan. 485 also. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAW, Omaha, Neb. 485 also. 500 Omaha Grain Exchange. Daily ex Sun, 9:45 am, 10:45, 11:45, 12:45 pm, 1:20, 8, market reports; 8:15-9 pm, music. Central.

WAAY, Youngstown, O. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat, 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 400 and 485 only. 1,500 mi. Fort Worth Star-Telegram. Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 3-3:30, 3:45-4, markets; 5:30-5:45, 6:30-6:45, sports. Daily ex Sat, Sun, 7:15-8 pm, 9:30-10:30, concerts. Sat, 6:30-6:45 pm, bible lesson. Sun, 11 am-12:15 pm, church; 3:30-4:30, concert. Central.

WBAU, Hamilton, O. Republican Pub. Co.

WBAV, Columbus, O. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 200 mi. T & H Radio Co. Wed, Fri, 10-11 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 485 also. 1200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, Fri, 8:30 pm, music. Sun, 7:30 pm, church services. Eastern.

WBU, Chicago, Ill. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central.

WBZ, Springfield, Mass. 422 only. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. Temporarily discontinued.

WCAC, Fort Smith, Ark. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 200, 480 also. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 400 only. Kaufman & Baer Co.

WCAF, Rodgers, Mich. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thur, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAI, San Antonio, Tex. Southern Equipment Co.

WCAJ, Univ. Place, Nebr. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 500 mi. Dept. of Physics, St Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAR, San Antonio, Tex. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 8:30-10 pm, music, lectures. Mon, Wed, Thurs, Fri, 5:30-6 pm, code instruction. Central.

WCAT, Rapid City, S. D. 485 also 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 m, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 485 also. 500 mi. Durham & Co., Inc. Daily ex Sun, 11:15 am-12:15 pm, 1-1:30, 2:15-3, 5-6, reports, music. Mon, Thurs, 6:30-8 pm, music. Tues, Fri, 8-10 pm, concert. Thurs, 9-11:30 pm, music. Sun, 11:15 am-12:15 pm, reports, business sermon; 1-1:30, markets. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 485 also. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 485 also. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAZ, Carthage, Ill. Carthage College.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 485 also. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program irregular. Eastern.

WCX, Detroit, Mich. 400 and 485 only. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 485 also. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 485 also. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 400 and 485 only. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Tex. Trinity Methodist Church South.

WDAI, Syracuse, N. Y. 485 also. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert.

WDAJ, College Park, Ga. 485 also. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Central.

WDAK, Hartford, Conn. 150 mi. Hartford Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 485 also. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAR, Philadelphia, Pa. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-1:50 pm, industrial reports; 7:45-10 pm, music. Sun, 10:30-12 am, 5-6 pm, church services. Eastern.

WDAX, Centerville, Iowa. 500 mi. First Nat'l. Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 485 also. 300 mi. Fargo Radio Service Co. Daily ex Sun, 9:30 am, weather. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church service; 4-5 pm, music. Central.

WDM, Washington, D. C. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York, N. Y. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 100 mi. James L. Bush. Daily ex Sun, every half hour, 9:30 am-1:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 485 also. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8, music; 8:35, markets; 9:45, weather. Fri, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAD, Atwood, Kan. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 400 only. 1,500 mi. A. T. & T. Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nichols-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 485 also. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermillion, S. D. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 485 also. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern.

WEAO, Columbus, O. 375, 485 also. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 485 also. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 485 also. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thur, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2 pm, reports, markets, news. Mon, Wed, Fri, 8:30 pm, concert. Sun eve, church service. Central.

WEAV, Rushville, Nebr. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. 1,500 mi. Will Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 485 also. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 485 also. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2 pm, reports. Central.

WEY, Wichita, Kan. 485 also. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 400 and 485 only. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:30-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAF, Poughkeepsie, N. Y. H. C. Spratley Radio Co. Temporarily discontinued.

WFAG, Waterford, N. Y. 340 only. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAN, Hutchinson, Minn. Hutchinson Elec. Service Co.

WFAM, St. Cloud, Minn. 485 also. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 485 also. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri, 11 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 485 also. 300 mi. Univ. of Nebr. Daily ex Sun, 10:00 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAY, Lincoln, Nebr. Nebr. Wesleyan Univ.

WGV, New Orleans, La. 500 mi. Interstate Elec. Co. Mon, Wed, Sat, 8-9 pm, music, talks; 12-1 mid., music. Central.

WFAZ, Charleston, S. C. 485 also. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 400 and 485 only. 1,000 mi. Strawbridge & Clothier. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evening, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital; 7:30 church services. Eastern.

WGAB, Houston, Tex. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAF, Tulsa, Okla. Goller Radio Service.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAK, Macon, Ga. Macon Elec. Co.

WGAL, Lancaster, Pa. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAU, Wooster, O. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 485 also. 300 mi. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 485 also. 500 mi. Am. Radio & Research Corp. Daily, 5-6:45 pm, Children's Hour, reports codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm. Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 9, concert. Eastern.

WGL, Philadelphia, Pa. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 400 only. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 485 also. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; 7:30, bedtime story, news. Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern.

WGV, New Orleans, La. 400 mi. Interstate Elec. Co. Mon, Tues, Wed, 8-9 pm, music, talks. Mon, Wed, Sat, 11-12:30 pm. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 400 and 485 only. 1,000 mi. General Elec. Co. Daily ex Sun, 12 m, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Sat, 9 pm, special. Fri, 10:30 pm, special. Sun, 10:30 am, 4 pm, 7:30 pm, church service. Eastern.

WHA, Madison, Wis. 485 also. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Daily ex Sat, Sun, 7 pm, lectures, news. Mon, Thurs, 7:30 pm, agriograms, concerts, sports. Sat, 12:15-1 pm, music, codes. Sun, 1:30-2:30 am, concert. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 300, 485, 600 also. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. Hafer Supply Co.

WHAI, Davenport, Ia. 30 mi. Radio Equip. & Mfg. Co. Daily ex Sat and Sun, 2-2:30 pm, 4:30-5-30, 10-11. Sat, 10-11 am, 2-2-:30 pm, 5-5:30, 11-11:30. Central.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 485 also. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 6 pm, markets, news, weather. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 400 only. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 400 and 485 only. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 250 mi. Associated Broadcasters, Inc. Daily ex Sun, 7-8 am; 9:15-10:55, 12:55-1:15 pm, 2:15-2:30, 4:15-5:30, 6:15-7, 7:30-8:30, 10:30-12 m. Tues, Wed, Fri, 7:30-8:30 pm omitted. Sun, 1-3 pm, 5-6; 10:30-12 m. Eastern.

WIAB, Rockford, Ill. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Central.

WIAI, Springfield, Mo. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 485 also. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 200 also. 200 mi. School of Engineering. Mon, Tues, Thur, Fri, 11:30-11:45 am, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 200 mi. Woodward & Lothrop. Daily ex Sun, 10:30-11:30 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Sat, 8-9 pm, concert. Sun, 4:45 pm, vesper services. Eastern.

WIAZ, Miami, Fla. Flagler St., Elec. Supply Sales Co.

WIK, McKeesport, Pa. 500 mi. K. & L. Elec. Co. Daily ex Sun, 6:30-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 400 only. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 6-6:30 pm. Daily, 2-3 pm, 7-7:30 pm. Tues, 7-12 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 485 also. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 200 and 375 also. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 3:30-4 pm, news, music. Mon, Fri, 8:45-9:45, concert. Sun, 11-12 am, church service; 3:30-4 pm, music. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 485 also. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 3:30, 5, 5:30, reports, code school. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 485 also. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30, music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 300 mi. Peoria Star. Daily ex Sun, 9 am, 11:30, 1:30 pm, markets, weather, agriograms. Tues, Thurs, Sat, 9:15-9:45 pm, concert. Central.

WJAP, Duluth, Minn. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 200 mi. Capper Publications. Thurs, health talks. Sun, 8 pm, church services. Schedule not regular. Central.

WJAR, Providence, R. I. 485 also. 600 mi. The Outlet Co. Daily ex Sun, 10-11 am, 2-3 pm, 5-6. Fri, 8-10 pm, concert. Eastern.

WJAS, Pittsburgh, Pa. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:30-6 pm, concert. Central.

WJAX, Cleveland, O. 485 also. 1,000 mi. Union Trust Co. Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJZ, Newark, N. J. 1,500 mi. Radio Corp. and Westinghouse Elec. Co. Mon, Thurs, Fri, 8:30-10:30 pm. Tues, 7-10:30 pm. Wed, 9-10:30 pm. Sat, 8:30-11 pm. Sun, 8:30-10 pm. Eastern.

WKAA, Cedar Rapids, Ia. 200, 485 also. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 7:30-9 pm, entertainment. Eastern.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 100 mi. L. E. Lines Music Co. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 100 mi. L. M. Turner. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 100 mi. Brenau College. No definite schedule. College activities. Thurs. 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 485 also. 500 mi. WKY Radio Shop. (Daily Oklahoman). Daily ex Sun, 10 am, 10:30, 11, 11:30, 12 m, 12:30 pm, 1, 1:20, markets, weather; 2:30 pm, concert; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Wed, Fri, 8:30 pm, concerts. Central.

WL2, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAG, Minneapolis, Minn. 400 and 485 only. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Tues, Wed, Fri, music. Mon, 10:10 pm, concert. Thurs, 9:15 pm, concert. Sat, 8:30, 10:30 pm, concert. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 485 also. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 100 mi. A. E. Schilling. Daily, 10-12 pm, music. Central.

WLAS, Hutchinson, Kan. 485 also. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm, 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

ADVANCE PROGRAMS

(Continued from page 6)

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Musical recital; 6:30-7:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 7:50-10:30 P. M., Musical concert.

WGI (Eastern, 360), 8:00 P. M., Talk on New England problems under direction of New England business men; Musical program.

WGY (Eastern, 370), 9:00 P. M., Dance music, Cain's Castle Orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Organ selections, H. C. Conrad at Alamo Theater; Three-minute biography of Old Testament characters, "Ezra"; Piano solos, Margaret Munro, Berkeley, Calif.; Vocal selections, Ruby Freeman, Renton, Ill.; mezzo soprano; "Just Among Home Folks," column in Louisville Courier-Journal; 7:30-9:00 P. M., Concert, University of Louisville Glee Club; Reading, "An Interesting Historical Episode"; Setting-up exercises.

WIP (Eastern, 400), 2:00-3:00 P. M., Song and musical recital; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories and roll call; 10:10 P. M., Dance music, Charlie Kerr's Orchestra at Cafe L'Aiglon.

WJZ (Eastern, 360), 8:45 P. M., Concert, Fred W. House, violinist; L. P. Goddard, pianist; 9:00 P. M., Lecture, "Roses," Robert Pyle, Pres. of American Rose Sy.; 9:30 P. M., United States "Navy Night." Talk, "Lessons of the Navy Maneuvers in the Bay of Panama," by Rear Admiral R. E. Coontz, Chief of the Bureau of Naval Operations; Concert, Battleship "Maryland" Orchestra.

WMAQ (Central, 400), 7:00 P. M., Talk, Samuel M. Felton, Pres., Chicago Great Western Railway; 9:15 P. M., Concert, Lake View High School Orchestra.

WMC (Central, 400), 8:00 P. M., Negro stories, Judge Jesse B. Webb; Songs, Hiram Fulson, guitar accompaniment; Popular songs, Mary Louise Armstrong, M. J. Averwater and F. Moorman, pianists.

WOC (Central, 400), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 6:35 P. M., Sandman's visit; 7:00 P. M., Musical program, artists from Kewanee, Ill.; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., Organ recital and trumpets.

WWJ (Eastern, 400), 9:30 A. M., "Tonight's Dinner," talk by Woman's Editor; 3:00 P. M., Concert, News Orchestra.

Sunday, April 29

KDKA (Eastern, 360), 10:45 A. M., Church service, East End Christian Church, Pittsburgh, Pa., Rev. John R. Ewers, minister; 2:30 P. M., Bible story for children, Rev. W. A. Logan, Alpha Lutheran Church, Turtle Creek, Pa.; 2:45 P. M., Concert; 4:00 P. M., Organ recital, Dr. Charles Heinroth, organist and director of Carnegie Institute; 4:45 P. M., Vesper services, Shadyside Presbyterian Church, Pittsburgh, Rev. Hugh Thomson Kerr, minister; 7:45 P. M., Church services for the shut-ins, Rev. E. J. Van Etten, Calvary Episcopal Church, Pittsburgh.

KFI (Pacific, 400), 10:00-11:00 A. M., Church service for all denominations, Church Federation; 4:00-5:00 P. M., Musical vesper service, Natl. Federation of Music Clubs; Industrial chorus, Antonette R. Sabel, director; 8:00-10:00 P. M., Concert, Packard Girls' Concert Club; 10:00-11:00 P. M., Concert, Bennett's Packard Six Orchestra.

KYW (Central, 400), 11:00 P. M., Central Church service, Dr. F. F. Shannon, pastor; Musical program, direction Daniel Protheros; 3:30 P. M., Chapel services, George P. Magill, Wilmette Presbyterian Church; 7:00 P. M., Chicago Sunday Evening Club service.

WBAP (Central, 400), 11:00-12:15 P. M., Church service, First Methodist Church, Rev. J. W. Bergin, pastor; 3:30-4:30 P. M., Sacred concert.

WDAP (Central, 390), 9:15 P. M., Concert, Henry Selinger and Drake Concert Ensemble; Alice Sullivan, Soprano.

WFAA (Central, 400), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. Wm. M. Anderson, Jr., First Presbyterian Church, Sacred music; 9:30-10:00 P. M., Choristers from Central Christian Church; 10:00-11:00 P. M., Concert, Paul E. Ashley's Orchestra.

WFI (Eastern, 400), 4:00 P. M., Chapel services; 7:30 P. M., Arch Street Presbyterian Church service; 9:30 P. M., Organ recital.

WGI (Eastern, 360), 4:00 P. M., Concert, Mal-Con band of Malden, Mass., C. R. Reasoner, director; "Adventure Hour," by Youth's Companion; 8:30 P. M., Church service, Rev. Lyman J. Radcliffe.

WGR (Eastern, 360), 3:00 P. M., Vesper service, Rev. Geo. A. Briggs, Baptist.

WGY (Eastern, 370), 9:30 A. M., Church service, Anthem, "They Shall Not Hunger Nor Thirst," Albany Street M. E. Church Choir; "Consider and Hear Me," Josephine Mairs, contralto; Sermon, "The Ministry of Reconciliation," Rev. Albert D. Angell, D. D., Albany Street M. E. Church; 4:00 P. M., Musical program, "March and Procession of Bacchus," WGY Symphony Orchestra, Leo Kliwen, conductor; "Turkish March," Frances Bisman, pianist; Excerpts from "Carmen," WGY Orchestra; "Faschingsschwank Aus Wien, Opus 26," Frances Bisman; "Valse Triste," Edward A. Rice, violinist; two movements from the "Sixth Symphony," 1, "Awakening of Joyful Feelings on Arrival in the Country," 2, "Village Festival," WGY Orchestra; 6:30 P. M., Church service, Anthem, "I Will Lift Up Mine Eyes," Albany Street M. E. Church Choir; "The Shadows of the Evening Hours," quartet; Sermon, "Some Things that Help to Make an Ideal Christian," Rev. Albert D. Angell, D.D.

WHAS (Central, 360), 9:57 A. M., Organ music; 10:00 A. M., Church service, Warren Memorial Church, Rev. Dr. Samuel Collen; Organ selections, Wm. E. Pilcher, Jr.; Vocal selections, Esther Brown, soprano, Mrs. Guy Ellis, contralto, Dr. Noble Mitchell, tenor, Walter Shackelton, bass; 4:00-5:00 P. M., Concert, Portland Ave. Presbyterian Church Choir.

WIP (Eastern, 400), 11:00 A. M., Church services, Holy Trinity Memorial Chapel, Rev. Janney Rudderow, minister; Music, Boy choir and male quartet; Ernest Felix Potter, organist and choir master; 2:00 P. M., 3:30 P. M., Concert, Arcadia Cafe Orchestra, Fery Sarkozi, director.

WJZ (Eastern, 360), 10:30 A. M., Musical program; 11:00 A. M., Church service of West End Presbyterian Church, N. Y., Rev. A. Edwin Keigwin, D.D., pastor; 3:45 P. M., Concert, Ruth Beard, contralto; 4:40 P. M., "Something for Everybody," by Youth's Companion; 6:30 P. M., "Readings and Records from the Bubble Books that Sing," Ralph Mayhew; 7:00 P. M., "Coming Events Cast Their Shadows Before—What Present World Shadows Augur," an interpretation by the Annalist; 7:15 P. M., Organ Recital; 8:00 P. M., "Inspirational Talk," O. D. Marden; 8:15 P. M., "Experiences in Siberia with the A. E. F.," Gen. Wm. S. Graves; 8:45 P. M., Concert, Waldorf Astoria Orchestra, Joseph Knecht, director.

WWJ (Eastern, 400), 11:00 A. M., Church service from St. Paul's Cathedral, Dean Rogers, rector; 4:00 P. M., Concert, News Orchestra; Recital, Bassillios Kyros, bass.

Monday, April 30

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Talk, Los Angeles Chamber of Commerce; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Gaumut Club; Female chorus, Woman's Lyric Club of Los Angeles; Program, Hollywood Chamber of Commerce.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Sinn Finn Syncopaters; 9:30-10:30 P. M., Concert, Hubbard Texas Orchestra.

WFI (Eastern, 400), 1:15 P. M.-2:00 P. M., Concert, Meyer Davis, Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Song Recital; 6:30-7:30 P. M., Concert, Meyer Davis, Bellevue-Stratford Orchestra.

WGR (Eastern, 360), 7:30 P. M., Digest of news; 8:00 P. M., Musical program, Buyers' Club of Buffalo.

WGY (Eastern, 370), 7:45 P. M., Musical program; "Scherzo-Opus 31," Elvira Spadora, pianist; "Joy of Spring," Mrs. Edwin Newkirk, contralto; "Topics of the Day," Pathe Exchange; "Mary of Argyle," Walter S. Cowan, tenor; "Humoresque," Part I, Anne F. Brubaker, reader; "Hame O'Mine," Walter S. Cowan; "Hungarian," "Le Papillon," "Pirouette," Elvira Spadora; "My Ain Folk," Mrs. Edwin Newkirk; "Humoresque," Part II, Anne F. Brubaker; "Bonnie Doon," Walter S. Cowan; "Lecture on Woman," Anne F. Brubaker; "One Fleeting Hour," Mrs. Edwin Newkirk; "Kamenoi-Ostrow," Elvira Spadora.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	7:30- 8:15	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	400	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	400	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00-12:00
KGW, Portland, Ore.	400	10:00- 2:00	.....	10:00-11:00	.....	10:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	400	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	400	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	400	8:00-12:30	8:00-10:00	8:00-10:00	11:30-12:30	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	400	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:30	6:05- 7:40	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba.	400	.....	.....	8:00-10:30	.....	.....	6:30- 6:45	.....
WBAP, Fort Worth, Texas.	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	6:30- 6:45
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	400	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	360	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	400	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	400	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	400	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, Newark, N. J.	360	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00	.....	.....	.....
WMAQ, Chicago, Ill.	400	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	400	8:00- 9:30	8:00- 9:30	.....	8:00- 9:30	8:00- 9:30	8:00- 9:30	.....
WOAI, San Antonio, Texas.	360	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	400	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....	6:30- 7:30

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

WHAS (Central, 360), 4:00-5:00 P. M., Organ selections, H. C. Conrad at Alamo Theater; Three-minute biography of Old Testament characters, "Nehemiah," K. G. Tucker, El Paso, Texas; "Just Among Home Folks," column in Louisville Courier-Journal.

WIP (Eastern, 400), 2:00-3:00 P. M., Song and musical recital; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories and roll call.

WMC (Central, 400), 8:00 P. M., Concert, Steamer Idlewild Orchestra, Bob Miller, director.

WOO (Eastern, 400), 11:00 A. M., Grand organ recital; 4:45-5:00 P. M., Organ recital and trumpets; 7:50 P. M., Musical recital to be announced by radio; 8:10 P. M., Concert, J. W. C. I. Military Band, Arthur A. Roeander, director; 9:00 P. M., Grand organ recital; 10:10-12:00 P. M., Concert, Adelphia Hotel Concert Orchestra, A. Candelori, director; Vocal and piano solos will be rendered between numbers.

STATION KHJ GIVES SUNRISE PROGRAM

Resurrection Morn Services Pierces Pall of Rain Over Broadcast

LOS ANGELES, CALIF.—With the dawning of Resurrection morn, 1923, there was conducted in this city, the first Easter Radio sunrise service in the West. Arranged originally for the benefit of shut-ins and those who would not be able to attend the impressive outdoor sunrise services held at many points of the Southland at Eastertide, the Radio service of KHJ which was presented through the courtesy of Dr. Edward M. Hiner, dean of American band school masters, became a saving gift and the solving of the difficulty induced by inclemency which was in reality a boon to the parched land of the state.

Nature seemed to lend beauty to the service. Before dawn a gray murk overhung the Southland. A curtain of rain veiled the splendor of the Easter sunrise; the dawn was dark. While within The Times Radio studio, the pall took the guise of a background for beaming smiles and the bounty that goes with sunshine.

The program opened with a trumpet flourish to herald the dawn of the commemorative day, by Dr. E. M. Hiner, Joe Colling, Jr., Aimie Reinwald and Robert Fraker. "Joy to the World," was sung by Anna Hiner, soprano, accompanied by a cornet quartet. Uncle John read St. Matthew, the 28th chapter, that illustrious document of the resurrection, wherein is told the story of that One who has arisen to preach immortality. A prayer, composed by Florence Edna Powell, was read by Uncle John. A poem by Edna Powell, who passed away on Easter Sunday, 1917, was read. "All the air is filled with sunshine," read the first line, and it appeared miraculous that with those words came a flood of golden sunlight that smiled through the haze in a blaze of glory. The cornet quartet presented "In the Cathedral," Barnard; and "Rosary," Nevin. Anna Hiner sang "Holy City," with obligato by Dr. Hiner.

Passengers riding in Radio-equipped taxis in Paris pay 2 francs extra for the trip.

A LARGE TWO COLOR MAP

Size 25x38 inches, showing the location of all the broadcasting stations of United States and Canada, their wave lengths, exact geographical position, change of time area, amateur radio districts, etc., etc. Also a complete list of call letters (listed alphabetically) of all the broadcasting stations, bound in a separate cover.

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COMMISSION PLANS TRUST QUIZZ SOON

NEW YORK OFFICE WILL PLAY LARGE PART

Definite Plans Not Yet Formulated but Information Will be Compiled for Early Start

By L. M. Lamm

WASHINGTON, D. C.—Investigators of the Federal Trade Commission will soon begin work on the survey of the Radio field and alleged Radio trust, which was provided for in the White resolution which passed the House of Representatives during the closing hours of Congress.

Work on the investigation has been somewhat held up because some of the officials of the Commission felt that changes are so rapid in the Radio industry at present that if the investigation were begun at this time, the report would be old before the next session of Congress at which time a report must be made. The situation has been fully discussed, however, and it has been decided to begin work in the very near future.

New York Office to Take Part

While definite plans have not yet been formulated by the Commission for the investigation it is probable that all of the information now available in the various government departments will be gone over and tabulated following which the necessary field work will be carried out. The New York office of the Trade Commission will of course take part in the investigation in view of the fact that the executive offices of the Radio companies are located in New York.

Another New Broadcaster Added to California's List

LOS ANGELES, CALIF.—Another new station was added to the list of Southern California plants with the opening during the last week of March of the new plant of the Radio Corporation of America, located on the Catalina terminal in the Wilmington section of Los Angeles Harbor.

The first message sent from the station was one of greeting from David P. Fleming, manager of the Wilmington Transportation Co., to William Wrigley, Jr., on Catalina Island. Commercial operation of the station is on a 24-hour service with three operators working on eight-hour shifts.

French Tax Sets

A decree of the French government provides that each owner of a receiving set shall pay 10 francs as an annual fee, keep secret all intercepted messages and cease operations when the government so instructs.

How to Make a Reinartz Receiver

COMPLETE BLUE PRINT

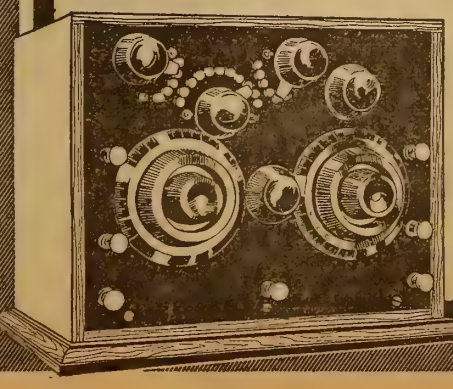
for the construction of a Reinartz Receiving Unit and two step amplifier.

INSTRUCTIONS FOR ASSEMBLY

Description of apparatus and accessories and details of tuning.

WINDING A REINARTZ COIL

Cabinet Dimensions
Panel Layouts
List of Parts



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Chicago, Illinois

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Eastern Representative, Jacob Miller, 2126 Broadway, New York
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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, April 28, 1923 No. 3

Bad Impressions

Distorted Sounds from Large Horns Not Effective

PEOPLE still exist who will not allow a phonograph in their homes. The first impression given by the big horns attached to the machines in their earlier designs made many people feel the phonograph would never produce clear music. Big horns protruding from the windows of Radio shops have in the same way given a bad impression and introduction to Radio. The music from such horns has been distorted and mixed with a "tin" sound. The right receiving set produces mellow tones, why distort them to produce loudness?

Incentive for Factory Workers

Installation of Radio Solves Production Problems

IN THIS busy age there is always a demand for something that will relieve the monotony of the daily grind. This was proved by one of the largest manufacturers of knit goods who recently installed Radio in his factories.

The girls were given five minutes out of every hour for recreation and rest. The experiment was tried with Radio by installing a set in the girls room in lieu of a phonograph. A great interest was taken in the concerts over the Radio.

It was thought that the workers would take advantage of this new arrangement and stay overtime, but by careful observation it was found to be opposite in this case, for being interested in the new-found diversion, they worked hard to pass the time and did not waste time as usual, by lagging, but hurried back to work to discuss the different things they had heard during the five minutes' rest.

As a result, the girls, instead of growing dissatisfied and leaving, stayed and seemed happy, and the news spread that none of the girls employed in this factory were leaving, and for this reason the owner of the factory could get all the help he wanted.

No Limits to the Field Covered

Distance Depends on the Power Back of Station

RADIO is a system of communication whereby intelligence is transmitted with the speed of light, in all directions, for any desired distance, without the aid of any artificial medium, by the propagation and detection of electrical disturbances in space.

An analysis of this definition will indicate the unique inherent characteristics of Radio which make it serviceable where other systems of communication cannot be applied.

While the speed of transmission in Radio is no greater than that of the wire communication systems, it is equal to it. A Radio message travels at the rate of 186,000 miles per second; more than 1,000,000 times the speed of sound.

A Radio transmitter will radiate its message in all directions, a characteristic which has made broadcasting possible. A broadcast message can be heard by those in airplanes, in ships at sea, by those in submarines submerged in the sea, and in mines or other points under the surface of the earth.

So far as is known Radio communication can be accomplished over any desired distance. Radio stations already have transmitted completely around the world, and since the medium which transmits light to us from stars and planets is the same medium which transmits Radio communication, it is reasonable to believe that a Radio message can be propagated through space for a distance depending only on the amount of power which is put behind it.

The third inherent characteristic of Radio, by which it transmits intelligence without the aid of any artificial medium, places it in a field absolutely all its own. Not only does this permit communication with points otherwise inaccessible, such as for example, aircraft, ships and inaccessible parts of the country, but it eliminates the need of securing rights of way for transmission lines and their construction and maintenance. A Radio system is, therefore, rendered more positive than wired systems in that it is not subject to failures which frequently occur during the winter months in wire lines.

Condensed

By DIELECTRIC

For those having perfect hearing the tortures of being very deaf are hard to imagine. Having among my acquaintances people who are mutes and those who are partially deaf I am of the opinion that it is more discomforting to be among the latter group. They are generally supposed to get the gist of a conversation and receive little sympathy if they fail, while the mute is saved this ordeal. It is very encouraging to learn of the results of recent tests at the Indiana Schools for the Deaf and to note that apparently not all of the children supposed to be totally deaf are actually so. Other tests have been made prior to this and phenomenal results claimed, however, it is certain that Radio is to play a great part in restoring the ability to hear and distinguish sounds to those who have latent hearing, and that of itself would be sufficient to make us thankful to the discoverers of Radiophony.

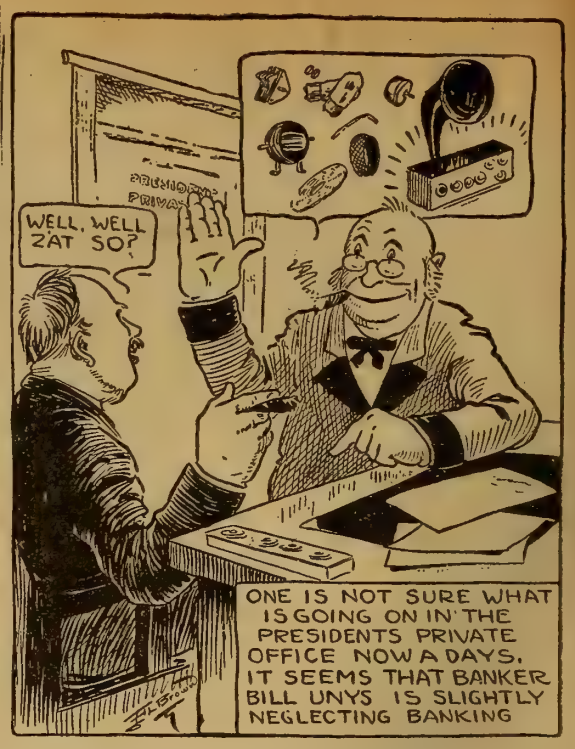
As time goes on the demand on the part of listeners-in for programs of a general high character will be met with a fuller response from the broadcasting stations. Already the public's demand for certain features has resulted in their incorporation in the regularly listed numbers to be broadcast. Those who wanted to hear grand opera given to the Radio world were finally successful in getting it. One of the large opera companies still holds aloof and refuses to allow its performances to be sent out through the ether. Opera has been broadcast in most of the large cities of the country this season and with profit to the managers as well as to the public. The first station to give this class of entertainment was KYW, transmitting performances by the Chicago Opera Company. This same station was the first to respond to the appeal to broadcast plays direct from the stage. Now we are to be provided with theatrical performances as a regular feature from their studio. Station WGY has put out some very good "Radio dramas" to the enjoyment of audiences tuned to the Schenectady station. In due season we will have everything we want to hear, even if it costs us contributions to broadcasting.

We look to the youth of the land for fearless investigation into untried methods of hooking up a set. Much that has been done to develop compact, portable receiving sets has been due to the ingeniousness of the young amateur. Of course he has contributed much else besides to the progress of Radio. As an organization of boys, there is perhaps no equal to the Boy Scouts in promoting practical tendencies. They have taken to the science of Radio enthusiastically and in most cases have had careful supervision. In New York alone some twenty-five thousand Boy Scouts are delving into the mysteries of Radio, building their own sets and adding to their store of knowledge most useful information. One of the Scout sets is a portable one adapted to use on hikes and weighs but ten pounds. One of the most promising phases of the future of Radio is the keen interest displayed by boys who will become the men directing the affairs of amateur leagues. So long as the boy is encouraged to spend part of his time in Radio experimentation there need be no apprehension about further growth in this line.

It would be a splendid thing for Radio if every community had a live, aggressive club comprising the set owners and set makers boosting the game and developing new members. There are clubs that actually accomplish little, but the recently organized "Springfield Associated Radiowls" in Massachusetts is on the right track in attempting to accomplish its purposes. Co-operation and experimentation are the essentials to a successful Radio club.

It begins to look encouraging for the listeners in since Secretary Hoover's conference completed its session with a constructive program. If the proposed changes in wavelengths are accepted as final, then we are on the way out of the tangle which would certainly have led to disaster, so far as broadcasting is concerned. It is very comforting to note that the amateur is well cared for in the schedule as outlined. In fact he is favored as he has not been before, and this is as it should be. A great deal is due to those not professionally concerned with Radio for its permanent advancement, and they should be granted every legitimate concession. Radio Digest was active in this conference with intent to aid in successfully overcoming the difficulties to efficient broadcasting. This paper has always done its share to promote the welfare of its readers—the great body of Radiophans—in whatever problem has presented itself, and you may rest assured it will continue to do so.

When I meet a genüine Radio BUG I like to find out just how much he is contributing to the game. Some of them are gifted with technical ability and aid the beginner in assembling his set. Others have Radio frolics, at which invited guests may revel in the joys of listening to what comes in through the set. I found one of these lately. He is an artist and while working away on his illustrations, sits with head phones all day long. Then when he goes home he sends out for folks who do not own a receiving set and brings them in to share the evening's entertainment. This he has done all winter, and when the Sunday afternoon recitals are broadcast the loudspeaker is aimed out of the window to give passersby as much as they like of the sacred music. Following up the results I found that nearly a dozen new enthusiasts had been added to our roll due to his enthusiasm and generosity. This is what I call a g-e-n-u-i-n-e Radio Bug! Let's have more of them.



RADIO INDI-GEST

(This column is open to all aspiring Radioknuts who tender suitable contributions. Try to "make" the column if you can. All unsuitable manuscripts are turned over to the Office Squirrel who does not guarantee their return or anything else for that matter.—Indi.)

QUESTIONS *and* ANSWERS

Q. & A. dept., Radeeo In-Dijest, Dere ser—I bot a arial ackording to the speshificatins of mister h. J. marx butt it wonte fit my house and lot being 2 long sew plese give me a picshure of same alterd 2 fit. P. S.—i hav an garadge on my lot? —PDQ (000).

A—Would suggest you moving your garage back in the alley. In case you have no alley, borrow your neighbor's garden. We never heard of H. J. Marx.

Dear Mr. Indi-Gest:

Please be so kind to pardon my seeming familiarity, but my wife (one will acquire wives, won't one?) has made an urgent plea that you answer her interrogation. In your most interesting paper of April 21, she read a story regarding the introduction of illicit liquors into this country by the aid of Radio and wishes to be enlightened regarding whether or not the initials "A. R. R. L." represent the "American Rum Running League"? —Alogonquin Tonsils III.

A—(1) Yes. (2) We are investigating, if so shall we send in your application to join the A. R. R. L. with ours?

(1812000036 89%$"&123) BLAH, Maywood.

In your issue of April 21 I notice a very good looking Sheik on your front cover. Please give me his telphone number. —LaVerne.

A—All mail addressed to Perin in care of Indigest will be forwarded. Members of the other persuasion can reach Inez and Eula in the same manner.

READERS' VIEWS

Did You Rub with the Alcohol?

Dear Indigest—After reading the Indigest I contracted a headache and rubbed my head with alcohol and went to sleep with a heating pad as a pillow. I was awakened by Station POZ playing Ali Ali. It came in over the pad like a ton of bricks. Can give name of pad and brand of alcohol on request.

—Lillian G.

Yes, It Is There—If You Look For It

Dear Indigest—I have been a subscriber to Indigest for the past year and in looking over one of the latest copies I notice you have a department known as the Radio Digest. I am glad I discovered this as it is a very nice little feature. —Polly W.

BOOK REVIEWS

How and Why to Make Radio Sets, by Xlophone Zapp, is one of the recent publications of Spark and Coil Publishers, Inc. Mr. Zapp describes the parts of a Radio set where there is no danger of confusing one with the other. For instance he clearly shows the difference between a tube and a variometer by illustrations drawn by his four year old daughter.

Radio As I Know It is a book that could contain another hundred blank pages and would not cover the subject to fuller extent. Written by Ivan Awfulitch, the Russian Radiophan. The English edition De Luxe, bound in heavy flexable insulated oil cloth, is now to be had. Translated from the Russian by Polly W.

NOTICE!

Due to spring alterations the department of Indigest known as the Radio Disgust will be moved over one column to the right. This will put Indigest in the center column of page 10 next issue. During repairs and alterations business will go on as usual. —*Indi.*

A. B. C. Lessons for Radio Beginners

Chapter XVII—Storage Batteries and Their Care

By Arthur G. Mohaupt

PROBABLY the most important auxiliary device used in connection with a modern vacuum tube receiving set is the storage battery which is used to supply the current to the filaments of the tubes. Although this battery is by most broadcasting fans considered to be of secondary importance and hence is given only casual attention, it is a very scientific piece of apparatus. In order that best

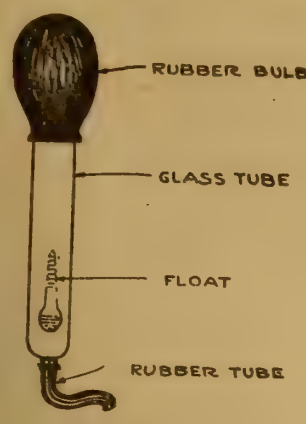


Figure 58

results and longest life can be obtained from it, it should really receive more maintenance and upkeep attention than the receiving set itself, for if the battery goes bad the receiving apparatus is lifeless.

It is true that most Radio instruction literature falling into the hands of the owner of a receiving set deals only with the operation of the set and completely omits the batteries, and it is for this reason that the present chapter on storage batteries will prove a very important guide to the purchaser or owner of a battery.

Differs from a Dry Cell

Fundamentally the inherent principles of operation of a storage cell are no different from those of an ordinary dry or wet cell of the primary type, for they both consist of two sets of plates or electrodes, one positive and one negative, and a solution or electrolyte capable of chemically acting more upon one electrode than upon the other. The one least acted upon, in this case, is the positive terminal. A storage cell differs, however, in this respect:

After it is exhausted through active use, both plates and electrolyte can be restored to their original condition by sending a direct current from some external source back through the cell in a direction opposite to that in which the cell itself would cause a current to flow. This is not possible with the ordinary primary cells, for when these are exhausted, the worn out parts must be replaced with new ones. It is true that a dry cell can often be rejuvenated to a slight degree, but as to restoring it back to complete normalcy, that is impossible.

Kinds of Storage Cells

There are two types or kinds of storage cells in common use today, one is known as the lead-sulphuric acid type and the other as the nickel-alkaline or Edison type. The former has been in use for a long time, while the latter has come on the market only in more recent years. Each has its own individual advantages and disadvantages, but since the lead cell is in most extensive use among Radio fans today, the present chapter will be devoted only to this type of cell.

The lead storage cell consists of two groups of plates, one positive and one negative. The positive plate is brown in color and consists of a pasty mass of lead peroxide (a chemical compound of lead and oxygen) supported in a grid or frame work composed of lead and antimony. The negative plate is gray in color and consists of pure lead in a very finely divided state (known as sponge lead) also supported in a similar grid. The electrolyte consists of a dilute solution of chemically pure sulphuric acid dissolved in distilled water.

Chemical Action

The lead peroxide and spongy lead are known as the active materials, for it is through their chemical reaction with the sulphuric acid of the electrolyte that the electrical energy is developed.

When the storage cell is called upon to furnish electrical energy to the filaments of the tubes or other apparatus, it is said to be discharging, and when a current is being sent through it from some external source to restore the various parts to their original condition it is said to be charging.

During the discharging process the active materials of both groups of plates unite with some of the sulphuric acid of the electrolyte and form a new chemical compound which appears on the plates in the form of a white salt, known as lead sulphate. There are thus several changes going on within a cell during discharge; both plates are being slowly converted into lead sulphate and the solution is being weakened to the sulphuric acid being used up by the plates.

During the charging process, on the other hand, the entire chemical actions are reversed, that is, the positive plate is converted back into lead peroxide, the negative to pure lead, and the electrolyte becomes stronger due to the acid being returned to it from the plates.

Thus it is evident that although called a storage cell, it really does not store electricity. What it stores is chemical energy.

The Commercial Lead Battery

A complete lead storage battery as is commonly used in Radio practice consists of three individual units or cells connected together "in series" and supported in a wooden or composition box or case.

Each unit or cell, in turn, consists of groups of plates, one positive and one negative. The two groups are assembled so that the plates of one fit in between those of the other, the plates being prevented from touching each other by means of insulating separators placed between each pair. Each group of plates terminates in a lead post which projects through the tops of the cell covers.

The three cells are connected in series when the entire battery is assembled. The positive terminal of the first cell and the negative terminal of the third cell form the terminals of the complete battery. The positive terminal is generally colored red and is marked POS or P or +. The negative terminal is usually colored black and is marked NEG or N or —. It is to these two terminals that the wires leading to the tube filaments are connected.

Rating of Storage Batteries

Storage batteries are always rated as to their terminal voltage and the quantity of electrical energy which they can supply under proper conditions of operation.

The three-cell storage battery as used in Radio practice has a terminal voltage of about 6 volts. Each cell has a pressure of 2 volts, and the three in series thus have a combined pressure of 6 volts. When a battery is fully charged, the pressure is slightly above this value, and when the battery is discharged the pressure is a little below. The average voltage on discharge is, however, about 6 volts.

The quantity of electricity which a storage cell can furnish is measured or designated in "ampere-hours." An ampere-hour is the quantity of electricity that has been supplied or consumed when a current of one ampere has flowed for a period of one hour. To calculate ampere-hours it is only necessary to multiply the current used in amperes by the length of time in hours.

The storage batteries most commonly used in Radio practice have a capacity of 60 or 80 ampere-hours, A 60-ampere-hour battery could furnish a current of one ampere for 60 hours, or 2 amperes for 30 hours, 3 amperes for 20 hours, etc.

Normal Charge or Discharge Current

All lead batteries are designed and constructed so that if they are discharged at a certain "normal" rate they will be exhausted in 8 hours. This is known as the "normal" charge or discharge current, and the strength of this normal current in amperes can always be calculated by dividing the ampere-hour capacity of the battery by 8. Thus, with an 80-ampere-

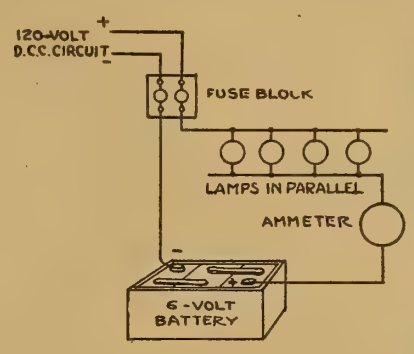


Figure 59

hour battery the normal current is 80 divided by 8 or 10 amperes.

It is a peculiar condition that if a battery is discharged with a greater current than the normal value, the full rated capacity of the battery cannot be obtained; while if the discharge current is less than the normal value, more than the rated charge of the battery can generally be extracted. This difference in available capacity is due to the formation of lead sulphate on the surface of the plates, and the readiness which which the electrolyte can ooze through the pores of the active material and replenish the exhausted solution.

Syringe Hydrometer

The syringe hydrometer is the device most commonly used for determining the condition of charge or discharge of the cells of a storage battery. As is illustrated in Figure 58, it consists of a glass tube about an inch in diameter and provided at one end with a rubber bulb and at the other end with a tapered stem to which is attached a piece of rubber tubing 2 or 3 inches in length.

Inside of this glass tube is another glass stem called the float. This float is weighted at the lower end with lead shot or mercury, and has the upper part provided with a graduated scale reading from 1,100 to 1,300.

The principle of operation of the hydrometer is that an object of a given weight will float to a greater depth in a lighter liquid or solution than it will in a heavier one. Since the strength of the solution in a storage cell depends upon the state of discharge, that is, upon the amount of sulphuric acid that has been extracted from the solution by the active material on the plates, the depth to which the hydrometer stem floats in the solution will readily indicate the condition of the battery.

Specific Gravity

The strength of the solution is termed its specific gravity, which refers to the number of times it is as heavy as pure water. Thus, in a fully charged battery the solution is nearly 1.3 times as heavy as pure water, and its specific gravity is said to be 1300. As the battery discharges, the solution becomes weaker and its specific gravity decreases. A battery should never be discharged beyond the point at which the specific gravity of the solution drops below 1150.

Before a hydrometer is used, it should be thoroughly cleaned in pure water so

(Continued on page 14)

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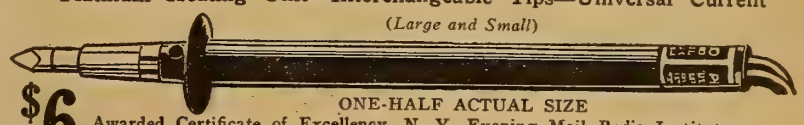

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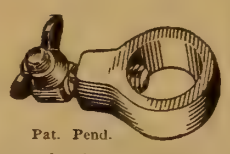

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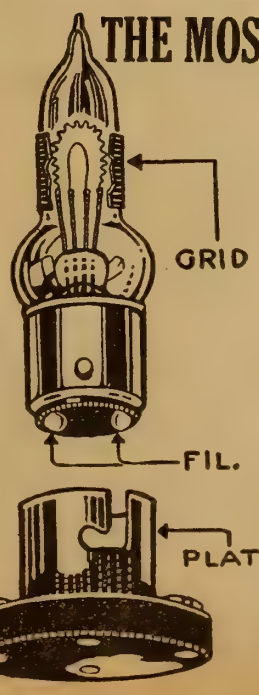

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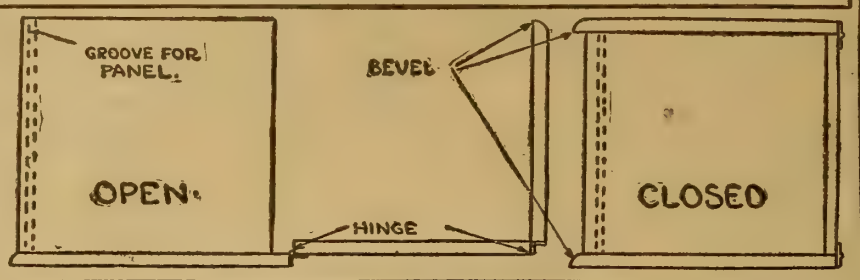
Accessible Cabinet for Radio Sets

Entire Set May Be Seen When Cabinet Is Open

In making a Radio cabinet for my set recently I discovered a little scheme that helps wonderfully. It is simply this: I run the commercial cabinets one better by hinging both the cover and the back instead of just the cover. The accompanying illustration shows the way it is constructed.

The cabinet has proven very satisfactory. Many of the sets in town are equipped with these cabinets and they like them well.—Howard R. Robertson, Hubbard, Iowa.

TOP AND BACK HINGE TO BASE



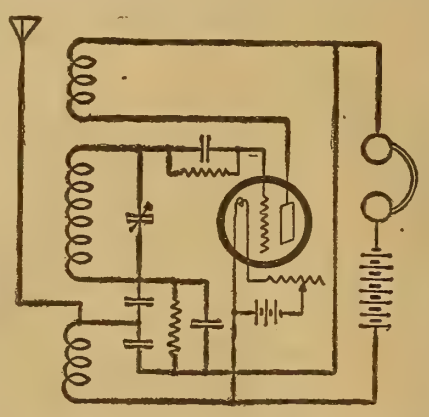
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

Hook-Up for Clear Signals

The accompanying hook-up is one that I find gives clearer signals than any I have tried. As you can see from the diagram there is a 50-turn coil inserted between the filament lead and the condenser



bank and the aerial is also connected to the condenser bank. This coil is tightly coupled to the main inductance and it is sometimes necessary to reverse the leads in connecting up since it also acts as a tickler.—Ira Simmons, Nowata, Okla.

Wire Wound Filament Rheostats

The sliding contact arm in brushing over the rheostat coil may possibly burn or oxidize the surface of the wire and prevent good metallic contact. This is especially so when the contact arm is narrow and covers only one or two wires at a time.

Remove any such oxidization with sandpaper or a pocket knife for best filament results.—H. E. Jameson, Milwaukee, Wis.

Small Condensers Made of Wire

Grid condensers and other small condensers can be quickly made by leaving the insulation on the wires and twisting them together like in making a regular soldered joint. The longer the splice the greater the capacity of the condenser. The capacity of these condensers can be

made of any value by connecting them in series and parallel in different combinations.

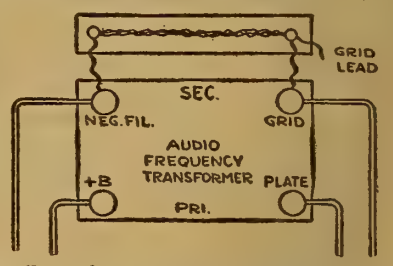
These condensers are very compact and when wrapped with a piece of tape they will stand the hardest kind of rough usage.—C. L. Smith, Jackson, Miss.

Grid Leak Installed to Take "Fry" Out of Set

The amateur who has a one or two stage audio frequency amplifier on his set is well acquainted with the hiss or frying sound it gives forth when operating at its best or highest capacity. By placing a grid leak across the secondary of the last amplifying transformer nearly all the frying and hissing noise can be eliminated without noticeably reducing the signal strength.

When static is real bad the strength of the leak can be increased to where it will take the harshness out of the static but it will reduce the signals somewhat.

The ordinary grid leak consisting of

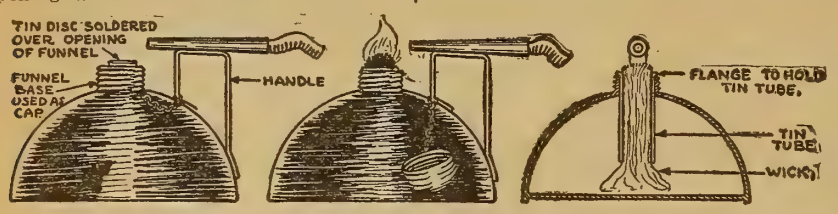


pencil marks on a strip of paper can be used, but I have had best results by making these lines with ordinary black drawing ink.—Chas. L. Smith, Jackson, Miss.

Oil Can Soldering Torch

In the December 9, 1922, issue of Radio Digest there appeared an article on an oil can made into a soldering torch. The illustration shows an improvement on this device. Most all oil cans are so arranged that the spout is unscrewed from the body for filling and cleaning. The spout is cut from the screw base and used for the blow torch. The screw base is used for a cap by soldering a disk of tin over the place from which the spout was cut.

A tin tube is made to fit the inside of the opening and is used for the wick. The



spout is soldered to the upper part of the handle. The illustration shows plainly the construction of the torch.—C. W. Pomeroy, St. Louis, Mo.

Improper Tapping

Often a station will come in best when the switch arm rests on two adjacent switch points. This may be due to improper tapping of the antenna tuning inductance, which may be the stator winding of a variocoupler.

Perhaps the safest way to overcome this difficulty is the use of the units and tens method in tapping, which necessitates two separate sets of switch points.

However, if only one switch arm is used, it is advisable to predetermine the best arrangement in advance. To this end, the beginning of the winding is tapped closely—say every five turns—increasing to seven or eight and then to every 10 turns.

With the above idea in mind when tapping your tuning coil, it will be an easy matter to get in between turns when tuning by means of a small variable condenser properly placed in the circuit.

Condensers Allow Variation

Operators using spider-web inductance coils of fixed position are restricted to a particular wave length, and even if the coils are mounted for coupling, the range is still limited unless variable condensers are used. The best arrangement is to place one variable condenser in series with the primary, and shunt another across the secondary. This affords results equal to those obtainable with a variocoupler.

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3/32" THICK	1¢	PER SQ. INCH
1/8" THICK	1½¢	PER SQ. INCH
3/16" THICK	2¢	PER SQ. INCH
¼" THICK	2½¢	PER SQ. INCH
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FLEWELLING CIRCUIT
EVERY PART COMPLETE
2 honeycomb coils, 1 2-coil mounting, 2 coil plugs, 3 .006 condensers, 1 variable grid leak, 1 grid leak, 1 23-plate .0005 MFD variable condenser, 1 Vernier rheostat, 1 tube socket, 8 binding posts, 20 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM, 1 3" dial and the Radio Digest Booklet on Operation and Construction of Circuit..... $11.00

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EVERY PART COMPLETE
1 7x9 Panel, 2 Audio Frequency Transformers (5 to 1 Ratio), 2 Rheostats, 2 V. T. Sockets, 7 Binding Posts, 1 Variable Resistance Leak, Necessary Bus Bar Wire. Can be used with either of the above circuits or any other receiver. $11.00

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13 Plate Variable;	value, $2.50	1.20
23 Plate Variable;	value, $3.50	1.35
43 Plate Variable;	value, $4.50	1.85
13 Plate VERNIER;	value, $5.50	3.75
23 Plate VERNIER;	value, $6.00	4.00
43 Plate VERNIER;	value, $6.50	4.25
Honeycomb Coils, 50 turns mounted		$0.95
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BEST QUALITY JACKS, Single Circuit; value, 65c; special at		.30
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THREE-INCH DIALS — Unbreakable — heat resisting composition—high finish; special		$0.30

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V. T. SOCKETS—Nickeled, brass sleeve, composition base value, $1.00; special at	.50
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EXTRA SPECIAL—Telephone 3000 Ohms Headsets; $9.00 value; reduced to	$3.50
ALUMINUM LOUD SPEAKING HORN—Nickel plated, highly polished; $8.00 list	$3.75
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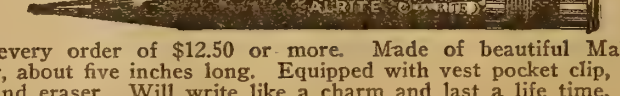

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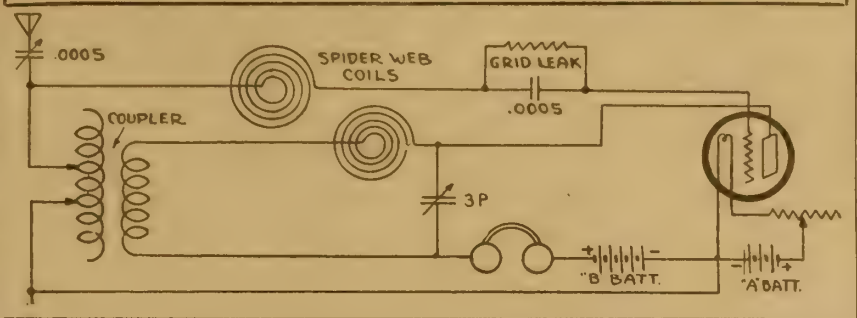
Special Circuit for DX Reception

Variocoupler Employed with Spider Web Coils

The circuit shown in the illustration is a real DX set. This circuit may be a pet of mine but it has given me better satisfaction than any so far that I have used. It consists of a variocoupler with 40 turns on the rotor, two spider web coils each 4 inches in diameter with 20 turns mounted permanently 4 inches apart, variable condensers, etc. The rotor of the variocoupler, as well as the spider web coils, provide regeneration for the set. To tune the set rotate the aerial condenser until signals are heard, then increase regeneration with the rotor, and vernier condenser. The results obtained with this set are extraordinary.—John J. Pulley, Philadelphia, Penn.

COILS PRODUCE REGENERATION

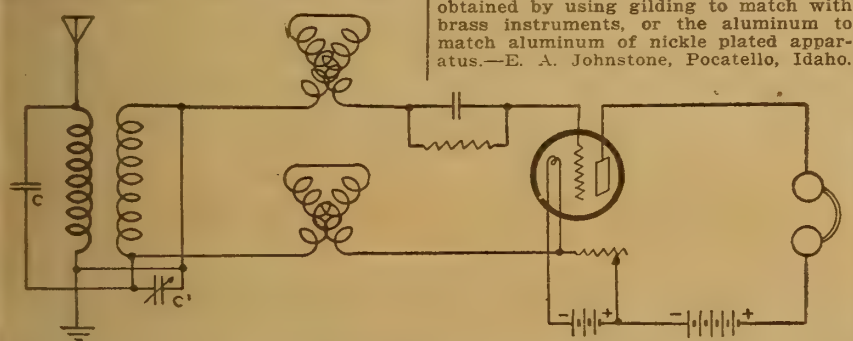


Flexible Leads for Rotors

Variometers and variocouplers in which the bearings alone are relied upon to conduct the energy from the moving coil, or rotor winding, to the rest of the circuit, are generally subject to trouble evidenced by intermittent signals. This is due to the fact that the bearing is either too tight to allow the rotor to turn readily or too loose to make good electrical contact. In any case, it is always advisable to put stops on the coil and make use of flexible "pig tail" connections to the rotor winding.—P. J. M. Clute, Schenectady, N. Y.

Condenser Serves Double

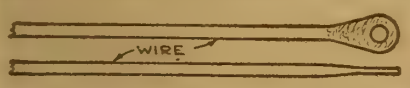
Having only one variable condenser and needing another I conceived the idea of using one for both the primary and secondary. By using a small phone condenser in series in the primary circuit I



did the trick and brought in stations I could not hear before.—John F. Dwiggans, Petersburg, Tenn.

Wire End Connections

Number 14 or larger copper wire or busbar is easily flattened at the end and a hole of suitable size drilled in it. This



takes the place of soldering a lug to the end of the wire and it makes a permanent connection that will slip under a small nut or binding post without a bunch of solder or the flaps of the lug sticking up in the way.—D. B. T. Dell, Columbia, S. C.

Shielding Panels

Many methods of shielding panels have been tried by the writer, but the following method has proved to be the most durable, neat and equally effective to any of the other methods tried.

The shielding must not touch any of the apparatus in the circuit, with the exception of the ground connection, otherwise trouble may occur from shorts and grounds. After drilling the panel for the various instruments, paint around these holes with molten paraffin, after the paraffin has cooled it may be trimmed down so as to make the space around the holes even and neat. After this has been done paint the panel with aluminum, silver or gold picture frame gilding. After the first coat has dried thoroughly, it is well to apply a second or even a third coat, as the thicker the shielding the more effective it will be and the less resistance it will offer for the accumulated charges to pass on to the ground.

After the gilding has thoroughly dried, the spots previously paraffined may be cleaned off with a knife, leaving the spots free from the gilding.

A slight reduction of hysteria losses may be obtained by using a separate shield for each instrument, that is by dividing the shielding into separate portions for each instrument, shieldings all being grounded.

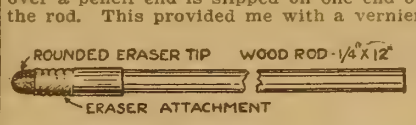
A very finished and neat effect may be obtained by using gilding to match with brass instruments, or the aluminum to match aluminum of nickle plated apparatus.—E. A. Johnstone, Pocatello, Idaho.

Increasing Crystal Set Range

Cut off about ¼ inch from the contact end of the cat whisker and replace it with a piece of filament support wire from a burned out 25 watt mazda electric light bulb. This is a very fine wire with considerable stiffness.—Arthur Thornton, McKeesport, Pa.

Eliminating Capacity Effects

A handle for turning the knobs may be made from a wooden dowel rod ¼ inch in diameter and about 12 inches long. A pencil eraser attachment designed to fit over a pencil end is slipped on one end of the rod. This provided me with a vernier



that is as good as any on the market. The adjustment was secured by putting the eraser end up to the edge of the dial and slowly twisting the outer end of the rod. Before using the eraser should be tapered with sandpaper.—Raymond Dannenbaum, Vallejo, Cal.

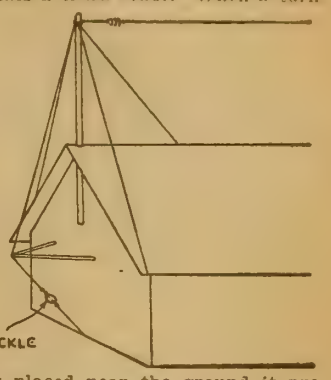
Use of Celluloid Putty

Sheet celluloid is as good an instrument as bakelite in making Radio apparatus. The different parts may be glued together with celluloid putty. This is made by filling a four-ounce bottle half full of equal parts of ether and denatured alcohol, and then adding all the "scraps" of cut celluloid that can be forced into the bottle. After 24 hours stir with a stick. Beware of fire, however.

Bracing Aerial Pole at End of a Ridge Roof

The accompanying diagram shows an excellent way of bracing an aerial pole where an anchor for a fourth guy wire is not available. My aerial consists of a 20-foot two-by-four on the end of a 20-foot building. It is braced in the manner described and has withstood several storms that have torn other aerials down.

I call this a truss brace. When a turnbuckle is placed near the ground it provides an easy method of keeping the guy wires taut.—P. C. Bowman, Springfield, Mo.



A loading coil is an inductance connected in the antenna circuit to receive longer wave lengths than the natural wave length of the antenna.

Your set will work just as good unmounted as in a cabinet.

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A. B. C. LESSONS

(Continued from page 11)

that no dirt or foreign matter of any kind will get into the solution. To use the hydrometer, the caps of the cells are opened and the rubber tube is inserted until the end projects below the surface of the electrolyte. The bulb is then squeezed and slowly relaxed so that some of the solution can gradually rise into the glass tube. The inner stem will then float in this extracted solution, and the point on the scale on the same level with the surface of the solution will be the specific gravity. To get most accurate readings, the hydrometer should always be held at the same level as the eye, this will avoid parallax and eliminate errors resulting from looking at the stem at an angle.

When taking a hydrometer reading, care should always be exercised so as not to spill any of the solution on the tops of the jars. Also the solution should always be returned to the cell from which it was taken. After a hydrometer has been used a number of times, it is always good practice to clean it well in pure water. When not in use, a hydrometer should always be kept in a clean place, preferably a closed box, so that no dirt will get into the battery solution.

Care of Storage Batteries

A storage battery should always be kept in a clean dry place and where it will not be subjected to too high or too low temperatures. The tops of the cells should be kept as free from dirt and moisture as possible. In case some acid solution is spilled on the jars, this should first be wiped off with a cloth soaked with dilute ammonia or baking soda solution, and then cleaned further with pure water. The accumulation of dirt and moisture on top of the cell jars may cause current leakage and premature exhaustion of the battery.

Another important point to observe is to see that the electrolyte within the cells is always kept at the proper level. It should never be allowed to become lower than the tops of the plates, but on the other hand should always be about ¼ to ½ inch above. The amount of water in the solution will constantly become less due to evaporation and electrolysis, and it will hence be necessary from time to time to replenish this. Only pure distilled water should be added to the solution, never any acid, for it is only the water that evaporates, not the acid. However, in case some of the electrolyte has been spilled, it will be necessary to add more acid. When this is necessary, the solution added to the cells should be of the same specific gravity as that still remaining.

A battery should always be kept in a well charged condition in order to secure maximum capacity and longest life from it. It should never be allowed to remain in a discharged condition for any length of time, nor should it ever be discharged beyond the point at which the specific gravity drops below 1150. Best efficiency and greatest activity will always be obtained when the plates are maintained well-charged so that a minimum amount of lead sulphate can accumulate on the surface.

Charging Storage Batteries

The process of charging a storage battery consists of sending an electric current from some external source through the cell in a direction opposite to that in which the battery itself causes a current to flow. During this charging the active material on the plates, as well as the electrolyte, are restored to their original condition again.

For charging purposes only direct current should be used. Alternating current will not do. Where a direct current lighting circuit is available, the battery can be charged directly from this line, providing, that sufficient resistance is cut in series with the battery to cut the current down to the necessary value. Unless this is done an excessively large current will flow, with the result that either the fuses are blown or the battery ruined. For charging purposes the positive terminal of the battery must always be connected to the positive side of the charging circuit.

One Way to Charge

In Figure 59 is illustrated a typical circuit arrangement for charging a storage battery from a 120-volt direct current lighting circuit and using incandescent lamps as a resistance for regulating the amount of current flow. As is shown, the circuit enters at the fuse block and the double-pole switch. Connected in series with the line is an ammeter used for indicating the amount of current flowing in the circuit. The current then flows through the bank of lamps (the lamps being connected in parallel) and then enters the positive terminal of the battery. The negative terminal of the battery is then connected to the negative side of the line.

The number of lamps to use depends upon their size and the amount of charging current desired. An ordinary 60-watt lamp permits about one-half ampere to flow. Hence enough lamps will have to be cut in until the current is of the right value. The normal charging current it will be remembered can always be determined by dividing the ampere-hour capacity by eight. If a charging current of 6 amperes is wanted, twelve 60-watt lamps will have to be connected in parallel, and the entire group of lamps then connected in series with the battery. The battery should be allowed to remain on charge until the specific gravity has become steady at a value of between 1275 and 1300.

Rectifiers

Where only alternating current is available, some device must be used for rectifying or transforming it into direct current. There are numerous types of rectifiers on the market, some are of the bulb type and others are of the vibrating reed type. The bulb type of rectifier is generally quieter and more positive in operation and less likely to give trouble.

If the above suggestions and directions are carefully followed, little trouble will be experienced in using a storage battery, and maxim efficiency and longest life will be obtained from the apparatus.

THE END

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How to Make One Condenser Flivver Super Set

Part I—Amplifier Details; Making the Inductance

By E. T. Flewelling

IT WAS promised in the April 14 number of the Digest that further details regarding the construction of the Flewelling Amplifier would be discussed in a future installment of this series. So many thousands of Radiophans have poured in letters requesting further information on this subject that it is planned to devote this, the first installment of a new series describing the greatest development yet of the Flewelling Flivver, which is none other than the One-Condenser Super.

Another consideration, which must be allowed before proceeding. In the April 14 issue the One-Condenser Flewelling was shown with no B battery potential on the amplifier tube. This error of omission was made by the draughtsman in preparing the circuit for illustration, and was not noticed until too late.

The corrected circuit is shown herewith.

Explanation of Circuit

In the diagram illustrated the condenser 4 takes the place of the former bank of three fixed condensers of .006 mfd. capacity and the variable grid leak shunted across them. Condenser 4 has a capacity of .006 mfd.

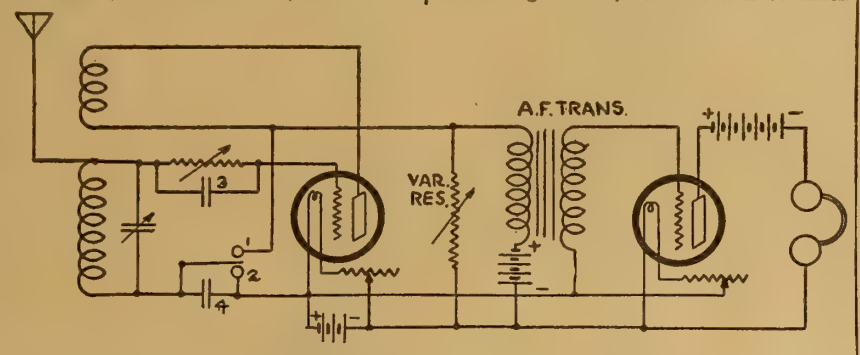
It will be noticed that a single pole double throw switch is connected in the circuit at this point. By throwing this switch to point 1, the hook-up becomes purely regenerative, shunting the .006 mfd. condenser and breaking the plate connection to the grid circuit. By means of this switch it is possible to make comparisons between signals on an ordinary regenerative apparatus, and the wonderful stimulation in the same signals effected by converting the apparatus to a Flewelling Super.

Guarding Against Back Coupling

The necessity of guarding against the possibility of back coupling from amplifier to detector, or vice versa, has often been pointed out in the previous series of articles in the Digest. In this seemingly trivial point of apparatus design and construction lies one of the secrets that is of paramount importance in the successful accomplishment of amplification.

The second point to consider is the necessity of guarding against the free action of the whistle, or blocking action, characteristic of the Flewelling Super detector, upon the grid of the amplifier tube.

Due consideration must be given both these stumbling blocks, else no success may be righteously expected in the use of the completed amplifier. Otherwise the experimenter will simply amplify all of the tube noises, static or atmospherics, and other extraneous sounds, and will receive but very little relative amplification of the signal coming in.



Elimination of Troubles

Considering the elimination of these troubles, first remember what has been previously said regarding coupling back. Shielding of the amplifier will help considerably and a separate B battery for the amplifier becomes a necessity. Were it not for the expense, a separate A battery might also be of help, but the extra cost makes this impractical. In regard to keeping the whistle action from the grid of the amplifier, this is really the most important point.

This may be done in two ways, the first of which is by far the most satisfactory. This is the placing of a filter between the detector and the amplifier tubes.

In the second method instead of keeping the action from the grid we "sidetrack" it by the placing of a high resistance across the primary of the audio-frequency transformer. This high resistance would be of the order of from 100,000 to 5,000,000 ohms. A good variable leak will serve very nicely for this purpose.

Patent Situation Prevents Diagram

Due to the patent situation the writer will be unable to publish a diagram showing what has been found to be the best method of handling amplification with the Flewelling Circuit, but this will be taken care of for the Radiophans within a very short time. The above method of handling amplification is very good. Because we find it necessary to postpone for a few issues complete details on the amplifier for the circuit let us consider the building of the new type of Flewelling Super.

The first circuit that was published contained three large fixed condensers plus an extra grid leak. After pounding out the theory and closely analyzing the action of the circuit we found that the extra grid leak and two of the large condensers were unnecessary. Exactly the same action and results are obtained by the use of a standard tickler coil circuit plus an added connection and one large .006 mfd. condenser. The diagram for this circuit is shown herewith and constituted what is undoubtedly the simplest known form of the circuit.

Complete Instructions to be Given

Success with the Flewelling circuit has been absolutely phenomenal but, judging by the number of inquiries and reports of success received within the last few weeks since this circuit was originally published, we know that there is a very large demand on the part of the fans for complete instructions concerning how they themselves may construct the circuit. Therefore, we shall begin a series of articles describing completely in every detail how the simplified Flewelling circuit may be constructed, using only the simplest, most easily obtainable and cheapest but best materials.

There have been so many attempts to merchandise and commercialize the name Flewelling that hereafter it will be impossible to mention any specific make of apparatus.

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(Continued on page 18)

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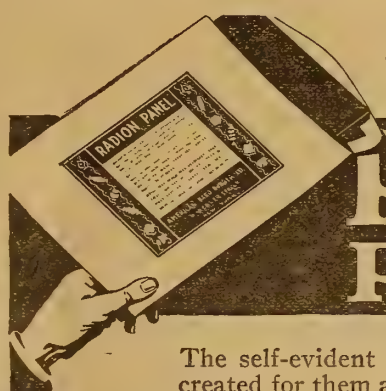

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How Ocean Vessels Are Guided by Radio Waves

Ether Signals from Submerged Cables Bring Ships into Harbor

By Peter J. M. Clute

ASIDE from the broadcasting of news and entertainment and the linking of widely separated points, Radio has many potential uses. Perhaps, one of the most useful developments in this line is the Radio piloting cable, with its great possibilities in the field of commerce and navigation.

Submerged Cable

The Radio piloting cable is essentially an insulated, electrically-charged, submerged submarine cable laid in a channel or an entrance to a harbor, and is used as an aid to navigation by serving as a guide to vessels entering during foggy, misty or hazy weather. Under such atmospheric conditions, the navigating officers are unable to pick up the buoys which are used to mark the navigable channel. Ordinarily the vessel cannot proceed into the harbor until the fog or mist has raised. By the use of the Radio piloting cable, as demonstrated by practical tests and experiments with this system at several large harbor entrances, vessels with navigating bridges screened in so that the pilots could not see the channel, have successfully managed to keep to the course and dock in safety. The feasibility and practicability of the system was effectively demonstrated during these tests, inasmuch as the navigating officers, in each case, were able to pursue a course at either side of the piloting cable without any difficulty, although having no previous experience with the scheme.

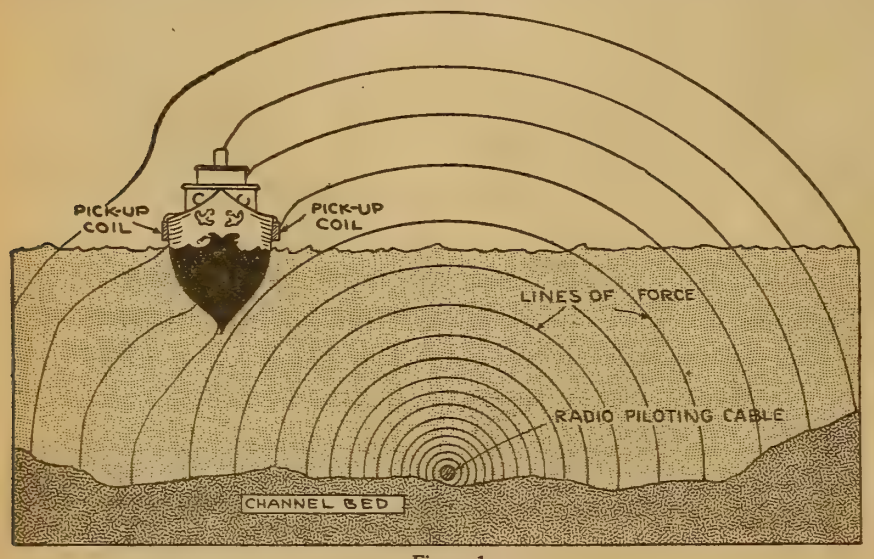

Figure 1

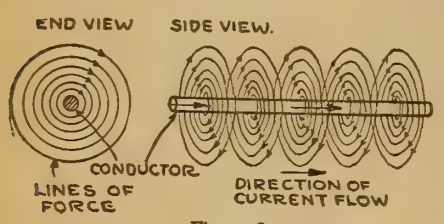

Figure 2

Cable Placed In Harbor

The submerged insulated cable is laid along the harbor or channel bottom, extending from a power station at the shore end, along the channel to a point several miles away, usually at the entrance to the harbor. Current at a frequency of about 500 cycles per second is supplied to the cable, thus producing an alternating magnetic field around the cable. Vessels equipped with special loop or "pick-up" coils mounted on each side and connected to suitable amplifiers are thus enabled to follow the lay of the cable by a simple comparison of the relative strength of signals received by the "pick-up" coils. Figure 1 shows a diagrammatic idea of the scheme.

Magnetic Field

The existence of a magnetic field about a conductor carrying current forms the basic principle of the Radio piloting cable. The magnetic field produced by a current of electricity always lies in a plane at right angles to the current producing it. In other words, the lines of force about a straight conductor carrying a current are concentric closed circles, of which the conductor is the axis. This is shown in Figure 2. If the direction of current through the wire is reversed, the direction of the lines of force will be reversed. It will be apparent from the illustration that the positive direction of the lines of force bears the same relation to the direction of current as the direction of rotation of a right corkscrew bears to the direction in which it advances. Likewise, to an observer looking along a conductor in the positive direction of the current, the positive direction of the lines of force will be clockwise.

Circular Lines of Force

Referring to Figure 2, the circular lines of force are further and further apart as the distance from the conductor increases. This is representative of the fact that the strength of the magnetic field near a straight conductor is greatest next to the conductor and diminishes as the distance increases. While the lines of force about a conductor permeate all space around it, the field becomes gradually weaker and weaker as the distance from the conductor increases, so that for all practical purposes it may be assumed that the field exists only in the space close to the conductor. The field strength decreases inversely proportional to the square of the distance from the conductor. Also, along all parts of a conductor in which the same current is flowing, the field is uniformly distributed.

The Radio piloting cable, in consequence of the 500-cycle alternating current flowing in it, radiates a corresponding alternating magnetic field. With proper apparatus this field can be detected or "picked up" at a distance of up to 1000 yards. By this means, the position of the piloting cable can be located by sensitive receiving and amplifying equipment.

Experiments to Find Range

Experiments which have been made with the Radio piloting cable with the object in view of determining the useful range of operation, have been instrumental in securing valuable data for the further elaboration and development of the scheme. The detecting equipment consists essentially of two "pick-up" or loop coils, one being suspended vertically on each side of the vessel, from ten to 15 feet above the water-line. Figure 3 shows the installation. Each coil is made up of two hundred to three hundred turns of number 12 or number 14 B. & S. gauge wire wound on a four-foot square loop frame. A double-throw selector switch permits connecting either detecting coil in circuit with a sensitive audio-frequency amplifier outfit. With this vacuum-tube amplifier, the comparative or relative strength of the signals picked up by the two coils will furnish the means of determining the vessel's position with reference to the location of the submerged piloting cable. The "shielding" effect of the ship's steel frame or hull exerts an unusual influence in that louder signals are obtained when the vessel is slightly to one side of the cable than when it is directly over the cable. In the latter position, the signal strength will be approximately the same from the two coils.

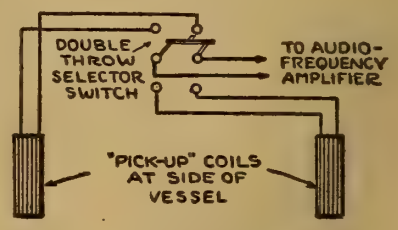

Figure 3

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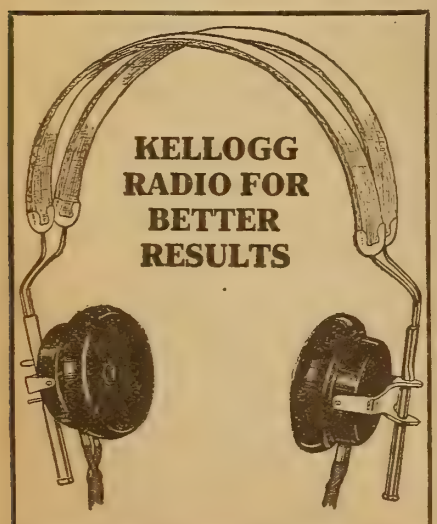

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Manufacturers Est. 1905
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Practical, Easily Made Single Tube Reflex Set

Part II—Wiring the Set

By H. J. Marx

AFTER the apparatus has been mounted on the panel there are still three parts to be taken into consideration. The tube socket, the audio frequency transformer and the Radio frequency, or reflex transformer.

Figure 1 shows a baseboard measuring six inches by seven inches and 5/16 inches in thickness. Naturally the size of this baseboard is dependent on the cabinet size, for this reason no provision was made for it in the panel layout.

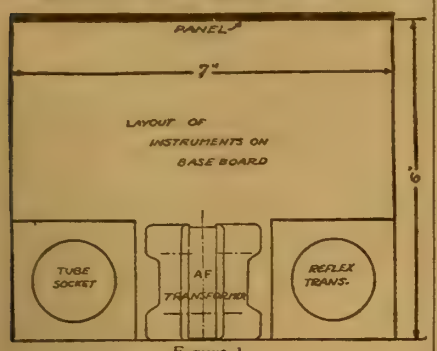

Figure 1

In the illustration a suggested arrangement of these three units is given. The secondary terminals of the Radio frequency or reflex transformer should be facing the primary terminals of the audio frequency transformer in order to keep the leads as short as possible. The crystal detector is connected in series between the grid terminal of the Radio frequency transformer and the plate terminal of the audio frequency transformer. The by-pass condenser should be connected across the primary terminals of the audio transformer.

Inductance Tap Switches

The inductance switches used are of the type with the contact points on a mounting plate in the rear of the panel. Since each switch has 15 contact points and there are only 6 each rough and fine tap connections only the alternate contact points were used and the last 4 points were left open. The odd points on the dial of the switch, 1, 3, 5, 7, 9 and 11, are connected while the remaining points are open. If desired, however, the first and second, third and fourth, etc., can be connected together and thus eliminate the open points which may confuse a person in turning.

The leads from the taps on the variocoupler are usually long enough to make connections without a lengthening piece. The contact points on the switch are slotted so that it is a simple matter to slip in the leads.

Soldering the Wires

A little soldering paste is placed on each point and when the soldering iron is applied the flux will flow into the slot and around the wire. Then when the solder is applied it will fill up to the slot and lock the wires in position with good electrical contact.

Antenna and Ground Connections

Looking at the rear of the panel the antenna binding post is in the upper right hand corner. Following the circuit, the lead runs from this point to the terminal of the rotating plates of the variable condenser, then to the one secondary terminal of the variocoupler. From here it goes to the lever terminal of the inductance switch, and over to the grid terminal of the audio frequency transformer.

The lead from the ground binding post connects only to the lever terminal of the other inductance switch.

Battery Posts Connections

The binding post in the lower right hand corner (rear view) is the A+ terminal and the lead runs direct to this post on the tube socket.

The two posts in the center are for the connections to the negative sides of both A and B batteries. These two posts are connected together by one lead which then runs to the rheostat, then to the one side of the .002 mfd phone and battery by-pass condenser, in addition this lead connects to F— terminal on the secondary of the audio frequency transformer.

The lower left binding post is the B+ terminal and is linked to the phone post above it, in addition the lead connects to one terminal of the open circuit jack. The other terminal of this jack is linked to the top left binding post, the other side of the by-pass condenser and the B+ side of the Radio frequency or reflex transformer.

Tube Socket Connections

The positive filament lead has been added, the negative filament terminal of the socket connects to the rheostat. The grid terminal connects to the secondary of the variocoupler and the fixed plate terminal of the variable condenser.

The plate binding post on the socket connects to P terminal of the Radio frequency or reflex transformer.

In reflex this compact arrangement of apparatus is an important feature as it avoids unnecessarily long leads. Because of the double duty imposed on the tubes naturally inductive interference will be unduly noticeable and should be avoided.

Voltage of A Battery

The A battery voltage should be 6 since peanut tubes are not recommended for reflex circuits. The B battery voltage at about 90 will give best results although with different tubes it may have to be changed.

The construction of a suitable cabinet is left to the discretion of the builder.

THE END

In winding your loose coupler, both coils are wound in the same direction.

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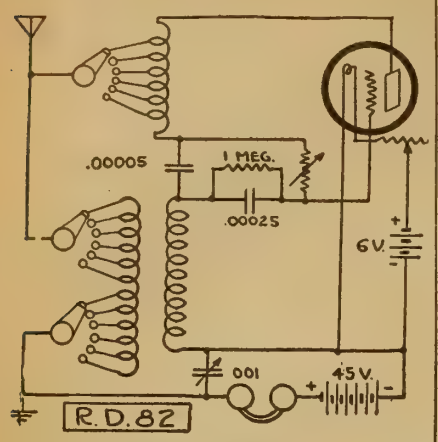
Super Antenna Company, Quincy, Illinois, U. S. A.

ARRANGEMENT MADE BY KAUFMAN SHOWN



CONSIDERABLE interest is being aroused in Radio circles throughout the East over the efficiency of the new Kaufman Circuit, originated by Wolff Kaufman. This circuit is illustrated as hook up Diagram R. D. 82. At first glance, no especial differences are noted in the circuit. Actually there are two distinct departures from the usual form of circuit.

First, the plate circuit feeds through the primary tuning inductance before passing through the receivers to the opposite side of the plate battery. In series in the plate circuit and the antenna lead, is added a single layer inductance consisting of 80 turns of No. 22 cotton covered wire wound on four inch tubing. The last 20 turns are tapped at every turn. This tapped switch connects to the antenna side while the tapped side of the coil connects to the plate of the tube. The untapped end of the coil with a condenser in series connects to the grid side of the secondary of the variocoupler. In addition, a variable grid leak is added from the grid of the tube to the lead, connecting this condenser and the tapped coil.

Considerable experimentation and analysis is taking place in this circuit to determine the exact theory of operation. On the surface, we have obviously a form of regenerative feed back which may be compared somewhat to a reflex idea in which the plate energy not only feeds to the primary circuit and thus re-enforces its power, but in addition feeds directly back through a capacity and inductance coupling to the grid circuit.

It will be noticed that the capacity coupling between this plate and grid circuit has a very low value and apparently the most effective control of this grid feed back is by means of the variable grid leak. Although the circuit is new apparently on the surface, it is but a combination of various developments and ideas that have been presented in the past and due credit should be given to the originator for the time and patience required in developing it to a practical stage.

Undoubtedly the circuit affords unlimited possibilities of still further development along this line and it is quite apparent that more will be heard from it from time to time.

FLIVVER SUPER SET

(Continued from page 15)

Use about No. 22 wire of double covering, either cotton or silk. Do not use single covered wire or enameled wire. Begin and wind 130 turns of wire on the tube, taking taps off from the 50th, 85th, 100th, 115th and 130th turn. This gives us six taps that may be chosen on the winding. These will be found to be plenty. No attempt should be made to pick out single taps.

Do not shellac the winding. Depend upon tightness of the winding to hold it in place, and if necessary to use a binder, use nothing but collodion. The rotor ball should have from 100 to 125 turns upon it.

This constitutes the heart of the Flewelling receiver and inasmuch as space is limited, more details of construction will be given in the second article of this series, to appear next week.

Which Side Is Positive

The positive side of a battery is that from which current flows to the external circuit. Negative is the return circuit to the battery. This applies only in direct current.

Reviews of Books

Ideas for the Radio Experimenter's Laboratory. By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data is given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, Vacuum tube characteristic measuring set and detailed advice given on the winding of various kinds of standard inductance coils. Price, 75 cents.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

Lefax Radio Handbook. A loose-leaf handbook. This book never grows old or out of date. All of the latest apparatus and hook-ups are added as time goes on. Anything that grows old is taken out and new leaves substituted. Price, $3.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know and we will see that the book is mailed to you. Porstage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

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CRL Rheostats, 75c List	.45
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Radio Corp.	Special Pr.
Fada	Special Pr.

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De Forest (Moulded)	Special Pr.
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WD 11 (Bell Panel or Base Mtg.)	.90

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TRANSFORMERS (Radio Freq.):

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Radio Lab. RT-1 (Limited supply)	3.90
Murad T-11 (Old standard)	3.80
Radio Corp. UV 1714	Special Pr.

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Emaloid 3-in. Unbreakable	.35
Emaloid 2-in. Unbreakable	.25

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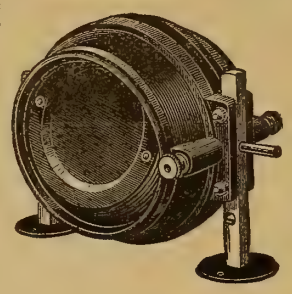
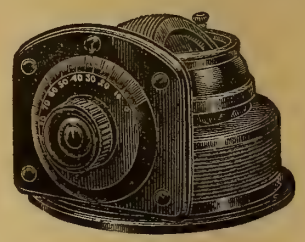


Radio Bargains



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5.00 R. E. S, 180°	3.50
4.75 Fada, 180°	3.50
4.00 Signal, 90°	2.95

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60c Signal WD 11	.45
50c Corona Porcelain	.25
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1.00 U. S. Signal Corps Antenna Cable (4 Strand Tinned Copper, 3 Strand Tinned Steel)	.65
.10 Porcelain Strain Insulators	.07
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8.00 Brandes Superior	5.95
5.00 Red Star 2400 Ohm	3.50
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.40 Tin Foil for Shielding	.25
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Questions and Answers

Phone Connections

(3298) MMS, Baltimore, Md.

I would appreciate to be enlightened as to the following:

. Is it necessary to put a lightning arrester on an insulated lead-in that is soldered to a tin roof and used as an antenna?

Does it harm a 120-ampere A battery to charge it at the rate of 10 amperes?

Is it necessary to turn your tubes off when finished, or is it better to disconnect your batteries leaving your rheostats at their last tuning point?

What is meant by connecting phones in parallel or series? I could never differentiate these two terms in my mind.

When using an Ever Ready dry cell B battery with a 45 volt tap when it runs low can I increase the current by using a 4½ volt unit in series?

I get best results from my detector tube when the point on the side of the tube is not pushed all of the way in the slot. The contacts seem to be O. K.; why is this?

If you do not disconnect your A and B batteries when your rheostats are off, does it consume any current?

I have a detector and a 2-step amplifier with a tuner of the Reinartz type using a spider web coil, and two 23-plate condensers with one rheostat, controlling the two amplifying tubes. How can I tell if this set is regenerative; if not, how can I make it so?

I can only receive local stuff in the day time, but at night I get a thousand miles and more consistently. How can I receive out of town stations in the day time?

What is the function of a transformer?

Can Radio frequency in a separate unit be attached to a Reinartz circuit? How?

I am using two 45-volt B batteries in my Magnavox, but it seems like 90 volts paralyze the tube; 45 volts seems to work better, but I can only get local stations with any volumn.

Will a 201 A tube function properly with the present type of transformer?

Is a 6,000-ohm phone louder than a 2,400-ohm?

A.—Theoretically there would be no necessity of using a lightning arrester on an insulated lead-in as described; however, it is a requirement of fire underwriters and must be complied with.

No detriment will result from charging A battery at the rate suggested.

Would advise turning rheostat down just after charging battery before connecting battery to set.

We are illustrating by diagram method of connecting phones in series and parallel for your information.

Battery current may be increased in the manner suggested, but when it runs low it will begin to make noises in tube; thus it would be rather advisable to use a new battery.

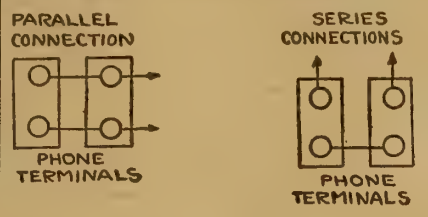
Would advise clearing contacts points with emery cloth to permit of fitting closely tube into socket.

No current is consumed when filament of tubes are not lit.

The circuit you are using is already employing regenerative principle.

Reception by night is both theoretically and demonstrable better by night than by day, due to the ionization of the air by the sun's rays. The receiving range is about one-tenth as great in day time as at night.

A transformer's function is to step up the voltage, generally speaking. However, in a Radio receiving circuit it has many purposes.



Method of using Radio frequency with Reinartz circuit is shown on page thirteen of December 16 issue of Radio Digest. However, we are not advising that it is generally effective with this circuit.

If a tap is used so that detector tube does not get to exceed twenty-two and one-half volts, plate potential amplifying tube should easily stand ninety volts without detriment.

A 201 A tube will function effectively and afford more volume than a 201.

A 6,000-ohm phone is not necessarily louder but more sensitive than a 2,400-ohm.

Flewelling Battery Voltage

(2392) W.N.A., Minneapolis, Minn.

Will you please inform me by return mail the voltage of the A and B batteries that are to be used with Flewelling Set? In the description batteries are not mentioned.

A.—Answering your inquiry with reference to Flewelling circuit will advise that the voltage of A battery depends peanut tube, requires one and one-half upon the type of tube used. A WD 11, volt on the filament. A Myers tube requires four volts and a standard tube such as Cunningham or Radiotron requires six volts. B battery voltage for a WD 11 tube should be sixty-five while for other tubes as high as one hundred and fifty volts may be used.

Reinartz with WD-11

(2396) LOS, Canton, S. D.

In your issue of January 13th, in article by H. J. Marx on "How to Make and Operate a Reinartz Receiver," it states that "this circuit will function well with any tube." Does this mean that I can use a 1½ volt tube in hook up shown in same article?

If not, why?

Have not been able to get a Nov. 25th issue to see the hookup for WD-11 tube.

A.—Answering your inquiry, will advise that a one and one-half volt tube may be used in the Reinartz circuit. As a matter of fact in any standard circuit. No change is required in circuit other than substitution of a one and one-half volt dry cell for the usual six-volt battery.

We note your failure to secure November 25th issue of Radio Digest. May we suggest the advantage and convenience of having your name upon our regular mailing list rather than depending upon newsstand service, which is apt to be disappointing as in this instance

Receiver Polarity

(2372) LO, Chicago, Ill.

Please tell me an easy way to find the polarity of receivers?

A.—Answering your inquiry as to method of determining polarity of phones, would advise that this may be accomplished by means of an ordinary compass. The south pole of the magnet (in receiver) will attract the north seeking pole of the compass and the north pole of the magnet (in receiver) will attract the south seeking pole of compass.

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Radio Illustrated

What is Billie Dove, Metro screen actress, listening to with such eagerness? Whatever the Radio waves were waving, they kept Miss Dove occupied during the five weeks she and the other members of the cast of "All the Brothers Were Valiant" spent aboard the whaling schooner, the "Carolyn Frances." It was on this schooner that many of the important scenes in this Irvin V. Willat production of Ben Ames William's story were filmed. "All the Brothers Were Valiant" is a Metro picture

It would be disappointing indeed to find out that two of the star performers of a Radio musical comedy were not Radiophans. However, we need not worry on account of George Clark and Tiny Mite, principals of "Radios" at the London Palladium, for the above picture proves how they stand on the question

A real loud speaker installed on the roof of the Western Electric permitted the officials of the company to speak to Pres. Du Bois via telephone and Radio as he sailed on the S. S. Aquitania. After the farewell messages a quartet sang songs for the passengers on the Aquitania © K. & H.

The photo shows Operator Raymond F. Guy adjusting wave length with a wavemeter at WJZ. This station has some of the finest Radio apparatus in the country. From the look on Raymond's face you can judge that adjusting this delicate apparatus is not play © K. & H.

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NEW WAVES TO END QRM

To the left is Miss Gertrude Paine, who is spoken of in broadcasting circles as "a peppy monologist and snappy accompanist." From this title you will readily judge she is somewhat of a jack of many trades and her versatility makes her almost indispensable to the broadcasters. Miss Paine recently gave some of her most popular readings and piano selections from Station KQV, of the Doubleday-Hill Electric Company, Pittsburgh, Pa.

MAY 15 DATE PLANTS TAKE ON NEW PLAN

Listener-In's Woes Cease

Official Order by Herbert Hoover to Take Effect—Stations Enthused Over Unique System

By E. E. Plummer

CHICAGO.—Broadcasting station interference and many other woes of the listener in will disappear at noon, May 15, with the taking effect of the reallocations of wave lengths in accordance with the Second National Radio Conference. The plan to end QRM, as "interference" is known in Radio code abbreviations, has been signed by Secretary of Commerce Hoover, and provides for 34 distinct and well separated wave lengths for Class B stations in 36 different

(Continued on page 2)

Following the recent broadcast of Miss Madelaine Borschneck-Bossi from Station WOR, Newark, N. J., we received numerous requests to print the picture of the "lady with the nightingale voice." If you were one of the fortunate ones who were so charmingly entertained by her, you will admit this talented coloratura soprano is equally charming in appearance as is the sound of her voice over the ether. It is unofficially announced that Miss Bossi will again be on one of the early programs of WOR by special request of the many fans who have heard her before

WNAC Gives Jazzmania at Request from Mae Murray

BOSTON, MASS.—Mae Murray, the motion picture star, had a special broadcast arranged for her by WNAC (Shepard Stores) on April 13, when she gave a Radio party in New York. She has been so pleased with WNAC programs that she made a request that the Colonial Orchestra play "Jazzmania" during her party.

TINY RECEIVER TUNES IN WNAC AND OTHERS

BOSTON, MASS.—Carlton Margeson, 171 King street, Dorchester, Mass., has built a tiny crystal Radio set that is only four inches long, seven and one-half inches wide, and one and one-half inches high. The tuner has 500 turns of Number 22 cotton covered wire, with 20 taps 25 turns apart. He gets Station WNAC quite clearly, and even WGI with this set. The total cost was $1.35.

WGV DISTANCE RECORD CLAIM SUBSTANTIATED

Heard in Alberta, Canada, and Off the Azores

NEW ORLEANS, LA.—The record long distance range for the small current used is believed to have been achieved by WGV, broadcasting station of the Interstate Electric Co., this city.

The station radiates on one and seven-tenths amperes and recently received a report from Grand Prairie, Alberta, Canada, which arrived simultaneously with a verbal report from the Radio operator of the S. S. Broncho, who came ashore and told L. C. Parker, Jr., of the Interstate company that he had heard WGV programs while at sea off the Azores some weeks ago.

"A similar maximum range is claimed by a St. Louis station, but that record fails to approximate the New Orleans record since the St. Louis station uses a nine ampere current," Mr. Parker declares in an interview with a Digest representative.

EXCLUSIVE WAVE LENGTHS FOR BROADCASTERS

(Continued from page 1)

cities, with 21 other wave lengths reserved for future B plants not now in existence.

Already a part of the plan has gone into effect; no broadcasters falling below the rigid qualifications set for Class B are being licensed for 360 meters, but are assigned wave lengths between 222 and 300 meters. These assignments are made by the district Radio supervisors who exercise their judgment to see that there will be no interference within their districts or with the districts adjacent.

Listeners In Can Tune Better

The wave lengths assigned to the B stations in the various localities are in accordance with the plan of the conference and are based entirely on the willingness of the various stations to co-operate in putting them into effect. Every station so far has fallen in with the plan with enthusiasm because of the better broadcasting and general beneficial effect it will have on Radio. Listeners in will be able to select their station at will, and without bringing in several other plants they have no desire to hear.

It is understood that any station now operating on 360 meters will have the privilege of remaining on that wave length if it so desires. Such stations, now commonly known as Class A, if they remain on 360 meters will be in what will be called Class C. New Class A stations (having an input less than 500 watts in their antenna, a Class B requirement) will be assigned a wave between 222 and 286 meters.

Besides the elimination of the general 400-meter wave, hereafter all government reports will be sent out by each station on its assigned wave, rather than on 485 meters, thus discontinuing use of this wave.

Exclusive Waves for Class B Plants

The thirty Cass B stations, now all on 400 meters, will be heard all over the country, once they obtain their new exclusive wave lengths, inasmuch as interference with other similar plants and small local stations has been their only barrier to this goal.

For the purpose of wave distribution without interference the country is divided into five zones. Assignments within these zones are for cities rather than for specific Class B stations, it will be noted. These follow:

	Frequency, Kilocycles	Wave Length, Meters
ZONE 1		
Springfield and Wellsley Hills, Mass.	890	337
Schenectady and Troy, N. Y.	790	380
New York City and Newark, N. J.	740	405
	660	455
	610	492
Philadelphia	590	509
	760	395
Washington, D. C.	690	435
ZONE 2		
Pittsburgh, Pa.	920	326
Chicago, Ill.	670	448
Davenport and Des Moines, Ia.	620	484
Detroit and Dearborn, Mich.	580	517
Cleveland and Toledo, O.	770	390
Cincinnati, O.	970	309
Madison, Wis., and Minneapolis, Minn.	720	417
ZONE 3		
Atlanta, Ga.	700	429
Louisville, Ky.	750	400
Memphis, Tenn.	600	500
St. Louis, Mo.	550	546
ZONE 4		
Lincoln, Neb.	880	341
Kansas City, Mo.	730	411
Jefferson City, Mo.	680	441
Dallas and Fort Worth, Tex.	630	476
San Antonio, Tex.	780	385
Denver, Col. (reserved)	930	323
Omaha, Neb.	570	527
ZONE 5		
Seattle, Wash.	610	492
Portland, Ore.	660	455
Salt Lake City, Utah.	960	312
San Francisco, Cal.	590	509
	710	423
Los Angeles, Cal.	760	395
	640	469
San Diego, Cal.	560	536

Reserved wave lengths in the five zones, that is, wave lengths which will be held awaiting the the erection of anticipated plants capable of B ratings, are: Zone 1, 303, 319, 469, 357, and 288 meters, Zone 2, 294, 345 and 366 meters; Zone 3, 300, 316, 375, 462 and 333 meters; Zone 4, 361, 291 and 306 meters; Zone 5, 297, 330, 349 and 370 meters.

What "Kilocycle" Means

In the tabulation above, it is noted that frequency in "kilocycles" is made the basis of the assignment. Dividing the speed of Radio waves, 300,000,000 meters per second, by the wave length, gives the frequency in cycles. A kilocycle is 1,000 cycles. In Radiophony it has been found best to rate stations according to their kilocycles frequency, as it is the separation or difference in this frequency, one station to another, that will permit the listener in to tune in the one and tune out the other.

The difference between each locality assignment, it will be noted, is 50 kilocycles. Another technical reason for this separation is to prevent audible heterodyning, sometimes called "beat notes," as a result of one station's frequency being too close in number to anonher's. The beat note is audible to most people when below 18 kilocycles difference exists between stations.

Stations will be rigidly required to keep within two kilocycles of their assigned waves. Constant check will be required to maintain accurate adjustments of the broadcast transmitters.

Kilocycles will supercede meters in designating the transmitting waves of all stations next year.

Class A Plan Similar

Similar somewhat to the plan for the Class B stations is that which has gone into effect for the Class A stations. District Radio supervisors are reassigning 833-kilocycle (360 meter) stations according to the plan, and all new Class A plants will receive "district-exclusive" wave frequencies between 1050 and 1350 kilocycles, that is, 222 and 286 meters, to take effect at once. The reassigned Class A plants will not use their new waves until May 15.

From the schedule of wave lengths for Class A stations, printed below, it will be seen that at least 20 distinct waves lengths are available for distribution in each of the nine Radio districts by the supervisors. Three or four wave lengths in each district will be reserved for the best of the local stations of this class, these waves not being assigned to stations in the immediately adjoining districts.

This gives the better of the Class A broadcasters a partially exclusive transmitting wave. For example, the wave length 222 meters may be assigned to stations only in the 4th, 5th and 8th districts; similarly, the wave of 233 meters will be authorized for use only in the 2d, 5th and 7th districts, while waves 224, 226, 229, etc., will be allocated in every district. This plan, it is believed, will tend to prevent considerable local interference, and create virtually an "A-1" class of stations within the general A class.

Each of the Class A station allocations, it will be noticed, is separated 10 kilocycles from the next. As in Class B allocations, stations must keep adjusted to within two kilocycles of their assigned wave frequencies.

Class A Wave Frequencies and Lengths

Below is given the Class A broadcasting wave frequencies and lengths, and whether the particular wave is to be assigned in each of the nine Radio supervision districts or is to be restricted in use to only certain districts. In the latter case the numbers of the districts entitled to its use are given:

Kilocycles Frequency	Wave Length, Meters	Assigned Districts
1350	222	4, 5, 8
1340	224	All
1330	226	All
1320	227	1, 6, 9
1310	229	All
1300	231	All
1290	233	2, 5, 7
1280	234	All
1270	236	All
1260	238	1, 3, 6
1250	240	All
1240	242	All
1230	244	2, 4, 8
1220	246	All
1210	248	All
1190	252	All
1180	254	All
1170	256	1, 3, 6
1160	258	All
1150	261	All
1140	263	2, 5, 7
1130	266	All
1120	268	All
1110	270	4, 7, 8
1100	273	All
1090	275	All
1080	278	1, 6, 8
1070	280	All
1060	283	All
1050	286	3, 8, 9

Women's Club Gives Hints on Gardening by Broadcast

AKRON, O.—Radio waves were very successfully used by the Ohio Federation of Women's clubs, April 22 to 28, to arouse public interest in gardening and landscaping, it was announced here this week by Mrs. W. W. Milar, chairman of the state federation's conservation committee. "Garden Hints" were broadcast by Radio, flashed on moving picture screens and printed in the newspapers during the drive.

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Looking Ahead

Major General Mason M. Patrick, Chief of the U. S. Air Service, in the next issue will tell Digest readers how Radio is being applied in aviation. Of these two modern forces in war, Radio plays an important part in assisting the other, aviation. Read what Major General Patrick has to say.

The Hazeltine Neutrodyne Circuit—will be discussed in an article next issue by Harry J. Marx, technical editor of the Digest. Mr. Marx has some interesting disclosures to make regarding this, the latest addition to the rapidly growing field of Radio "hook-ups."

Radio Waves; How They Are Made; How They Travel—the subject of Chapter II of Thomas W. Benson's series of articles for Radio beginners. Are you a newcomer? Read the second chapter next issue.

The Three Tube Reflex De Luxe Set—description for the making of which starts with this issue, will be continued next week. This wonder set, built and described by H. J. Marx, accomplishes the work of six tubes, but uses only three. Read more about it next week.

E. T. Flewelling's One Condenser Flivver Super Set—Part II next week. Due to illness and need of rest, Mr. Flewelling was forced to postpone the article which was to have appeared this week, but assures us he will have many live hints on the new set to tell Digest readers next issue.

Advance Programs of the Big Broadcasters for the Week—and more stations represented than in any other source of similar information. Watch this exclusive Digest feature expand. Read it every week so you will know the best nights to listen in.

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RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

BACK again this week with twelve new records and seventeen old ones beaten. Of these, S. S. Atwood of Esperance, Washington, wins honorable mention for submitting the most records and also the longest distance, which is 2500 miles. This is not being done every day. Send in your measured records.

Station Heard—Miles Away—Who Heard It

CFAC—1750, Ted Lehman, Ashland, Ky.
CHYC—2300, S. S. Atwood, Esperance, Wash.
KFDJ—2100, Ted Lehman, Ashland, Ky.
KGB—1725, Louis Bruchiss, Chicago, Ill.
KGY—1925, Paul French, Oxford, Mich.
KJS—1150, W. F. Galloway, Vancouver, B. C., Can.
KOG—2450, H. F. Andrews, Albany, N. Y.
KWH—2350, C. R. Buchtmeyer, Allentown, Pa.
WAAS—1025, E. B. Miller, Plainview, Tex.
WBAJ—1150, E. B. Miller, Plainview, Tex.
WBT—2250, Kenneth Curtis, Seattle, Wash.
WCAI—1100, A. C. Flint, Chicago, Ill.
WCAL—1400, S. S. Atwood, Esperance, Wash.
WGN—1750, E. B. Miller, Plainview, Tex.
WDAU—1700, E. B. Miller, Plainview, Tex.
WFAM—1300, S. S. Atwood, Esperance, Wash.
WFAV—1350, S. S. Atwood, Esperance, Wash.
WGAB—1750, J. A. Bernier, Quebec, Can.
WIAQ—1700, S. S. Atwood, Esperance, Wash.
WLAZ—2075, A. B. Butters, Los Angeles.
WMAG—1325, R. T. Andrae, Cobalt, Ont., Can.
WMAH—1350, S. S. Atwood, Esperance, Wash.
WMAU—1400, W. W. Selden, Springfield, Mass.
WNAC—2500, S. S. Atwood, Esperance, Wash.
WOAJ—1550, S. S. Atwood, Esperance, Wash.
WOAN—1100, H. M. Clark, Auburn, Me.
WOAW—1325, H. M. Clark, Auburn, Me.
WWAC—1550, Donald Wood, Waco, Tex.
WWAX—1700, Sydney Warner, Springfield, N. J.

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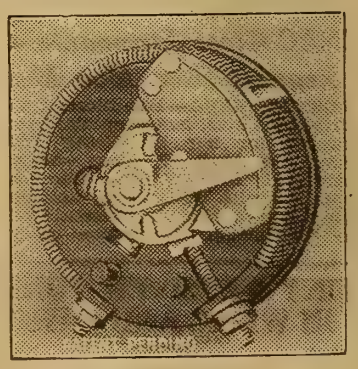

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BOOTLEGGERS FIND PROFITABLE FIELD

SMUGGLE "PEANUT TUBES" ACROSS BOUNDARY

Detroit Fans Make Purchases of Scarce Apparatus—Ask No Questions and Say Nothing

DETROIT.—A new kind of bootlegging has developed between Detroit and Windsor, Ont., just over the international boundary—smuggling "peanut tubes" into the States. Just why a situation of this kind should exist is difficult to determine, although there are plenty of critics ready to offer explanations.

However, the stealthy traffic here is a surprise to a great many people. Many are asking the question, "Is it because the North American market is controlled or divided? Is it made easy for the consumer to buy what the interests wish to sell it, but not at all easy for the public to buy what it wishes when it wishes?"

Can Get It Across the River

It is extremely difficult here to buy much of certain kinds of Radio equipment that the people are after. This comes in at infrequent intervals and even then one must have his order filed several days in advance before he can get it. However, it does not seem to be just the same across the Detroit river, a mile from the center of the city. There is little trouble over there it is said getting the very equipment that cannot be obtained here. Many, however, are not stopping to ask questions but make their purchases, put them away securely and say nothing.

JEK of WOR Has New Test Given Aspirants

Hears Violinist Over Phone Before Giving O. K.

NEWARK, N. J.—You know, or perhaps you don't know, that every one who broadcasts from WOR must submit to a test being made of his voice, or playing. When JEK, program director, made this rule, some of the other station managers thought that she would not be able to make artists come all the way to Newark for tests, especially since Radio programs are not paid for. But artists realize the publicity value in Radio, so they are willing to go to a little trouble to get on a program. Every day from 4 to 5 p. m. there is a steady stream of applicants, to make "try-outs." A novel one was made the other day, however. A very busy young violinist from New York had requested the privilege to broadcast and had been given the usual reply—that he would have to make a try-out. So he called up WOR and asked JEK if it would be possible to play without being heard by her beforehand.

"No," said JEK, "I'm sorry, but I must hear you play before I give you permission to play for the vast audience."

"But I can't possibly get over to make the try-out, as I am leaving on a concert tour in two weeks and I want to play over the Radio before that time."

JEK put on her thinking cap—it's a cap she wears nowadays, more than her other hats, too.

"I'll tell you what to do," said she. "Play a piece for me over the telephone. That would be so like the Radio that I can judge how you would come over the air'"

"It's a go," said the young man, and played beautifully! And he played for the Radiophans, on Friday, April 13th, at 8:30 p. m.—Lindsley Lindy, who has given concerts in London, Paris and Berlin, and who plays on a real "Strad."

Some big-hearted New Yorker anonymously contributed $100 for the purchase of a radio outfit for the leper colony in Porto Rico.

WOO CONCERT HEARD THROUGH PARIS LOOP

PHILADELPHIA, PA.—Station WOO has received a letter from Andre A. Marie, Electrical engineer, 4 Rue Richepanse recording the remarkable fact that Station WOO's transatlantic concert, broadcast March 15 with Marcel Dupre, organist of Notre Dame Cathedral at the grand organ, was heard in Paris on a loop aerial. This concert was heard simultaneously across America and across the Atlantic ocean.

YOUNG BROADCASTER HAS NEIGHBOR TALENT

HOUSTON, TEX.—Fred Mahaffey, Jr., 15-year-old high school student, claims to be the youngest broadcasting station operator in the world. He has regular programs daily except Sunday at 7:30 to 8 p. m. with his own violin selections, piano solos by neighbors and vocal numbers. Mahaffey's station is KFCV, 360 meters. He uses 10 watts antenna input and is heard all over the Southwest.

RADIO FOOLS THE POLLIES

Miss Marion Merle, pretty vaudeville girl, fooled her trained troop of macaws, cockatoos and parrots with a Radio instrument. The set she carries is made from an old newspaper camera box, but it works just as good as the best of them and the tropical talking birds got the thrill of their young lives trying to learn the source of the mysterious chatter © International

American Legion Station Closed for Summer, April 1

OMAHA, NEBR.—April 1 marked the close of the American Legion Station, WGAT. The station will not be opened again before early in the fall.

One of the features of WGAT has been simultaneous broadcasting in co-operation with Station WJAB. This was done by using a line and line amplifiers, which connected WJAB with the Legion studio. Both stations went out on different wave lengths, and the double broadcasting proved quite popular among the Radiophans.

Bequeaths Radio Set

The first case on record of a Radio receiving set being specified in a will was revealed when the will of J. J. O'Heir was probated in New York. He bequeathed a "Radio set and tools, valued at $500," to William Watson.

ENGLISH STATIONS RELAY BROADCAST

SIMILAR WAVE LENGTHS HAMPER TEST

Success of Experiment Opens Big Possibilities for British Broadcasting Company's Stations

MANCHESTER, ENGLAND.—A highly interesting experiment in Radio broadcasting procedure was carried out recently at the Manchester station of the British Broadcasting Company. For some time past the station has been relaying the Paris time signals, which are sent out on a wave length of 2,600 meters, then the officials endeavored to pick up and relay the London and Birmingham broadcasting stations.

This they did, part of the children's "talk" from London and the "talk" and orchestral program from Birmingham being received on a special aerial, which is set some short distance away from the normal transmitting aerial on which the items were re-radiated to the Manchester area listeners-in. The great difficulty lies in the fact that the wave lengths of the stations are so similar—Manchester is 385 meters, London 369 meters, and Birmingham 420 meters,—so that a particularly selective circuit is necessary to avoid jamming by the re-radiated signals.

This is the first time a direct Radio relay has been accomplished on the British Broadcasting Company's stations, and it naturally opens up big possibilities. If, as seems quite likely, the development becomes a thoroughly practical proposition, it may probably result in there being one big central broadcasting station only, say in London, where the best of the leading musical and vocal talent could be engaged, while in other parts of the country the auxiliary stations would merely relay the program for the private listeners-in in their areas.

PHONOFILM GIVES VOICE TO MOVIES

New Device Invented by Dr. De Forest Given First Public Showing

NEW YORK.—The first public showing of Dr. Lee de Forest's latest invention, the phonofilm, was given at the Rivoli Theater recently. Many so-called "talking pictures" have been exploited in the past in which a phonograph supplies the sound, but this will be the first showing of a film that literally talks and supplies music.

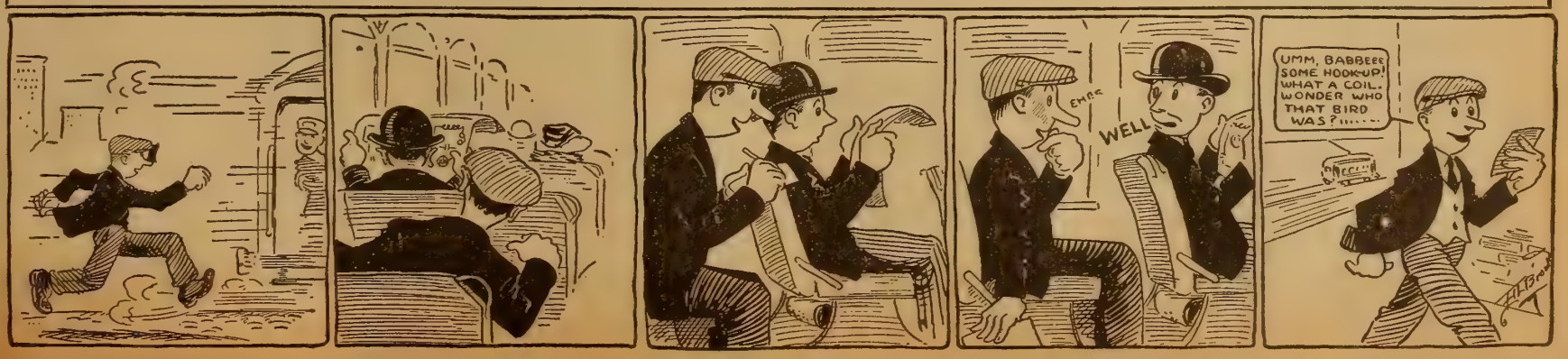
The phonofilm, as the name implies, is a combination upon the same film of picture and voice or music. The sound waves are photographed on the film at the same time the pictures are taken, thus insuring at all times perfect synchronization. In reproducing these sound waves are transformed into telephonic electric currents. By the use of Audion amplifier these currents are amplified 100,000 times and finally turned back into sound again through "loud speakers" located behind the motion picture screen.

A most astonishing result is accomplished: a dancer appears on the screen keeping perfect time with the music supplied by the film; a singer appears from whose moving lips comes every note in perfect tone and synchronism; the bow of a cello player holds the fascinated attention of the audience, as every stroke brings forth the mellow strains of the instrument.

Frisco Entertains New Orleans

NEW ORLEANS, LA.—At a recent meeting held by the New Orleans Chapter, American Association of Engineers, a Radio program by the San Francisco chapter of their oraginzation was the chief feature of entertainment. Motion pictures of Louisiana bird life followed the ether program.

THE ANTENNA BROTHERS — Spir L. and Lew P. — E. T. Flewelling, of Course!



WSY, BIRMINGHAM, GETS TRADE MARK

Dick Johnson, Designer of Emblem, to Be Heard on Broadcast

By George H. Watson

BIRMINGHAM, ALA.—WSY, broadcasting station of the Alabama Power Company, has what it believes is something new. It is a trade mark which appears on all literature sent out by the station. Thousands are already familiar with the three strokes of the anvil which ring before the michrophone of WSY and in the phones and loud speakers over the continent.

The trade mark, just protected is shown herewith. It depicts Thor, the old Norse God of battle and thunder, striking shafts of lighting from an anvil. The iron is symbolic of the iron and steel working center of the south, the bars of lightning are the artist's conception of WSY's service. The ancient thunder gives a touch of the supernatural still associated with the Radiophone. WSY's slogan "Service From the Heart of Dixie" underlies the figure.

Dick Johnston, announcer for WSY, has just mailed out 5,000 letters announcing that the artist from Tuskegee Institute who made the design will be heard soon on the WSY program. Each letter shows the new trade mark.

Decree Issued to Cover Cuban Radio

Divide Stations into Five Classes and Assign to Each a Set Wave Length

WASHINGTON, D. C.—Pending the passage of a law to cover the use of Radio telegraph in Cuba, a presidential decree has been issued defining the various classes of non-governmental Radio stations and prescribing certain general rules for their operation, says Acting Commercial Attache P. L. Edwards in a report to the Department of Commerce. Up to the present time there has been no law or regulation covering the construction or operation of Radio stations in Cuba.

Under the decree, non-governmental Radio stations are divided into five classes, A, B, C, D and E, to each of which is assigned a wave length and a maximum power. No sets of any of these classes will be used for commercial purposes.

Owners Must Register

All owners of stations coming within any of these five classes were registered with the Director General of Communication before March 16, 1923. After that date no station could be used unless the proper permit had been issued by the office mentioned. The permits are for a term of one year in the case of classes A, B and C, and for five years in the other two classes. Applicants must pass an elementary examination, but it is not believed that this requirement will in any way hamper the issuance of licenses.

Can Not Use S. O. S.

The decree further provides that the Government may, under specified circumstances, require transmitting stations of any of the five classes to cease operation without their claiming indemnity from the Government. Transmitting stations of any class are made subject to the regulations of the International Radio Convention signed in London in 1912. The decree also prohibits the transmitting of the international distress call, S. O. S., either as a special signal or in the course of any general text. Penalties are provided for the disclosure of any public or Government message intercepted by any station. Only apparatus capable of transmitting a pure, continuous wave may be used.

TWO SUPERSENSITIVE CIRCUITS
(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.

S. A. TWITCHELL
1925 Western Ave. Minneapolis, Minn.

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:45- 8:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	3:45- 5:00
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	7:30- 8:15	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	400	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	400	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00-12:00
KGW, Portland, Ore.	400	10:00- 2:00	.....	10:00-11:00	.....	10:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	400	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	400	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	400	8:00-12:30	8:00-10:00	8:00-10:00	11:30-12:30	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	400	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:30	6:05- 7:40	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	6:30- 6:45	.....
WBAP, Fort Worth, Texas	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	6:30- 6:45
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	400	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	360	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	400	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	400	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	360	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, Newark, N. J.	360	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00	.....	.....	.....
WMAQ, Chicago, Ill.	400	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	400	8:00- 9:30	8:00- 9:30	.....	8:00- 9:30	8:00- 9:30	8:00- 9:30	.....
WOAI, San Antonio, Texas.	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	400	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....	6:30- 7:30

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. Thus the use is very simple.)

Wife vs. Husband and Airphone Set

Albert H. Waitt, Millionaire Owner and Operator of Station 1AOV, Sued for Divorce

NEWTON, MASS.—A mania for Radio is given as one of the grounds for the divorce suit instituted by Mrs. Lillian B. Waitt of this city against her millionaire husband, Albert H. Waitt, in an interview recently. "He is obsessed with Radio," declared Mrs. Waitt of her errant husband. "Not only did he have a receiving set, but he had a powerful transmitting apparatus, by special license of the United States government. It was a registered station, with the call 1AOV.

Husband Locks Up and Leaves

"Night after night, with a hired Radio operator, he would go to the Radio room at the top of the house and spend hour after hour there, leaving me alone. I think any jury will consider that gross neglect and cruelty.

"When I returned from a visit to New York, and found him gone, after publishing in the local newspapers and telling the servants and friends that he was going to South America, I went up to the Radio room and found it padlocked, with a printed sign on the door reading: 'Radio Station 1AOV Closed!' That's how far he carried his obsession.

"I had the padlock smashed, after consulting an attorney, thinking he might have hidden my jewelry there, but I did not find them."

Mrs. Waitt, in a statement, also declared that her husband was displeased with her trip to New York and broadcast the fact from his sending station. When she asked him why he did it, he answered that he wished to let her friends know that she was coming.

When figuring on the wave length of your aerial, remember the lead-in counts.

"As valuable to your radio set as RADIO is valuable to the world"

is

ARTHUR PUDLIN'S Variable High Resistance Leak

Eliminates the hissing and all disagreeable noises.

Enables you to hear all stations clearly.

Endorsed by Flewelling, Rosenblum and other leading Radio engineers.

Price with .00025 Mica Condenser $1.00
Price without Condenser .75

For sale at all good dealers. If your neighborhood dealer hasn't them in stock, send us purchase price and we will mail you immediately the Arthur Pudlin Variable High Resistance Leak. Also send dealer's name.

Arthur Pudlin Engineering Co.
1540 Broadway, New York.

SPEED TRANSMISSION TEST MADE BY ARMY

100 Words a Minute Is Achieved by New Apparatus

WASHINGTON, D. C.—Successful experiments in high speed Radio transmission between the Army Message Center in the Munitions building here have just been completed. With new commercial apparatus, capable of sending mechanically from a perforated tape up to a speed of 100 words a minute and recording the messages in a saw-toothed ink line on a tape, a reception speed of 65 words a minute has been achieved. After a little practice, signal corps experts say, their operators will be able to mechanically copy the received messages visually as well as by ear, and in this way a great saving of time will be made in clearing traffic.

An attractive piece of furniture designed and so constructed to accommodate the Radio set and its entire equipment. With it you make a neat installation of Radio in the home. Its many advantages and moderate cost make it almost indispensable.

For sale by first class Radio and Furniture Dealers or write

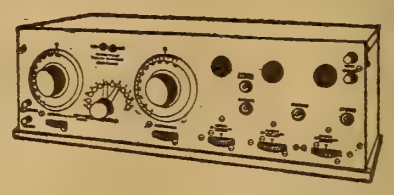
Robbins Woodworking Co.
Dept. C.
LIBERTYVILLE, ILLINOIS

GREBE RADIO

It is written:
"The cure of ignorance is study." The wise man carefully investigates, — then buys a Grebe Receiver.

Doctor Thy

Licensed under Armstrong U. S. Pat. No. 1113149



A. H. GREBE & CO., Inc.
Richmond Hill, N. Y.
Western Branch—451 East 3rd St., Los Angeles, Cal.

WJZ BROADCASTS SCHOOL LESSONS

Left photo shows H. W. Leyenberger, a teacher of the Haaren high school, giving via Radio several problems for his class in mathematics to figure out in their school room several miles away. Two girl students are checking the results of the problems. Miss Elinore Hastings of the teaching staff of the Haaren high school of New York is shown above teaching a class via Radio. The questions are transmitted via Radio from headquarters of the board of education and the students of the class are then required to solve the problems. This is the first attempt at introducing the Radio in the classroom and is being tried by the New York board of education in co-operation with the Westinghouse station WJZ at Newark, N. J. © International

CUBAN PLANT PWX GIVES FANS OPERA

PRIZES OFFERED HEARERS BY DIRECTOR GALLO

San Carlo Grand Opera Company to Remain Three Weeks—Plan Other Broadcasts

HAVANA, CUBA.—Opera across the sea carried the message of friendship from Cuba to the United States on Tuesday night, April 24th, when the San Carlo Grand Opera Company opened its season in the Theatro Nacional here. The entire opera, "The Barber of Seville," with Titta Ruffo, Tito Schipa, Josephine Lucchese, and others in the cast, was broadcast.

Beginning at 9:00 P. M., Eastern time, the broadcasting was done by the Havana station, PWX, arrangement with The Cuban Telephone Company, which transmitted the performance from a microphone in the theater to the sending plant.

This enterprise had the official stamp of the Cuban government through arrangement by General Crowder, U. S. A., with the President of the Cuban Republic. The President was in attendance at the opera and preceded the broadcasting of the music with a speech through the Radio to those listening in this country.

Award Prizes to Listeners In

Fortune Gallo, director of the San Carlo Grand Opera, will give prizes to those Radiophans who send in the best written accounts of what they heard on Tuesday night. These reports should be addressed to Fortune Gallo, Aeolian Building, New York City. The prizes will consist of boxes and seats for performances of The San Carlo Company on its tour of America next season, 1923-1924. The prize winner will determine the time and place where he will attend the opera next season as he will be given seats at a performance in a city nearest to his home town on the San Carlo itinerary.

The San Carlo organization will remain in Havana for three weeks and in its casts will appear Giovanni Martinelli, Lucresia Bori, Mari Kouznezova, Anna Fitziu, Marie Rappold, Sophia Charlebois Stella De Mette, Manuel Salazar, Marie Valle, and others, with Carlo Peroni and Giacomo Spadoni, conductors, and The Pavley Oukrainsky Russian Ballet. Other broadcasts are planned.

"Sun Dodgers" Give Radio Sets to Crippled Children

CHICAGO, ILL.—Thousands of crippled children in Chicago will soon be "tuning in" their own Radio receiving sets to jokes, musical entertainments and bedtime stories.

The Board of Trade Radio station, WDAP, located on the Drake hotel, has recently organized a "Sun Dodgers" club for this purpose. Membership is $5 and this sum will purchase a crystal set for one crippled child. Nearly 700 Radiophans have responded to the "via the air" call for volunteers.

Boy Scouts will make the installation and show the children how to manipulate the knobs and dials.

President Harding to Speak on WJZ

Broadcast Enables Nation's Leader to Speak to Largest Audience Reached by Any President

NEW YORK, N. Y.—President Harding's voice will undoubtedly vibrate through the ether from Station WJZ, when he speaks before the Volunteers of America in New York on May 10. Definite arrangements have not been made relative to the hall in which the address will be given, but it is expected that the microphone will pick up the President's voice from either the Metropolitan Opera House or the Hippodrome.

Such broadcasting will give President Harding the distinction of addressing the largest audience of any President in the history of the United States. The waves of WJZ have sufficient power to carry their message to every state in the Union, so when this station places its microphone before the President, his voice will be heard in thousands of homes.

The rates of Swedish coast stations were recently reduced to 30 centimes per word, minimum 3 francs per Radiogram.

Club Discusses Radio Frequency

MILWAUKEE, WIS.—Radio frequency amplification has been the topic of interest and discussion at the last several meetings of the Milwaukee Radio Amateur's Club, Inc. I. H. Strassman, 9AHO, A. R. R. L. City Manager, awakened the members' interest with his talk entitled, "Radio Frequency Intervalve Transformers."

R-C CABINETS

Mahoganette—Thoroughly well constructed—hinge top—nickel lift knob.
With or without "Arceelite." Special Radio Panel already attached. Costs no more than inferior grades of cabinets.
Ask your dealer or apply to
THE R-C MILLS, Manufacturers
303 4th Ave. New York City

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

Cotogrip

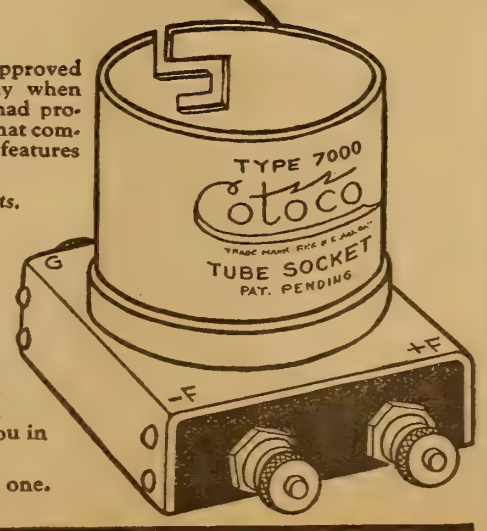
"Built First to Last"

This little beauty was approved by our engineers only when convinced that they had produced the one socket that combines all the essential features of a good socket.

1. *Positive Cotogrip Contacts.*
2. *Hard Rubber Insulation.*
3. *Rugged Construction.*
4. *Compact Design.*
5. *Concealed Mounting.*

It is impossible to show the unique mechanical action of Cotogrip contacts in a photograph. It is different from any other socket you have ever seen. This socket will interest you in every way.

You ought to have one.
Ask Your Dealer



COTO-COIL CO. PROVIDENCE

RADIO
At Cut Prices
Standard parts only in original packing. Sold on a "money-back" basis.

PHONES	
$ 8.00 Brandes Superior	$ 5.95
12.00 Nathaniel Baldwin Type C. Double	8.95
7.50 Dietzen special, 3000 ohms	3.95
TUBES	
1½ Volt Peanut Tube	2.00
1½ Volt Mercury	4.95
CABINETS Made in our factory	
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The Week's Advance Broadcast Programs

HERE is the fourth appearance of this new service for Digest Readers. There are only fifty eligible stations for the listening, but already twenty-three of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Station Directory. Much other data on the stations for which advance programs are given, will be found there.

Tuesday, May 1

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Medical Sy.; Concert, Junior Music Clubs of Southern Calif.; 8:00-9:00 P. M., Concert, Egan School; 10:00-11:00 P. M., Reading, Dr. Frank Nagel of Hollywood Opera Reading Club; Programs of Matinee Musical Club, MacDowell Club and Los Angeles Music Teachers' Assn.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour, concert and bedtime story by "Uncle John"; 8:00-10:00 P. M., May Day party given by Uncle John.

KYW (Central, 400), 8:00-8:58 P. M., Rosine Leonard, Soprano; Robert Lindt, Accompanist; Ralph F. Elliott, Tenor; Hariet Weeber, Accompanist; Mary Agnes Doyle, Reader; Wendell W. Hall, Music Maker.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Mrs. Pearl C. Davis, soprano; E. Clyde Whitlock, violinist; 9:30-10:30 P. M., Concert, Gainesville, Texas, Orchestra, under auspices of the Chamber of Commerce, C. C. Shell, director.

WDAP (Central, 390), 10:00 P. M., Concert, Lake View High School Band; Sinfonian Quartette; Soloists. Mr. Benj. Carswell, Tenor; Virginia Burch, Contralto.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Concert, Arcadia Cafe Orchestra; 3:00-3:30 P. M., Vocal and piano solos; 4:15-4:45 P. M., Talk, Betsy Logan, "Affairs of the Heart;" Musical recital; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "Music Week," D. L. Whittle, Pres. of Dallas Music Trades Ass'n; 8:30-9:30 P. M., Band concert; 11:00-12:00 P. M., Musical program under auspices of Lester Gunst Co.

WFI (Eastern, 400), 1:15-2:00 P. M., Meyer Davis, Bellevue-Stratford Concert Orchestra; 3:30-4:15 P. M., Nellie G. Abbott, violinist, Philadelphia Women's Symphony Orchestra; 6:30-7:00 P. M., Popular Music; 9:00 P. M., Musical program.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club, Modern Priscilla talk, Ruth E. Newman; 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "Iron Trade Review"; 8:30 P. M., Business Report, Roger W. Babson; Entertainer, Nelson Waring, pianist.

WGR (Eastern, 400), 3:00 P. M., Music; 4:00 P. M., Ampico Recital; 7:30 P. M., Digest of Day's News; 7:45 P. M., Topics of Scientific Interest prepared by Scientific American.

WGY (Eastern, 370), 1:00 P. M., Music and address, "Furnishing the Summer Porch;" 7:40 P. M., Address, "New York's Fresh Water Fisheries," Justin T. Mahoney, New York Superintendent of Inland Fisheries; 7:45 P. M., Musical program, "Non e wer," Howard H. Wheeler, cornetist; "Crooning Water," Lois B. Hardesty, soprano; "Nocturne in C Minor," Irene Cooley, pianist; "Armorer's Song," from "Robin Hood," Edmund Witherwax, bass; "In Autumn," Howard H. Wheeler; "Tis Spring," "To You," Lois B. Hardesty; Address, "The Moral Influence of the Drama," Rabbi Goodman Lipkind; "Etude in E Minor," (Chopin), Irene Cooley; "Asleep in the Deep," Edmund Witherwax; "Venus Waltz," Howard H. Wheeler; "Within My Heart a Song," "Good Night," Lois B. Hardesty; "The Bass Viol," Edmund Witherwax; First Movement, "Allegro Moderato," from the Concerto in A Minor (Grieg), Irene Cooley, Kitty Mienhold, pianists.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theatre organ; Biography of Old Testament characters, "The Sanballat Crowd;" Vocal selections, Mrs. James M. Russell, soprano; May Greene, accompanist; Piano selections, Miss Mary Greene; "Just Among Home Folks," Louisville Courier-Journal; 7:30-9:00 P. M., Concert, Louisville Flute Club, Oakley H. Kellogg, Dr. Theodore Beust, Karl Keursteiner, Chas. Gardner, Mrs. Theodore Beust, accompanist; Reading, "An Interesting Historical Episode."

WIP (Eastern, 400), 1:00-1:15 P. M., Business talk; 2:00-3:00 P. M., Artist Recital; 6:00-6:30 P. M., Dinner Dance Music; 7:00-7:30 P. M., Uncle Wip's Bedtime stories; 10:10 P. M., Dance music, Charlie Kerr and orchestra from Cafe L'Aiglon.

WJAX (Eastern, 360), 8:00 P. M., Concert arranged by Cleveland News; Dance music, Joe Smith-Martha Lee Club Orchestra; Negro Spirituals, Mozart Club of Cleveland; Chorus, Lutheran Choir.

WLW (Central, 360), 10:00 P. M., Concert, Alpha Chapter of Delta Omicron Sorority, Cincinnati Conservatory of Music.

WMAQ (Central, 400), 4:35 P. M., Program arranged by Bush Conservatory of Music; 7:00 P. M., Babson report; W. I. Lyon talks on "Bird-banding;" Clarence Hansen talks on "The Power of the Small Town;" 9:15 P. M., Vocal music, Miss Grace George; David Rees Jones, pianist.

WOC (Central, 400), 12:00 M., Chimes Concert; 3:30 P. M., Educational talk by F. C. Walker; 5:45 P. M., Chimes Concert.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand organ recital; 5:00 P. M., Grand organ recital and trumpets.

WWJ (Eastern, 400), 9:30 A. M., Music; 3:00 P. M., The Detroit News Orchestra; 7:00 P. M., "The Town Crier," Detroit News Orchestra, program by Healy Shops.

Wednesday, May 2

CFCN (Mountain, 440), 10:30-12 P. M., Dance program, Imperial Orchestra, Plaza Cabaret.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Nick Harris Detective Stories from Pantages Theater Bldg.; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Wa-Wan Club; Vocal selections, Radio Girls Quartet; Program, Musical Optimists.

KGW (Pacific, 400), 8:00-9:00 P. M., Old Timers Party.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour, Concert and Bedtime Story by "Uncle John;" 8:00-10:00 P. M., Soldier's Program, Post War Service League of Hollywood.

KYW (Central, 400), 8:00-8:58 P. M., Musical Program courtesy of Lyon & Healy Concert & Artist Department; Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Mrs. Prigmore, O. Webster, with other artists; 9:30-10:30 P. M., Concert, European Club of Fort Worth.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theater, concert, Arcadia Cafe Orchestra; 3:00-3:30 P. M., Fashion talk, Betsy Logan; Recital; 4:15-4:45 P. M., Talk, "Affairs of the Heart," Betsy Logan; Musical program; 5:45-6:00 P. M., Dream Daddy with the little tots; 7:30-7:50 P. M., Dream Daddy with the boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "Brotherhood of Man Pageant," J. Howard Payne.

WFI (Eastern, 400), 1:15-2:00 P. M., Meyer Davis Dance Orchestra, 3:30-4:15 P. M., Musical program; 6:30-7:00 P. M., 10:30-12:00 P. M., Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:45 P. M., "Camp Fire Girls," Eunice L. Randall; Concert, Emma Ainslee, contralto, and pupils; Health talk, Henry Copley Greene, American Red Cross; Talk on Farm, Garden and Lawn, Breck's; Concert, Emma Ainslee and pupils.

WGR (Eastern, 400), 2:00 P. M.-3:00 P. M., Music; 4:00 P. M., Ampico recital; 7:00 P. M., Digest of Day's News; 8:00 P. M., University of Buffalo quartette, W. E. Davis, director; H. M. Parker, violinist.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theatre organ; Biographical sketch of Old Testament characters, "Melachi," T. O. Alexander, Baton Rouge, La.; Mother's Day address, Bryan B. Bladock, Fort Worth, Texas; "Just Among Home Folks," Courier-Journal; 7:30-9:00 P. M., Concert, Senior class of Louisville Conservatory of Music, Robert Nall Thompson, director, pianists, Katherine Pedigo, Geraldine McNeely, Evelyn Kaiser, Mrs. Marie Bornwasser, Marie Whiteside, Clarice Thompson, Mildred Strehler, Dorothy Adams; Readings, Mabel Morrison, Bessie Sonner; Vocal solos, Margaret Bickel, Iva Dagley, Sallie Pennington, Elizabeth Shelton; Violin solos, Cora Cook, Texarkana, Texas, Marion Nugent.

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, 400), 2:00-3:00 P. M., Popular musical program; 6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wip's Bedtime Stories.

WLW (Central, 360), 8:00 P. M., Children's entertainment, Willis Music Company; Original poems, T. C. O'Donnell, editor of Writer's Digest; Badario, "Trader Turned Gentlemen;" Concert, Casino Orchestra.

WMAQ (Central, 400), 4:35 P. M., Program by Cosmopolitan School of Music and Dramatic Art; "Stories for the children" Miss Georgene Faulkner; 9:15 P. M., Musical Program by Mr. & Mrs. Clarence Eddy.

WOC (Central, 400), 12:00 noon, Chimes Concert; 3:30 P. M., Educational Talk, D. K. Kirk; 6:35 P. M., Sandman's Visit; 7:00 P. M., Pipe Organ Concert, E. John Richards, organist, Edna Sonneville, soloist; 8:00 P. M., Lecture, "Americanism," auspices Masonic Service Association; 10:00 P. M., Musical Program, Erwin Swindwll, director.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ Recital; 11:30-11:55 A. M., Grand Organ Recital and trumpets; 9:55 P. M.

WSY (Central, 360), 8:00 P. M., Musical program, "On The King's Highway," Male Choir; "The Bird of the Wilderness," Mrs. Lucile R. Brooks, soprano; "Crucifix," Brown Bates, bass, J. D. McGill, tenor; Praise God In His Holiness," Quartet; "Rose of My Heart," Brown Bates; "Trovatore," Mrs. Kimball Morrison, pianist; "His Way Is Mine," Male Choir; "Farewell," Mrs. H. T. Burnett, contralto; "I Will Magnify Thee," Double Quartet; "Whispering Hope," Mrs. Lucile R. Brooks, Mrs. H. T. Burnett; "Martha," Mrs. Kimball Morrison; "The River of Life," Male Choir.

WWJ (Eastern, 400), 3:00 P. M., News Orchestra; 7:00 P. M., The Town Crier, News Orchestra; Mrs. Meta Goebel Owen, mezzo soprano; Miss Julia Wenzel, pianist.

Thursday, May 3

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Program, Y. M. C. A.; 8:00-9:00 P. M., Concert, Sherwood Music School; 10:00-11:00 P. M., Vocal selections, Hollywood Girls Quartette; Los Angeles Oratorio Sy.; First Congregational Church Choir; Instrumental music, Geo. J. Birkel Co.

KGW (Pacific, 400), 7:00-7:30 P. M., Lecture, University of Oregon Extension Course; 8:00-8:15 P. M., Vocal selections, Helen Drain, contralto; 8:15-9:00 P. M., Concert, George Olsen and orchestra; 11:00-12:00 P. M., Hoot Owls.

KHJ (Pacific, 400), 12:30 to 1:15 P. M., Concert; 6:45-7:30 P. M., Childrens' Hour; 8:00-10:00, DeLuxe Program featuring Frank J. Steiner, 'cellist and J. J. Gilbert, flutist.

KYW (Central, 400), 8:00-8:58 P. M., Musical Program, Edison Symphony Orchestra; Wendell W. Hall, KYW'S Music Maker; 9:25 P. M., Reading, Rev. C. J. Pernir, S. J., Head of English, Loyola University.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Roscoe Carnrike, negro dialect songs; 9:30-10:30 P. M., Concert, Rex Maupin's Original Texas Hotel Orchestra.

WDAP (Central, 390), 10:00 P. M., Musical program, Mrs. Hannah Butler assisting artists; Milan Lusk, violinist.

WDAR (Eastern 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Concert Arcadia Cafe Orchestra; 9:00-3:30 P. M., Soprano and piano solos; 4:15-4:45 P. M., "Affairs of the Heart" Betsy Logan; Talk, Musical program; 5:45-6:00 P. M., Dream Daddy with the little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls; 10:10 P. M.-1:00 A. M., Concert; WDAR artists and Howard Lannan's Arcadia Cafe Orchestra.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "Public Service Transportation Problems," W. M. Holland, president Dallas Railway Co.; 8:30-9:30 P. M., Masonic service program under the auspices of Masonic service committee of Grand Lodge of Texas; 11:00-12:00 P. M., Musical program under auspices of Will A. Watkin Co.

WFI (Eastern, 400), 1:15-2:00 P. M., Meyer Davis Bellevue-Stratford Concert Orchestra; 3:30-4:15 P. M., Billy Meck, dialect stories; J. S. Magee, violinist.

(Continued on page 12)

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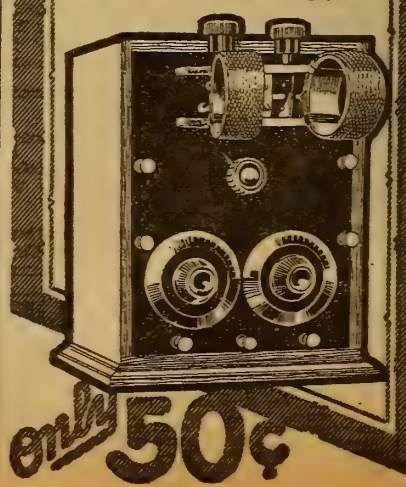

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First Steps for Beginners in Radio

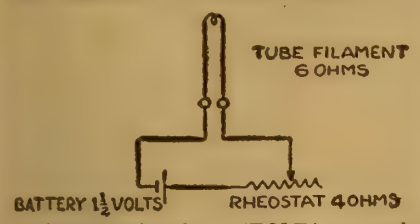
Chapter I—Laws of Electricity Used in Radiophony

By Thomas W. Benson, A. M. I. R. E.

A THOROUGH understanding of Radio phenomena demands a knowledge of the laws of electricity. Radio being but a special application of this useful servant of man depends thereon for its fundamental units and laws. Athough having symbols and terms distinctly its own, Radio phenomena will be more clearly understood in the light of the paragraphs to follow.

Electromotive Force

In order that electricity might flow in a wire of circuit it is necessary that a difference of potential or electrical pressure exist between two points connected by a conductor. To measure this potential



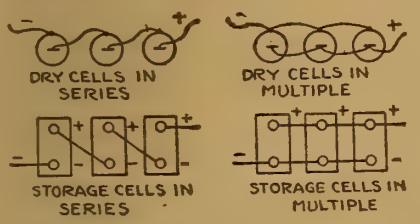
or electromotive force (E.M.F.) we make use of the volt which is then the unit of pressure so to speak. Thus we find that a dry cell has a voltage of 1½, that is, the pressure at the terminals of a battery tending to make a current flow in any circuit connected to it, is 1½ volts. There is no fixed unit of voltage but is arrived at by other means.

Now when we connect an electrical device to the dry cell, let us say the filament of a WD1-11 tube with a rheostat in series as shown in Figure 1, a current will flow. The amount of current flowing is measured in amperes which is the quantity of current.

It should be made very clear that the voltage is forcing the current around through the rheostat and filament but the amperes is the amount of current flowing.

Resistance

Whenever a circuit is completed the material or conductor through which the current flows offers a certain resistance or tends to hold back the current. This effect is measured in ohms, the unit of resistance. Going back to our illustration we find we have a very fine wire in the tube and also a rheostat made of wire that has



a high resistance. By regulating the holding back effect of the circuit we can control the amount of current or amperes flowing. Thus by turning the rheostat handle so there is less resistance for the voltage to overcome the current through the filament increases and it gets hot.

Ohm's Law

The law of current flow is known as Ohm's Law, the most fundamental law of electricity, and also, the most simple. Put into words, the current in a circuit varies directly as the voltage and inversely as the resistance. Put in the form of a formula we have:

$$I = \frac{E}{R}$$

That is, the current in amperes (I) is equal to the voltage (E) divided by the resistance (R) in Ohms.

Let us see how this works out. When resistances are connected in series their total resistance is equal to the sum. In the circuit we have say a 4-ohm rheostat and the filament of the tube with a resistance of 6 ohms. This gives a total of 10 ohms when all the rheostat is in. To determine the current we simply divide the voltage 1.5 by the resistance, 10 ohms giving .15 amperes. Say we cut the rheostat out entirely leaving the battery connected direct to the tube, this gives but 6 ohms and on figuring it out the current will be one-quarter ampere.

Since the current is equal to the voltage divided by the resistance it also holds that when voltage and current are given the resistance is equal to the voltage divided by the current or:

$$R = \frac{E}{I}$$

For instance, the UV 200 takes 1 ampere filament current at 5 volts. To determine its resistance divide voltage, 5, by current 1, and we find its resistance is 5 ohms.

Going one step further it will be clear that the product of the current and resistance should equal voltage. We can express this as E=I×R.

Resistance in Series

It has been stated that when resistances are in series that is when the current must flow through one after the other the total resistance is equal to their sum. However, when they are connected in parallel or so that the current can branch and flow through them simultaneously a different rule holds good. When the resistances are all alike the resulting resistance of the set is equal to the resistance of one divided by the number in parallel. Thus, putting two like resistances in parallel cuts the resistance in half, three in parallel gives but one-third the resistance of one unit.

On the other hand if resistances of unlike value are connected in parallel it complicates matters somewhat and we must fall back on formulae again. When two unlike resistances are in parallel the following holds good:

$$R \text{ (total resistance)} = \frac{R \times R}{R + R}$$

That is, their product divided by their sum. When more than two unlikes are in parallel the formula becomes:

$$R \text{ (total resistance)} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

Which can be readily solved. The reader may doubt the value of these formulae to the experimenter but their value will be apparent when one wishes to build up say a given grid leak from a number of smaller or larger leaks.

Standard of Resistance

The standard of resistance being an ohm, it is advisable when high resistances are used to use other units. Thus the megohm is used for one million ohms. A half-megohm leak then has a resistance of half of one million or 500,000 ohms.

The resistance of a conductor varies as its length, diameter and material. Increasing the length of a wire will increase its resistance and vice versa. Increasing the size of wire reduces its resistance and increases the current carrying capacity. The use of special materials, such as German silver, nichrome and constantan, gives wires having high resistances.

Units of Energy and Power

Having obtained an idea of the relationship between the units of pressure, current and resistance, we can go on to a consideration of the units of energy and power. We have seen that a certain voltage is required to force the current through the circuit, and since the current does the work we must consider both voltage and amperage in determining the energy expanded in the circuit to do work.

(Continued on Page 14)

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. His articles yet to appear are:

Chapter II—Radio Waves and their Propagation.
Chapter III—Pointers about Aerials and Grounds.
Chapter IV—About Condensers and Inductances.
Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

Hear Atlanta On Crystal We receive programs from Atlanta Minneapolis, Davenport, FortWorth, Dallas, Kansas City, St. Louis, Denver on Crystal without batteries. Usual crystal set requires only easy, inexpensive changes. Send stamp for further information or $1 for copyright drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED.
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W. T. 501 Peanut Tubes, 4 V. ½ Amp. with Adapter $2.75
(Use storage battery or 3 dry cells in series)
R. V. T. 5-6 V. Detectors 2.75
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(Sent on receipt of price. No C. O. D. orders accepted)
1 Tube Regenerative Receiving Set with Detector Tube and 3000 Ohm Headset. VERY SPECIAL VALUE 29.75
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Just What You Have Been Looking For
A VARIABLE RADIO RESISTANCE THAT MOUNTS ON PANEL IN A JIFFY

Patents Pending.
Real Radio Fans, in the building of their sets, will more than appreciate this device, which gives them a variable resistance which is adaptable for use in all Radio Hook-ups—in the grid circuit—as amplifier coupling resistance for both radio and audio frequency—"B" battery resistances—antenna shunts—tuned loop circuits—resistance couplers for both radio and audio frequency, and many other places in the radio hook-up that the amateurs' ingenuity will suggest.
Has switch lever and seven carefully calibrated values of resistance of ⅛ megohm each between terminals. Protecting bakelite discs assure permanency of moisture-proof India ink resistance. Don't guess—it is important to have resistances properly adjusted to function with your other apparatus to get the best results from all tube sets. A Premier Variable makes this sure and easy.
Code No. 250. Price ..... $1.50 each
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BUFFALO, N. Y.
Western District Office: 417 South Dearborn St., CHICAGO, ILL.

Radiophone Broadcasting Stations

Corrected Every Week—Part III

State, City, Call

Alabama:
Auburn, WMAV
Birmingham, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KDZA, KFDH

Arkansas:
Fayetteville, KFDV
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KMJ
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KFCL, KFI, KHJ, KJS, KNN, KNV, KNX, KUS, KWH
Modesto, KXD
Oakland, KLX, KZM
Pasadena, KLB
Reedley, KFAZ
Richmond, KFCM
Sacramento, KFBK
San Diego, KDPT, KDYM, KFBC, KFFA
San Francisco, KDN, KDZG, KDZX, KFDB, KLS, KPO, KSL, KUO
San Jose, KFAQ, KQW,
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFCK
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KLZ
Gunnison, KFHA
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WQAW

Florida:
Jacksonville, WDAL
Miami, WIAZ, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH
Winter Park, WRAF

State, City, Call

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WGAK, WMAZ
Savannah, WHAO, WRAB

Idaho:
Boise, KFAU, KFDD
Kellogg, KFEY
Moscow, KFAN
Thomasville, WPAX

Illinois:
Belvidere, WOAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WHAP
Elgin, WTAS
Galesburg, WRAM
Mattoon, WQAL
McLeansboro, WRAS
Peoria, WJAN, WQAX
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Brookville, WSAL
Evansville, WOAU
Greencastle, WLAX
Huntington, WHAY
Indianapolis, WLK
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WGAZ
West Lafayette, WBAA

Iowa:
Ames, WOI
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Lamoni, KFFV
Le Mars, KFCY, WIAU
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Emporia, WAAZ
Hutchinson, WLAS
Independence, WFAY
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WNAK, WTG
Marion, WRAD
Parsons, WOAJ
Topeka, WJAQ, WPAM
Wichita, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS WLAP
Paducah, WIAR

State, City, Call

Louisiana:
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, WGAQ

Maine:
Bangor, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WAAJ, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Bay City, WTP
Dearborn, WWI
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Laurium, WPAV
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, WBAD, WBAH, WCAS, WLAG, WLB, WRAH
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, WEAK
St. Louis, KFEZ, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, KFDU, WFAV, WGAT, WJAB, WKAC, WMAH, WQAP, WSAS
Norfolk, WJAG

State, City, Call

Oak, KFEQ
Omaha, KFCZ, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
York, KFDR

Nevada:
Reno, KDZK
Sparks, KFFR

NEW HAMPSHIRE:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR, WWT
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WLAW, WSAP
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

Ohio:
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH, WSAI
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL, WWAJ
Dayton, WA1, WJAJ
Fairfield, WL2
Granville, WJD
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA

State, City, Call

Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY, WMAB
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

Oregon:
Arlington, KFGL
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW, KQY
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Brookings, KFDY
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas:
Abelene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WRAA, WSAV
Laredo, WWAX
Orange, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, DM7, WCAR, WOAI
Stanford, WOAZ
Tyler, WOAF

State, City, Call

Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KFCP
Salt Lake City, KDYL, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZR
Everett, KDZZ, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CFAC, CFCN, CJCY
Edmonton, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS, CJGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE.—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLAW, New York, N. Y. New York Police Dept.

WLAX, Greencastle, Ind. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

WLB, Minneapolis, Minn. Univ. of Minn. 100 mi. Daily ex Sun, 12-12:30 pm, 7:30-7:50. Central.

WLK, Indianapolis, Ind. 485 also. 500 mi. Hamilton Mfg. Co. Daily ex Sun, 11-11:30 am, 12-12:30 pm, 5-5:30, reports. Tues, Thur, 8:30-10 pm, concert. Sun, 8:30-10. Central.

WLW, Cincinnati, O. 2,000 mi. Crosley Mfg. Co. Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat. 2 pm, special. Sun, 11 am, church services. Eastern.

WMAB, Oklahoma City, Okla. 500 mi. Radio Supply Co. Mon, Wed, Thurs, 8:30-9:30 pm, concert. Central.

WMAC, Cazenovia, N. Y. 330, 250, 275 only. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. Atchinson County Mail.

WMAF, Dartmouth, Mass. Round Hills Radio Corp.

WMAG, Liberal, Kan. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 500 mi. General Supply Co. Daily ex Sun, 2:15 pm, music, news. Mon, Fri, 10 pm, music. Central.

WMAJ, Kansas City, Mo. 485 only. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 485 also. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Eastern.

WMAL, Trenton, N. J. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 50 mi. First Baptist Church. Sun., 10:30-12 m., 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Mon, 4:35-5 pm, 9:15-10. Wed, Fri, Sat, 7-7:30 pm. Tues, Thurs, 7-8 pm. Central.

WMAR, Waterloo, Iowa. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 485 also. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. Ala. Polytechnic Inst.

WMAW, Wahpeton, N. D. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 400, 485 only. 2,000 mi. The Commercial Appeal. Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 500 mi. B. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAK, Manhattan, Kans. Manhattan Radio Supply Co.

WNAL, Omaha, Neb. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 485 also. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat, 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30-9:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. Charleston Radio Elec. Co.

WNAP, Springfield, O. 200 mi. Wittenberg College.

WNAR, Butler, Mo. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman).

WNAT, Philadelphia, Pa. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm, Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. People's Tel. & Telg. Co.

WNAW, Fortress Monroe, Va. Henry Kunzmann.

WNAX, Yankton, S. D. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. Shipowners Radio Service.

WNJ, Albany, N. Y. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. Wireless Telephone .Co of Hudson Co., N. J.

WOAA, Ardmore, Okla. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 485 also. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. Maus Radio Co.

WOAD, Sigourney, Ia. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. Medland College.

WOAF, Tyler, Tex. 485 also. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. Apollo Theatre.

WOAH, Charleston, S. C. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 485 also. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. Collins Hardware Co.

WOAL, Webster Groves, Mo. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 1,000 mi. James D. Vaughan. Daily, 8-9 pm, concert. Central.

WOAO, Mishawaka, Ind. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. Kalamazoo College.

WOAQ, Portsmouth, Va. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. H. P. Lundskow.

WOAS, Middletown, Conn. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. Boyd Martell Hamp.

WOAU, Evansville, Ind. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. Woodmen of the World.

WOAX, Trenton, N. J. 342 only. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. Penick Hughes Co.

WOC, Davenport, Ia. 400 and 485 only. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, Tues. night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, sports; 7, concert; 10 pm, concert, Wed. only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 1:45 pm, 6, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 485 also. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 485 also. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church services. Central.

WOO, Philadelphia, Pa. 400 only. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12 m, time; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Thurs, 7:50 pm, concert. Eastern.

WOQ, Kansas City, Mo. 485 also. 1,000 mi. Western Radio Co. Mon, Tue, Wed, Thur, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 400 only. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment. Eastern.

WOS, Jefferson City, Mo. 485 also. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOV, Omaha, Neb. R. B. Howell.

WOU, Omaha, Neb. Metropolitan Utilities Dist.

WPA, Ft. Worth, Tex. 485 also. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, 11:30-12 m, 1:30-2 pm, 2:30-3, 6-6:30. Daily ex Sun, Mon, Wed, 8:30-9:30 pm, 10-10:05. Mon, 11-12 mid. Sun, 3-3:30 pm, 9-9:30. Central.

WPAA, Waco, Neb. Anderson & Webster Elec. Co.

WPAB, State College, Pa. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7 pm, music. Wed, Fri, 10-11 pm. Sun, 2:30-3:30 pm. Central.

WPAF, Council Bluffs, Ia. Peterson's Radio Co.

WPAG, Independence, Mo. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. Doolittle Radio Corp.

WPAK, Fargo, N. D. North Dakota Agricultural College.

WPAL, Columbus, O. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. Awerbach & Guettel.

WPAP, Winchester, Ky. Theodore D. Phillips.

WPAQ, Frostburg, Md. General Sales & Engineering Co.

WPAR, Beloit, Kan. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. J. & M. Electric Co.

WPAT, El Paso, Tex. Saint Patrick's Cathedral.

(Continued on page 9)

STATION SCHEDULES

(Continued from page 8)

WPAU, Moorhead, Minn. Concordia College.
WPAV, Laurium, Mich. Tinetti & Sons.
WPAW, Wilmington, Del. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.
WPAX, Thomasville, Ga. 25 mi. S-W Radio Co. Daily ex Sun, 5-6 pm, roads, weather, stocks, music. Mon, Wed, Fri, 8:30-9:30 pm, music. Sat, 10-11 am, codes. Sun, 11:30 am-12:30, 8:30 pm-9:30, church service. Eastern.
WPAY, Bangor, Me. Bangor Radio Lab.
WPAZ, Charleston, W. Va. Dr. John R. Koch.
WPG, New Lebanon, O. 485 also 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15 pm, news, 6-6:30 pm, markets Mon, Fri, 8-9:45 pm, music, farm program. Central.
WPI, Clearfield, Pa. Elec. Supply Co.
pm, news. Mon, 8 pm, concert. Eastern.
WPM, Washington, D. C. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.
WQAA, Parkesburg, Pa. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. 200 mi. E. B. Gish.
WQAD, Waterbury, Conn. 310 only. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 6:30-7:45 pm, music, Boy Scout news. Wed, 8:30-9:30 pm, concert. Eastern.
WQAF, Sandusky, O. Sandusky Register.
WQAH, Lexington, Ky. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. Ann Arbor Times News.
WQAK, Dubuque, Ia. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. 100 mi. Coles County Tel. & Telg. Co. Tues, Thurs, 9-11 pm, music, lectures. Central.
WQAM, Miami, Fla. 500 mi. Electrical Equip. Co. Daily ex Sun, 5:15-5:45 pm, news, stocks, weather; 7:30-9 pm, music. Sun, 9-11 pm, music. Eastern.
WQAO, New York City, N. Y. 300 mi. Calvary Baptist Church. Sun, 11:15-12:15 am, 8:30-9:30 pm, church services. Eastern.
WQAP, Lincoln, Nebr. Am. Radio Co.
WQAR, Muncie, Ind. Press Pub. Co.
WQAT, Richmond, Va. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5. Eastern.
WQAS, Lowell, Mass. 50 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WQAV, Greenville, S. C. 75 mi. Huntington & Guerry, Inc. Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.
WQAW, Washington, D. C. Catholic University of America.
WQAZ, Greensboro, N. C. Greensboro Daily News.
WQAX, Peoria, Ill. Radio Equipment Co.
WRAA, Houston, Tex. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.
WRAB, Savannah, Ga. Savannah Board of Public Education.
WRAC, Mayville, N. D. State Normal School.
WRAD, Marion, Kans. Taylor Radio Shop.
WRAF, Winter Park, Fla. Winter Park Electric Construction Co.
WRAH, Providence, R. I. Stanley N. Read.
WRAK, Escanaba, Mich. Economy Light Co.
WRAL, St. Croix Falls, Wis. Northern States Power Co.
WRAM, Galesburg, Ill. 200 mi. Lombard College. Wed, 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
WRAN, Waterloo, Ia. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. 100 mi. Jacob C. Thomas. Tues, Fri, 7-9 pm. Central.
WRAS, McLeansboro, Ill. Radio Supply Co.
WRAU, Amarillo, Tex. 50 mi. Amarillo Daily News. Tues, Thurs, 7:30-8:30 pm, music. Central.
WRAV, Yellow Spring, O. Antioch College.
WRAY, Scranton, Pa. 485 also. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15, 10:30 pm, music. Sun, 4 pm, chapel. Eastern.
WRK, Hamilton, O. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.
WRP, Camden, N. J. 250 mi. Federal Inst. of Radio Telg. Daily ex Sat, Sun, 10-10:45 pm, music, news, agriograms. Eastern.
WRR, Dallas, Tex. 485 also. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 1,000 mi. Tarrytown Radio & Research Laboratory. Mon, Thur, Sat, 6:15-7 pm, 7:30-8:30, 10:30-12 pm. Sun, 1-3 pm. Eastern.
WSAA, Marietta, O. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. Clemson Agri. College.
WSAH, Chicago, Ill. A. G. Leonard, Jr.
WSAI, Cincinnati, O. United States Playing Card Co.
WSAJ, Grove City, Pa. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. Franklin Elec. Co.
WSAP, New York, N. Y. Seventh Day Adventist Church.
WSAS, Lincoln, Nebr. 485 also. 700 mi. Nebr. Dept. of Agri. Daily ex Sat pm and Sun, 10 am, 11, 12:20 pm, 2, reports. Central.
WSAV, Houston, Tex. Clifford W. Vick. Temporarily discontinued.
WSB, Atlanta, Ga. 400 and 485 only. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12 music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSN, Norfolk, Va. 100 mi. Shipowners Radio Service Inc. Mon, Wed, Sat, 8:15-9:30 pm, concert. Eastern.
WSY, Birmingham, Ala. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. Penn Traffic Co.
WTAU, Tecumseh, Neb. Buegy Battery & Elec. Co.
WTAW, College Station, Tex. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 485 only. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WTP, Bay City, Mich. 75 mi. Ra-Do Corp. Mon, Wed, Fri, 1:30-2 pm, reports, news; 6:30-7:30 pm, concert. Central.
WWAC, Waco, Tex. 485 also. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. Wright & Wright, Inc.
WWAJ, Columbus, O. Columbus Radio Club.
WWAX, Laredo, Tex. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWAY, Chicago, Ill. Marigold Gardens.
WWB, Canton, O. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 200 mi. Ford Motor Co. Wed. 10-11 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 400, 485 only. 1,500 mi. Evening News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30 am, weather; 11:55-12, time; 12:05-12:45 pm, music; 3-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, markets; 7-10, entertainment. Sun, April 15, and every other week, 11 am, 5:30 pm, church services. Sun, fill in weeks, 2 pm, concert; 7:30, church services. Eastern.
WWL, New Orleans, La. Loyola Univ.
WWT, Buffalo, N. Y. 200 mi. McCarthy Bros. & Ford. Daily 3-4:30 pm, 7:30-9:30. Eastern.

(Note.—This completes the station schedule list. The first part will appear again next week.)

Reviews of Books

Home Radio—How to Make It. By A. Hyatt Verill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Getting Acquainted With Radio Receivers. By Paul Godley. Describes the necessary parts. How to put an aerial, tuning, regeneration, loud speakers, dry cell tubes, connecting the receiver, operation, faults and their remedies. Price, 25c.

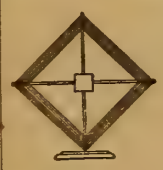
Radio Simplified. By Kendall and Koehler. New developments of Radio described in non-technical terms. The latest and most efficient hook-ups. Tells about vacuum tube, loose couplers, variocouplers, variometers and everything necessary for those who aim to get the best results in building or operating a Radio outfit. Price, $1.00.

Amateur Radio Call Book. In this book there will be found a complete list of all amateur, special amateur and Radiophone broadcasting stations. Just the book to have near you when listening in on stations and new call letters are heard. There is a large two-color map included, also how to construct and operate a honeycomb coil set, detector and two stage amplifier. Price, $1.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Porstage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

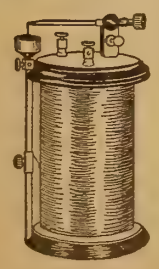
GENUINE
WD 12 Tubes.....$6.50
The same as WD 11 with Standard base.
UV 199 Tubes.....$6.50
Consumes only .06 of an ampere.
UV 199 Sockets.....$0.75
UV 199 Adapters.....$1.25
Also WD 11 and 201 A Tubes in Stock.
Special Prices to Dealers on All Radio Parts.
ENGINEERING SERVICE BUREAU
832 Windsor Avenue Chicago, Ill.

Ritter Loop Aerial $1



A knock-down aerial. All parts perfect and made to fit properly. Results guaranteed. Can be assembled in 10 minutes. Loop aerials of this kind never sold for less than $5. We manufacture and sell right from our factory.

Ritter Grand $2.50 Crystal Set



The best set for beginners or others desiring a real good set for little money. Tunes up to 600 meters; can receive up to 50 miles radius under normal conditions. Has received 100% ratings from technical depts. of many publications. Call and see the crystal set and loop aerial working. Mail orders filled.

RITTER RADIO CORP.
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New York City
DEALERS WRITE FOR DETAILS

AERIOLA SR. STYLE TUNER UNIT
Green silk on Bakelite Tubes with diagram, $5.65.
REINARTZ ULTRA CIR. SET PARTS, $29.90
Ultra Reinartz Tuner Unit & Diag., $5.95, wound to the specifications of March 24 Radio Digest. Ruby Mica-Copper-Bakelite mounted Condensers N. P. binding posts, .00015, 50c; .0015, 60c; .0025, 70c. Reinartz coil Doub. green silk-Bakelite Spider, $1.65; Reinartz plate circuit chokes (triple adjustable), $1.70. Complete set Reinartz tuner and detector parts, $10.95. Tuner, Det. and 2 Stage, $18.90. Two stage outfit, $8.95.
GOV'T RADIO STORAGE BATTERIES
New Signal Corps Edison 3 cell type BB-4, $4.50; Single Cells for W. D.-11 tubes, $1.50; 60 A. H. for W. D.-11 tubes, $5.25; 6 Volts Edison, $7.75; Edison "B" battery single elements, 4c ea.; double, 10c.
HI-POWER AMPLIFYING TRANSFORMERS
Best! Loudest! No burn-outs. $2.65 with special diagram.
GENUINE PEANUT TUBES
Wonderful Det. and Amplifier. Smallest tube made (aeroplane style). 1 V., ¾ amp., ½" dia. x 2¼" long.
FLEWELLING .006 COND'RS & PARTS
.006 Bakelite-Ruby Mica-Copper Calibrated Cond., 85c. Spider coils, green silk on Bakelite, $1.75 ea.
NEW SPECIALS
30 OHM RHEO. for 201-A or W. D.-11 tubes, $1.00. Variable grid leaks, 1/10 to 5 Megohms, 75c. HI-POWER LOUD SPEAKER AND PR. BALDWIN PHONES, $10.90. Variable grid. Cond., .00025 or .0005 max., 45c. Vernier Attachment for any Var. Condenser, 95c. Armstrong Super. New 3 tube outfit. Owner sacrificing.
QUALITY RADIO SHOP, RICHMOND, IND.

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Radio

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Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

RADIO CORPORATION OF AMERICA WR-21 DETECTOR AND AMPLIFIER TUBES
4 VOLT FILAMENT, 7 AMPERE. FORMALLY EQUIPPED IN AERIOLA GRANDS. FITS WD-11 SOCKET, OR STANDARD SOCKET WITH ADAPTOR.
WR-21 DETECTOR.....$3.95
WR-21 AMPLIFIER.....4.25
THESE TUBES WILL OPERATE ON 6 VOLT STORAGE BATTERY

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90
FREUND'S WONDER CIRCUIT $13.20
COMPLETE PARTS FOR REINARTZ SETS . . . $11.45
COMPLETE PARTS FOR 2 STEP AMPLIFIER . . $12.45
WD-12 TUBES.....$6.50
The Genuine WD-11 Tube Equipped with Standard Base to Fit Standard Socket
ADAPTORS FOR WD-11 AND WR-21 TUBES.....50c

Moulded Variometers	$3.45	Master Baldwin Type C. Head Sets	$6.95
180° Moulded Variocouplers	$3.45	Brandes Superior Headset	$5.75
Mahogany Variometers	$1.95	Antenella Aerial Plug	$1.15
180° Bakelite Variocouplers	$1.75	3 Coil Honeycomb Mounting	$3.45
Freshman Variable Grid Leak and Condenser	75c	2 Coil Honeycomb Mounting	$2.60
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35	WD-11 Bakelite Sockets	50c
Master Baldwin Type C Units with Cord	$3.95	Barchass Coils	$1.95
		Firth Cord Tip Plugs	60c
		Thordarson Amplifying Transformers	$2.95

Radio Corporation of America New and Improved Radiotron Tube.
UV-199 Detector and Amplifier TUBE.....$6.50
Operates on 3 Volts (2 Dry Cells); Consumes .06 (1/16) Ampere. Same Characteristics for Sensitiveness and Loudness as UV-201.

Socket for UV-199 Tube.....75c
Complete Parts for Knocked Down Receiving Set $17.95
COMPLETE PARTS FOR FLEWELLING CIRCUIT $12.45

VARIABLE CONDENSERS

$4.30 Value, 43 Plate, now	$1.75
$3.70 Value, 23 Plate, now	$1.45
$3.30 Value, 11 Plate, now	$1.35
$3.10 Value, 5 Plate, now	$1.25
$2.70 Value, 3 Plate, now	$1.15
$7.00 Value, 43 Plate Vernier Variable Condenser	$3.95
$6.50 Value, 23 Plate Vernier Variable Condenser	$3.45
$6.00 Value, 11 Plate Vernier Variable Condenser	$2.95

PARTS FOR SINGLE TUBE REFLEX SET as listed in Radio Digest..... $27.65

Radiotron UV-201-A Tubes, 6 Volt Filament, .25 (¼) Ampere..$6.50
Formerly Sold for $9.00
Operates on 6 Volt Storage Battery or 4 Dry Cells in Series

U.S.A. SIGNAL CORPS (Aviation Type 194-W) WESTERN ELECTRIC PHONES, $7.95
Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES
These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at..... $9.95
Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special..... $4.65

3000 Ohm GUARANTEED HEADSETS, $8.50 Value $3.65
MAGNAVOX, LOUD SPEAKERS, Type R3 . . . $27.45

JACKS

Pacent Single Circuit	$0.35
Pacent Double Circuit	.50
Federal Single Circuit Filament Control	.35
Federal Double Circuit Filament Control	.50

HONEYCOMB COIL

1,500 Turns	$1.50
1,250 Turns	1.50
1,000 Turns	1.25
750 Turns	1.00
250 Turns	.75
150 Turns	$0.60
100 Turns	.50
75 Turns	.40
50 Turns	.40
35 and 25 Turns	.40

CABINETS
MAHOGANY AND WALNUT

6x 5⅜" by 6" deep	$1.45
6x 7⅜" by 6" deep	1.95
6x14" by 6" deep	2.45
6x16½" by 6" deep	2.95
6x22" by 6" deep	2.95
9x12½" by 7" deep	3.95
9x10½" by 5¼" deep	2.95

Rheostats	45c	Spaghetti Tubing, yard	10c
Sponge Rubber Ear Caps, Pair	50c	Lightning Arresters	95c
Dials, 2, 3 and 3½ Inch	25c	2-Slide Tuning Coils, at	$1.95
Grewol Detectors	$1.65	Phone Caps, for mostly all phones	25c
Signal Corps Super Sensitive Microphone Transmitters	$2.45	Anti-Capacity Switches	$1.50
Solid Copper Aerial Wire, 100 ft.	35c	Lightning Switches	$2.65
		Hydrometers, now at	45c

Formica Panel, ⅛" thick, black or brown, square inch . . 1½c

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
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Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, May 5, 1923 No. 4

Two Circuit Sets Best

When Making a Set Make a Good One

IT IS just as easy for the amateur, working from a diagram if necessary, to build a two-circuit set and be assured when he finishes the job that he has something that will give him long distant reception. Let us stick to the hook-ups that get the most of Radio impulses to the receiver rather than urging or even suggesting something that is far inferior in performance under slightly unfavorable conditions.

Hook-ups, diagammatically, at least, are the cheapest part of the set and the parts required for a two-circuit hook-up are little more than that for a single-circuit set, all things considered.

It is quite necessary to guard against capacity effect in the single circuit, much more than in the two-circuit set, therefore the former is much harder to handle, and there is more internal and external capacity effects that are going to interfere and selectivity is not, it is generally conceded, as easily obtained as with the two-circuit set.

There is rarely a week free from complaint from single circuit users about interference. The logical means to an end is to build a two-circuit set or if you have a single circuit change to a two-circuit.

World's News by Air

Great Demand for Information Is Now Supplied

DEMAND for information is being satisfied by Radio. That this demand is greater than it has ever been in the history of mankind is attested to by librarians, who point to the large number of scientific works being read today. It is part of the great progress made in scientific development in the last quarter century.

Radio has not been in the least progressive in this development. In fact, with the development of Radio, all other sciences are being aided. For Radio is being used as a means by which knowledge of the other sciences is being spread.

Tune in on any broadcasting station and you will just as likely hear a lecture on the fundamental principles of the Einstein theory as you will on the latest developments in the cure of cancer. Universities throughout the United States have enrolled their faculties toward the dissemination of information under their auspices. Regular courses in certain subjects are being broadcast, and more are being planned.

Concerts are giving Radio listeners a wider knowledge and greater appreciation of music. Plays, classic and modern, also help advance the education of the public by Radio. Health lectures are regular events for Radiophans. So are lectures on child care, and on various other topics now and then are broadcasted.

Growth of the Industry

Almost Three Million Fans Now Have Sets

OLD established manufacturers of Radio apparatus of a year ago were wondering how they would dispose of their stock. Many dealers were just making a bare living at selling Radio apparatus. Just about three hundred thousand Radio amateurs scattered throughout the United States constituted the field for sales of Radio goods and apparatus.

Since then a great change has taken place. Old apparatus, instruments manufactured under patents fifteen years old, ordinary double slide coil crystal sets were becoming immediately popular. Now there are more than six hundred incorporated manufacturers of Radio apparatus in the United States. It is impossible to estimate the number of dealers. There are almost three million fans who have bought and installed Radio receiving sets.

These sets receive music and other broadcast matter from some five hundred or more broadcasting stations located in every state in the Union. Every state but one has one or more stations, and some have as many as twenty.

With the establishment of more solid Radio regulations, with the advent of fair competition and intelligent manufacture of Radio apparatus of good design Radio will still grow.

RADIO INDI-GEST

Here we are in our new home! How do you like us over in the center column? That is what we want to know. Do you Radioknuts want a whole column of Indigest or do you like it better as we were? It will all depend on your say so whether or not we stay here or move back to the right hand column under Al Brown. Personally we like it better here but we leave it up to you, so write in and tell us what you think of it.—Indi.

INDIGEST SCOOPS WORLD ON STEBBINS' DEGENERATIVE SET

BULLETIN

Squedunk, Minn.—In an interview with Indigest Stebbins says, "Gol darn, if it ain't the dad blamest shame the way most inventors hold onto they circuits. I intend to give the Sooper Degenerative to everybuddy that's got the nerve to use it."

By Slatherty Simpson

Armstrong, Logwood and Flewelling—and now comes Stebbins. The Radio Indigest has scooped the Radio world on one of the most deficient sets ever invented. It is with pride that we announce the series of articles "written exclusive for INDIGEST" by Lem Stebbins, inventor, postmaster, and constabule, of Squedunk, Minn., on his latest circuit "The Stebbins Souper Degenerative Set." Article I begins next issue with Mr. Stebbin's exclusive drawing of the set in INDIGEST. Watch for it!

A Radio Shock

One night, as the storm beat and blustered,
I sat at my Radio set,
And listened to lectures and concerts and talks,
By guys I never had met.

I had just heard a concert that came
From Los Angeles over the wire;
It was followed a few monments after,
By a clergyman preaching "Hell Fire."

I followed as closely as may be,
But my senses would lag and shirk,
And I drowsed as the clergyman ended,
And then came to with a jerk.

He had preached on sinners and sinning,
And I felt like a blooming toff;
But he ended his lecture and then inquired,
"How do you shut the d—n thing off?"

—J. FOSTER MOORE.

QUESTIONS *and* ANSWERS

Q. & A. Department, Indigest—Dear Sir: Can you tell me whether I can buy, and who makes, the super-ultra panel stretcher? I have a 7x18 panel that I would like to stretch to a 10x20. Thank you horribly.—Lillian G.

A.—It is against the policy of Indigest to advertise any Radioknut apparatus. Sorry. However you might try to borrow one from Al Brown he has one that he stretches his cartoons with.

Q. & A. Deparment, Indigest, Dear Sir; Will you kindly tell me what are the present circulation figures of your asteamed paper Thanks for the answer.—Jimsie.

A—At present we are the leading paper in the field and are now running 000,000,000,07 more copies than our nearest competitor, the radio digest.

READERS' VIEWS

We Shall Ask Arthur—We Shall

Indi: Hah, Hah! Shhh! Not so loud. In looking over Mr. Mohaupt's article last issue of radio digest (April 28), page 11, I noted the title "Storage Batteries and Their Care," and then.....whatcha think? In the first column I note a cut of a glass arrangement with a rubber nipple attached. Ha, Hah! Very clever of that fellow Mohaupt. Yes, yes. Is he married?

—WOR Listener In.

EDITORIALS

The music publishers of a certain society demand pay for their copyrighted material. Is this a mercinary motive or fair?—We think so too.

INDIGEST has taken its stand and we feel that we are founded on the sound principles of *Being Right.* WE WILL NOT publish any copyrighted music of the authors, composers and music pub. assn. in our unfilched column, as we are founded on non-money-making principles and do *not* believe in grasping extortion (unless the assn. should wish at any time to pay us for doing the same). Until such time we ask that the Radioknuts, and all INDIGEST followers, stand by us in our just and honest views and refrain from whistling any and all songs published by the assn. Their latest number is *"My Mammie Was Born in Ireland and Lives in Dixie Land—So That's Why I'm the Sheik of Schenectady."* DON'T sing or whistle it!!!!

INDIGEST KINKS?
SEND A DOLLAR—

THERE are many little Indigest kinks worked out in the home that would hamper your fellow Radioknut and cause him much worry. Indigest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.

INDIGEST KINKS DEPARTMENT

Deer Endi—i bot a radeeo set and my muther-in law wuz allus trying to listen in, sew i hooked the hed set to her dome during a thunder storm and now the old dame aint botherin me no more. This kink will wurk providing youre luky but you stand to loose a good set by having same burnt out. Enclose pleze find my dollur.

—eZra HechT.

Looking Ahead

Indigest has scooped the world on the Stebbin's Sooper Degenerative Circuit. It is with pride that we announce the serles of articles, to begin in INDIGEST, written exclusively for INDIGEST by the inventor. Reserve your copy of INDIGEST at your favorite news-dealer—10c.

Condensed

By DIELECTRIC

One's mental condition at the time of illness really has much to do with the rapadity of recovery. That may be according to Coué; if it is, don't belittle it on that account. A young lady is doing very well in the Montreal General Hospital in spite of having suffered a broken back and this is largely due to being able to listen in to concerts and other entertaining features over the Radio.

The usual procedure of broadcasting from a college was reversed when the authorities at Haverford College, Pa., used their receiving set a short time ago to bring a lecture to the student body. Lord Robert Cecil's lecture delivered in Philadelphia was broadcast through Station WFI and it was desired to have the students take notes on it. This is likely the first time that a class has been addressed by Radio with the "prof" in another town.

A church without a pastor need not necessarily be a church without preaching. If the members will purchase a receiving set and amplifier they may utilize the services of a minister supported by others. The Belmont Methodist Episcopal Church, of Belmont, Mass., installed just these things and when their regular pastor was away they carried on the services by employing the aid of Radio. Instead of closing a weak church it might be made to thrive by this means.

When Station WEAF sent out the songs of the college glee club contesting at Carnegie Hall, New York, we were asked to pass upon the merits of each and pick the winner. The singing by each of these clubs displayed careful training and excellent ensemble. Dartmouth received the first prize, Princeton second and Yale third. I'm glad the decision did not rest with me, because I was lost in the beauty of their combined voices.

Radio is fast becoming an economic asset to various fields of endeavor. I shall mention only one instance at this time. Where a large force of foresters were formerly needed to patrol a certain district in the neighborhood of Spokane that work is accomplished by one airplane. Patrolling these one million acres of timberland requires but two and one-half hours daily, whereas the former system required constant attention. The secret of it lies in the fact of the plane being equipped with Radio. You see Radio is an economizer, whether so used or in place of six seats at a concert hall.

Radio is one of the best publicity agencies available. The use for this purpose is coming to be more extensively recognized both in this country and in Canada. There it is being used by the Calgary Board of Trade to reach probable tourists from every State in the Union and every province in Canada. Calgary and its environs will be extolled as exceedingly attractive points to visit with Radio broadcasting as the medium setting forth this information. CHCG is being used for this purpose and since it has been heard all over the United States the Canadians are expecting notable results.

This is for the pessimist who views Radiophony as a plaything and of but passing interest. When blizzards and cyclones destroyed means of communicating with adjacent territory by putting the telephone and telegraph lines out of commission, what was done? Why they waited until those lines were repaired. During the recent blizzard in the Middle West, which wrought havoc with the telegraph lines, what was done? Well, KYW got busy with their RADIO transmitting station and relayed whatever news was of importance to receiving sets tuned to their station. Without Radio this could not have been done, but with it the storm's damage was mitigated.

Simple Arrangement Adds Step of R.F.

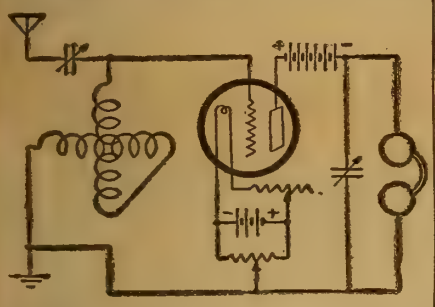
Radio Frequency Permits Loop Aerial to Be Used

It is a very simple matter to add a step of Radio Frequency amplification using the system shown by the accompanying diagram. The simplicity of the arrangement is exceeded only by its efficiency and very few parts are needed to construct the amplifier.

The antenna connection is arranged so that either a loop or outdoor antenna may be used. For a loop, shunt the antenna binding post marked No. 2 to the ground post and connect any standard loop without condenser.

For an outdoor antenna, use the antenna binding post marked No. 1 so that the condenser in the set will not be connected. The other details of the set are standard parts, variometer, tube and socket with proper batteries according to the tube, a 3-plate and a 23-plate variable condenser, a 200 to 400-ohm potentiometer and a filament rheostat.

With this outfit it is unnecessary to have direct connection between the Radio



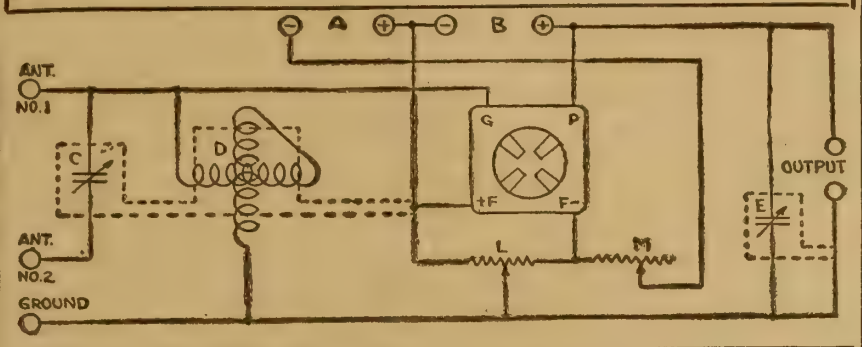
frequency amplifier and the primary circuit of the tuning unit. Instead, if found to be too harsh for local stations, attach the ends of a coil of about 25 turns of an oatmeal box with a No. 25 wire to the output of the Radio frequency amplifier unit and place the coil near the tuning unit, about 3 or 4 inches from the primary coil.—L. W. Martin, Houston, Texas.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

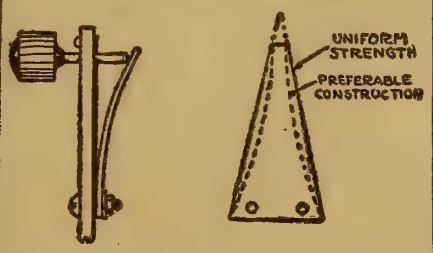
RADIO AMPLIFICATION HOOK-UP



Shape for Resistance Spring

When laying out the phosphor bronze contact piece for the Flewelling variable leak care should be taken to have this piece of the proper shape. This is to make the change of resistance gradual.

It is quite evident to students of mechanics that a beam supported at one end



and of uniform thickness should have the shape of a triangle, if the stress is to be uniform. Furthermore, it is best to go one step further and make the contact piece so that the end nearest the adjusting screw will be raised from contact with the resistance unit before the supporting end is raised.—Carl Schindler, West Allis, Wis.

Variable Grid Leak

Many Radiophans have old rheostats lying around whose resistance wire is either loose or broken. It is possible to make a variable grid leak out of one of these.

Pry out the fiber ring on which the wire is wound and remove the wire. Then replace the fiber ring and glue it back into place.

Next take a very fine file and make the surface of the fiber, where the contact lever touches, very smooth. Mark this surface all the way around with a pencil. Connect one end of this marking to a binding post. It will then be seen that resistance can be varied by just turning the knob located on the other side of the panel.

Line Switch on Battery Saves Charge and Tubes

Practically all filament rheostats are constructed with a zero point or "off" position which serves the purpose of a switch between the vacuum tube and the storage or A battery. However, it oftentimes happens that in the hurry of cutting off for the night, the rheostats are not turned completely off. Under these circumstances, the filament battery is left connected in the circuit discharging all night long through the resistance.

To prevent this, it is advisable to connect a separate battery line switch, which through practice and force of habit, should be opened first before the filament rheostats are turned back to zero. Then, if the latter operation is not performed, the battery circuit will be opened anyway by means of the line switch.—P. J. M. Clute, Schenectady, N. Y.

Moving Coil Speaker

The best-known loud speaker is composed of a metallic horn connected to what is actually a telephone receiver of large size. The permanent magnet is energized by an external source of current, and the diaphragm is actuated by a coil of wire suspended between the pole pieces of the electromagnet. The actuating current passes through the suspended coil.

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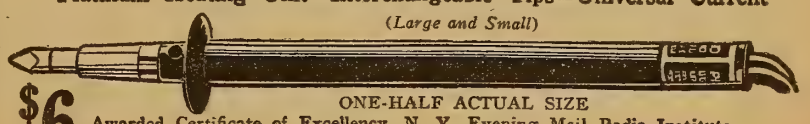

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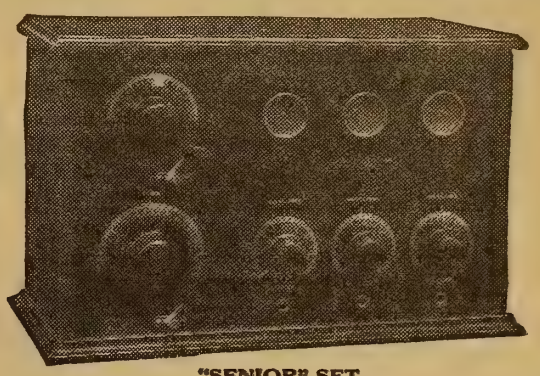

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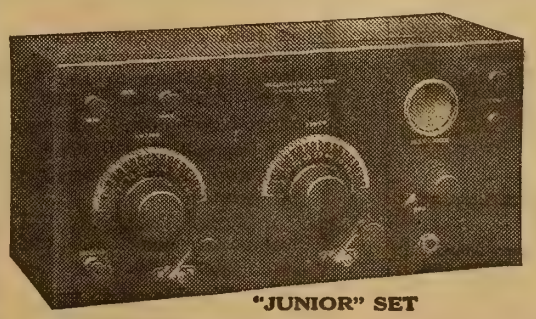

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ADVANCE PROGRAMS

(Continued from page 6)

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "General Conditions in the Shoe and Leather Industry," New England Shoe and Leather Ass'n; 9:30 P. M., "Romance of the Shoe," Harry M. Wood; Concert, Crescent Gardens Orchestra.

WGR (Eastern, 400), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico recital; 7:30 P. M., Digest of Day's News.

WGY (Eastern, 370), 1:00 P. M., Music and address, "Using Colored Oilcloth;" 7:45 P. M., Radio drama, "The Fortune Hunter;" Instrumental selection, excerpts from "Tumble In," WGY Orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theater Organ; Biographical sketch of Old Testament charactetrs "Resume of the History," Margaret Moore, Bainbridge, Ga.; Evelyn Campbell, soprano, Dorothy Adams, accompanist; Dorothy Adams, pianist, "Just Among Home Folks." Courier-Journal; 7:30-9:00 P. M., Mrs. Elmer Graham, soprano; Mrs. Chas. Nicholson, accompanist; Joe Eisenbeis, tenor; Duet, Mrs. Graham, soprano; Mr. Eisenbeis, tenor; Reading, Elizabeth Somers Steiger, Robert Muth; Mrs. Chas. K. Leslie, soprano; Chas. K. Leslie, baritone; Duets, Mrs. Chas. K. Leslie, soprano, Mr. Chas. K. Leslie, baritone; Reading, "An Interesting Historical Episode."

WIP (Eastern, 400), 1:00-1:15 P. M., Short talk; 2:00-3:00 P. M., Artist recital; 6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wip's Bedtime Stories.

WJAX (Eastern, 360), 8:00 P. M., Concert, Singer's Club, Dixie Howell, soprano.

WLW (Central, 360), 10:00 P. M., Musical program, Sigma Alpha Iota Sorority, Beta Chapter, College of Music, "Scottish Airs," "Valse," Frances Bejach, pianist; "From the Land of the Sky Blue Water," "Waltz," Eleanor W. Mackey, soprano; "A Little Love, a Little Kiss," "Red Moon," Lucile R. McKeever, violinist; Corrine Sammet, Saxophonist; Frances Bejach, pianist; Vocal selection, S. A. I. Sextette; Violin solo, Lucile R. McKeever; Vocal duet, Eleanore Mackay, Amy Hattersley; "Maids of Cadiz," "A Picture," Amy Hattersley; "Bohemian Dance," Margaret Q. Finny, pianist.

WMAQ (Central, 400), 4:35 P. M., Program by the Lyceum Arts Conservatory; 7:00 P. M., Rockwell Stephens, Auto Editor Daily News, gives 2nd of series of talks on auto trails; "Worlds in the Making," Arthur Carpenter; Gilbert W. Butler will talk to Boy Scouts; 9:15 P. M., Helen Leefelt, pianist; Geo. Simons, baritone.

WOC (Central, 400), 12:00 M., Chimes concert; 3:30 P. M., Talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:35 P. M., Sandman's Visit; 7:00 P. M., Musical program; 8:00 P. M., Lecture, "Yosemite National Park," James V. Lloyd, National Park Ranger.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ Recital; 11:30-11:55 A. M., Grand organ recital and trumpets; 7:50-9:00 P. M., WOO Orchestra, Robert E. Golden; 9:00-9:55 P. M., Organ Recital, Mary E. Vogt at the console.

WWJ (Eastern, 400), 3:00 P. M., News Orchestra; 7:00 P. M., The Town Crier, News Orchestra; Mrs. Marie Haines, contralto; Fred Walters, baritone.

Friday, May 4

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Public School Music Teachers Ass'n; Male chorus, 100 voices, Orpheus Club; Dominant Club; California Federation of Music Clubs.

KFI (Pacific, 400), 6:45-30 P. M., Peter Rabbit; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Public School Music Teachers Ass'n.; Male chorus, 100 voices, Orpheus Club; Dominant Club; California Federation of Music Clubs.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe Program.

KYW (Central, 400), 8:00-8:58 P. M., Nita Obrassova, Soprano; Margaret Carlisle, Accompanist; Milan Lusk, Violinist, Elioise Bodlan, Pianist, Accompanist; Wendell W. Hall, Music Maker; 9:05-9:25 P. M., Book Review, Llewellyn Jones, Literary Editor Chicago Evening Post; 10:00 P. M.-1:00 A. M., Midnight Review.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Grace Williams' Orchestra; 9:30-10:30 P. M., Concert, College of Industrial Arts Girls' Orchestra of Gainesville, Texas.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Concert, Arcadia Cafe Orchestra recital; 3:00-3:30 P. M., Betsy Logan's Household Hints; Musical program; 4:15-4:45 P. M., Talk, "Affairs of the Heart," Betsy Logan; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M.; Dream Daddy with boys and girls; 7:50-8:00 P. M., Songs; 8:00-9:50 P. M., Musical program.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "The Sunday School Lesson," Dr. Robert S. Hyer, Southern Methodist University; 8:00-9:30 P. M., Musical program, G. M. Wallace and mixed quartet.

WFI (Eastern, 400), 1:14-2:00 P. M., Meyer Davis Bellevue-Stratford Concert Orchestra; Strawbridge and Clother Male Quartette 6:30-7:00 P. M.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club, Address, Miss D. H. Goodwin; 5:00 P. M., Girl's story hour, Eunice L. Randall; 9:30 P. M., Travelogue, David M. Cheney; Concert, Somerville Quartet.

WGR (Eastern, 400), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico recital; 7:00 P. M., News Digest; 8:00 P. M., Vocal concert, direction W. H. F. Penny, composer.

WGY (Eastern, 370), 1:00 P. M., Music and needlework talk, "The Demure Dotted Muslins," courtesy of Modern Priscilla; 7:45 P. M., Concert, "Swanee Smiles," WGY Instrumental Quartet; "Little House o' Dreams," Arthur A. Gayne, baritone; "Lullaby Waltz," Quartet; "Grand Opera Strains," James H. Johnstone, mandolinist; Baseball talk, "Prospects of 1923 Baseball Season," "Daniel," sport writer for the New York Herald; "Chansonette," Quartet; "Casey at the Bat," Arthur A. Gayne; "Aggravating Rag," James H. Johnstone; Address, "The Radiotron," W. C. White, Research Laboratory, General Electric Co.; "Panama Twilight," Quartet; "Nailo," Arthur A. Gayne; "Lights Out," "Frolic of the Kazoos," James H. Johnstone; "Japaloma," Quartet; 10:30 P. M., Musical program, "Song of Steel," Union College Glee Club; "Serenade," John Burnham, violinist; "Kashmiri Song," "Longing, Dear, for You," Glee Club; "Sweet Melody," "I Love a Little Cotttage," Union College Instrumental Club; "Route Marchin'," Glee Club; Some New Saws, W. V. Fretts, The Bishop Brothers, B. A. Stilson; A Vocal Melange, Civil Engineering Quartet; "Sunkist Rose," "Your Kisses," Instrumental Club; "The Road to the Isles," "The Old Road," Glee Club; "The Kerry Dance," "The Spring Has Come," David M. Brockaway; "Mah Lindy Lou," "Exhortation," "Alma Mater," Glee Club.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theatre organ; Biographical sketch of Old Testament Characters, "Resume of the Prophecy," W. A. Stevenson, Commerce, Ga.; Concert, under auspices of Alice Monroe, Jeffersonville, Ind.; Anna Jacobs, soprano; Kathryn Steller, contralto; Albert Hebner, tenor; "Just Among Home Folks," Courier-Journal; 7:30-9:00 P. M., Concert, Summers Syncopaters, New Albany, Ind., Lenore Summers, piano and director; U. S. Government address; Reading, "An Interesting Historical Episode."

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program, 6:00-6:30 P. M., Dance music, 7:00-7:30 P. M., Uncle Wip's Bedtime Stories.

SATURDAY, MAY 5.

WIP (Eastern, 400), 2:00-3:00 P. M., Song Recital; 6:00-6:30 P. M., Dance music; 7:00-7:30 P. M., Uncle Wip's Bedtime Stories.

WMAQ (Central, 400), 4:35 P. M., Program arranged by Columbis School of Music; 7:00 P. M., "Talks on music of Mrs. H. H. A. Beach, Marx E. Obern-dorfer, assisted by Mrs. Cora Thorne-Birt, soprano; 9:15 P. M., The Shrine Chanters, Choral.

WOC (Central, 400), 12:00 noon, Chimes Concert; 3:30 P. M., Talk, C. C. Flanagan; 5:45 P. M., Chimes Concert; 6:35 P. M., Sandman's Visit; 7:00 P. M., Musical Program, P. S. C. Orchestra; 8:00 P. M., Educational Lecture by Col. Geo. W. Harris, Inf. U. S. A.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ Recital; 11:30-11:55 P. M., Grand Organ Recital and Trumpets.

WSY (Central, 360), 8:00 P. M., Musical program, "Steal a Little Kiss," Maurer's Orchestra; "Light of the World We Hail Thee," Ned Maurer, cornetist; "Roaming in the Gloaming," Scottie Stuart; "Lovely Lucerine," Maurer's Orchestra; "Selected," Percey Rosenberger, reader; "Moon River," Preston Matthews, saxophonist; "Am I to Blame," "Wonderful Land of Dreams," "You've Got to See Your Mamma Every Night or You Can't See Your Mamma at All," Maurer's Orchestra.

WWJ (Eastern, 400), 7:00 P. M., The Town Crier, News Poet; News Orchestra; Louise H. Campbell, Michigan Agricultural College speaker; Cockburn Bros. popular songs.

Saturday, May 5

CFCN (Mountain, 440), 10:30-12:00 P. M., Dance selections, Imperial Dance Orchestra, Plaza Cabaret.

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Los Angeles County Dental Sy.; Concert, Junior Music Clubs of Southern Calif.; 8:00-9:00 P. M., Program, University of Southern Calif.; 10:00-11:00 P. M., Vocal selections, Packard Radio Club, Harry Coe, Ben McLaughlin, Leonard Van Berg.

KGW (Pacific, 400), 3:30-4:00 P. M., Children's program, pupils of Mrs. Marie Johns; Stories, Aunt Nell.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe Program.

KYW (Central, 400), 8:00-8:58 P. M., Musical Program, courtesy W. W. Kimball Co.; Wendell W. Hall, Music Maker; 9:05-9:25, Under the Evening Lamp Sketches, Youth's Companion.

WBAP (Central, 400), 7:00-7:20 P. M., Sunday school lesson, Mrs. W. F. Barnum, leader of Barnum Bible Class of First Methodist Church.

WDAP (Central, 390), 10:00 P. M., E. E. Harder, clarinetist; Harmony Four; W. G. Kassing, tenor, other artists.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Concert, Arcadia Cafe Orchestra; 3:00-3:30 P. M., Tenor and piano solos and short talk; 4:15-4:45 P. M., Dance music; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Musical program, Anna P. Baker and assisting musicians; 11:00-12:00 P. M., Musical program, Mrs. Albert Smith, Joseph R. Brown, and assisting musicians.

WFI (Eastern, 400), 1:15-2:00 P. M., Meyer Davis Bellevue Stratford Concert Orchestra; James Wilson Public School Orchestra; 6:30-7:00 P. M., Meyer Davis Concert Orchestra; 8:00-8:15 P. M., Talk for boys, Dr. William Barnes Lower; 8:15-9:00 P. M., Cantoresau Cymralg (Ladies Welsh Choir).

WGI (Eastern, 360), 6:15 P. M., Condition of Massachusetts Highways, Automobile Legal Ass'n.; 7:00 P. M., Talk on New England Problems, direction of New England business men; Drama, "The Thirteenth Chair," Amrad Players, W. Eugene Hammett, director.

WGY (Eastern, 370), 8:00 P. M., Dance music, Cain's Castle Orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Organ Recital, Heyde C. Conrad, Alamo Theatre organ; Concert, Kentucky Sextette Orchestra, Arthur Jackson, director and drums; "Just Among Home Folks," Courier-Journal; 7:30-9:00 P. M., Concert, Apollo Concert Orchestra, Bruno Weinert, violin and director; Luigi Resta, trombonist; Miss Balough, accompanist; George A. Resta, clarinetist; Katherine Lucile, pianist; Reading, "An Interesting Historical Episode."

WMAQ (Central, 400), 7:00 P. M., "Custer Battlefield Highway." Wm. D. Fisher; 9:15 P. M., "The Paul Revere Club Blue Square Follies."

WOC (Central, 400), 12:00 noon, Chimes Concert; 3:30 P. M., Talk, C. C. Hall; 5:45 P. M., Chimes Concert; 6:35 P. M., Sandman's Visit; 7:00 P. M., Musical Program; 9:30 P. M., Dance Program, P. S. C. Orchestra.

WOO (Eastern, 400), 11:00-11:30 A. M., Grand Organ Recital; 4:45-5:00 P. M., Grand Organ Recital and Trumpets.

WWJ (Eastern, 400), 3:00 P. M., News Orchestra.

Sunday, May 6

KFI (Pacific, 400), 10:00-11:00 A. M., Church service for all denominations, Church Federation; 4:00-5:00 P. M., Musical vesper service, Natl. Federation of Music Clubs; Industrial chorus, Antonette R. Sabel, director; 8:00-10:00 P. M., Concert, Packard Girls' Concert Club; 10:00-11:00 P. M., Concert, Bennett's Packard Six Orchestra.

WBAP (Central, 400), 11 A. M.-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor, Will Foster, organist; 3:30-4:30 P. M., Concert.

WDAP (Central, 390), 9:15 P. M., Theodora Blieding, violinist; Katharine Gorin, pianist; Henry Selinger and Drake Concert Ensemble.

WFAA (Central, 400), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor of First Presbyterian Church, musical program; 9:30-10:00 P. M., Musical program, Choristers of Central Christian Church; 10:00-11:00 P. M., Concert, Bob Harris' Orchestra.

WFI (Eastern, 400), 4:00 P. M., Chapel services; 7:30 P. M., Services from Arch Street Presbyterian Church, Phila.; 9:30 P. M., Organ recital.

WGI (Eastern, 360), 4:00 P. M., Concert, L. Doersam, baritone, Florence Doersam, accompanist; "Adventure Hour," Youth's Companion; 8:30 P. M., Church services, Massachusetts Federation of Churches.

WGY (Eastern, 370), 9:30 P. M., Church services, First Presbyterian Church, Albany, N. Y., Prelude, "Andantina," Harold W. Thompson; Anthem, "In Heavenly Love Abiding," Quartet; "The Echo Amen," Choir; Offertory, "Meditation," "O Rest in the Lord." Alto solo; Hymn, "Faith of Our Fathers, Living Still"; Sermon, "Faith to the Front." Rev. Wm. Herman Hopkins, D. D., First Presbyterian Church, Albany, N. Y., Prayer; Hymn, "My Faith Looks Up to Thee"; Benediction; Postlude, "March," from "Aida," Harold W. Thompson; 3:00 P. M., Concert, "Turkish March," from "Ruins of Athens," WGY Symphony Orchestra, Leo Kliwen, conductor; "Cortege du Serdare," from the "Caucasian Sketches," WGY Orchestra; "Prologue," from "I Pagliacci," William A. Fay, baritone; "Blue Danube," WGY Orchestra; "Invictus," "How Many Dreams," William A. Fay; "Danse Arabe," from the "Nutcracker Suite," WGY Orchestra; "A Year Ago," "In the Silent Night," "William A. Fay; "Minuet," from the "Military Symphony," WGY Orchestra; 7:30 P. M., Church services, First Presbyterian Church, Albany, N. Y. Prelude, "Spring Song," Harold W. Thompson; Antiphon, "Bless the Lord, O My Soul;" Hymn, "O God, Our Help in Ages Past"; Prayer; Anthem, "Jerusalem, O Turn Thee to the Lord," Quartet; Offertory, "Indian Melody," "Watchman, What of the Night?"; Hymn, "Fling Out the Banner, Let It Float"; Scripture; Sermon, "This Hopeful World," Robert E. Speer, LL. D., Secretary of Board of Foreign Missions and President of the Federal Council of Churches of Christ in America; Prayer; Hymn, "Christ for the World We Sing"; Benediction; Postlude, "March of the Priest," Harold W. Thompson.

WHAS (Central, 360), 9:57 A. M., Organ recital; 10:00 A. M., Church services, Fourth Avenue Presbyterian Church, Rev. Dr. Chas. W. Welch, pastor; Wm. E. Cohen, organist and choir director; 4:00-5:00 P. M., Concert, Special Double Quartet, New Albany, Ind.

WIP (Eastern, 400), 11:00 A. M., Church services, Holy Trinity Memorial Chapel, B. Janney Rudderow.

(Continued on page 14)

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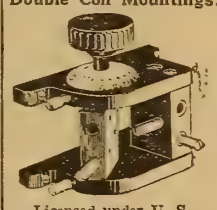

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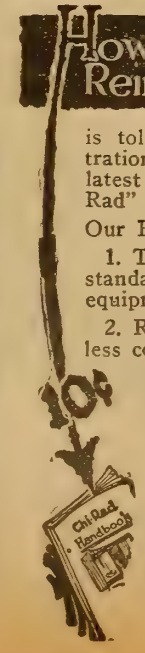

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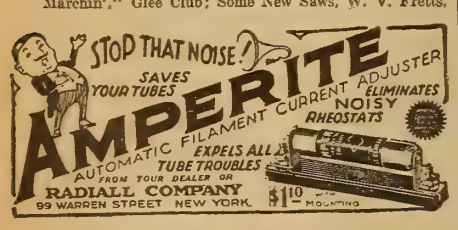

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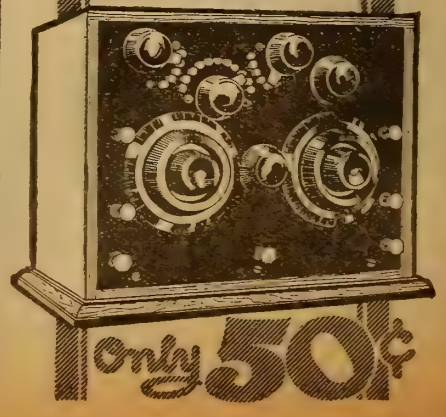


Only 50¢

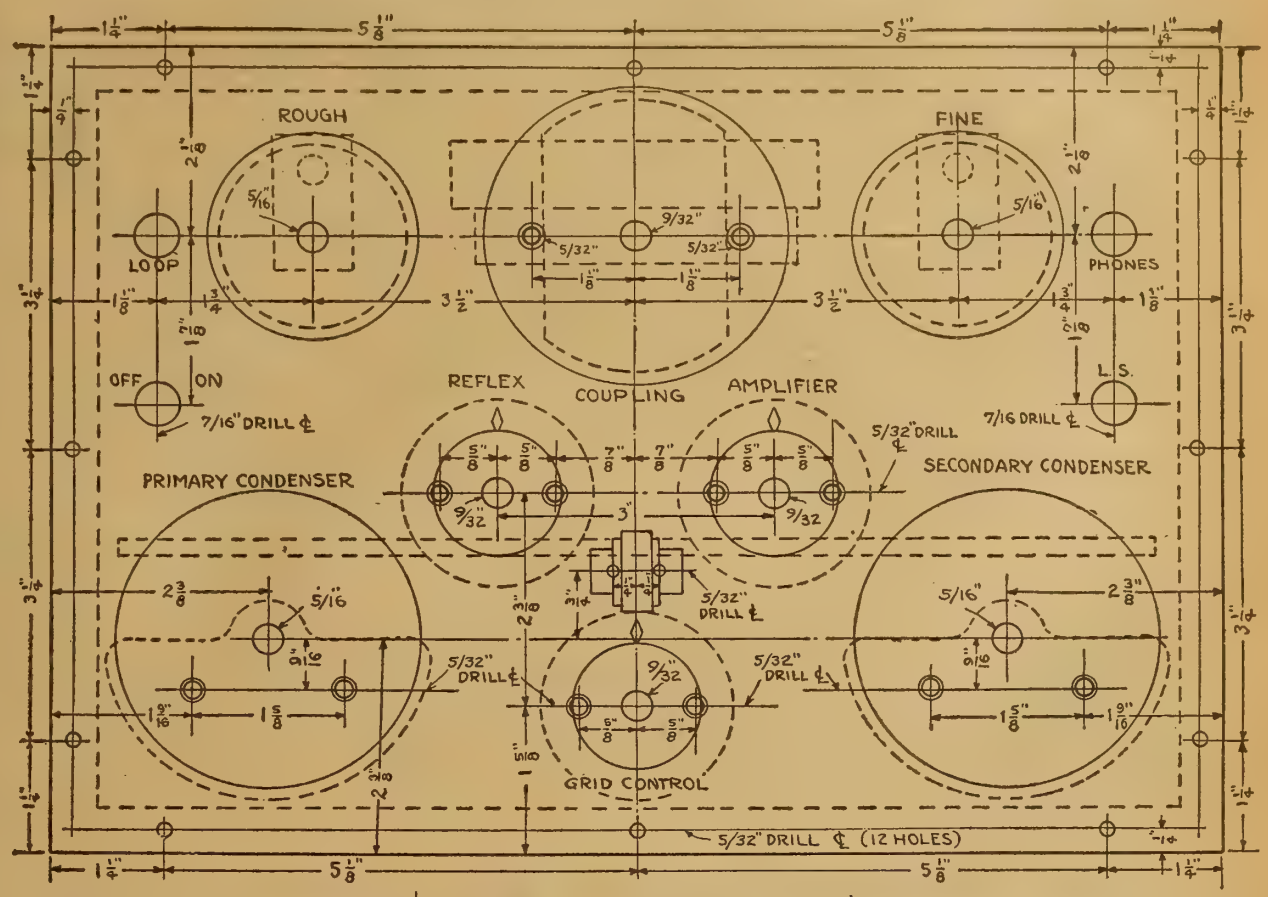
Making a Three Tube Reflex De Luxe Receiver

Part I—Panel Layout and Hook-Up

By H. J. Marx

AFTER three months of research work and experimentation, there is a considerable degree of satisfaction in presenting a circuit that accomplishes a little more than what has been done before. Experience teaches us that rarely can we get that all-around combination of advantages continually sought, but seldom attained. Some circuits have the advantage of their good distance reception; others have volume; then again others have the disadvantage of requiring too many tubes; or, again, tuning may be complicated and difficult.

In working on this circuit, it has been the aim of the author to eliminate unnecessary controls, reduce so far as possible not only the quantity of apparatus but also the number of necessary adjustments. After the circuit development was completed, then arose the problem of compact assembly on the panel and in the cabinet. This required time and patience, but was worth the effort.



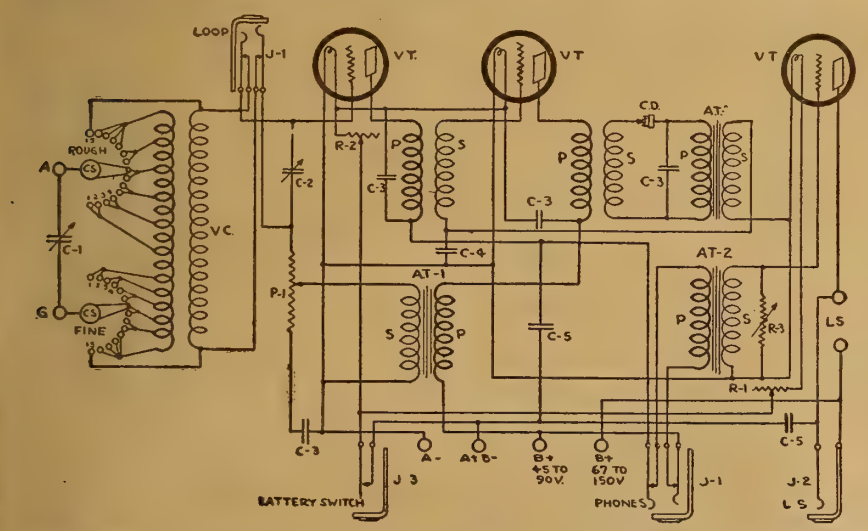
PARTS REQUIRED

VT—3 Hard vacuum tubes and sockets
VC—Variocoupler
CS—2 Contact switches
RT—2 Radio frequency transformers, reflex type
AT-1—2 Audio frequency transformers
AT-2—1 Audio frequency transformer, high voltage type
P-1—Potentiometer, 400 ohms
J-1—2 Double circuit jacks
J-2—1 Open circuit jack
J-3—Jack type battery switch
R-1—1 Rheostat, 6 ohms
R-2—1 Power rheostat, 6 ohms
R-3—1 Grid leak, variable
C-1—Variable condenser, .0005 mfd.
C-2—Variable condenser, .0005 mfd., vernier
C-3—4 Fixed condensers, .002 mfd.
C-4—1 Fixed condenser, .0015 mfd.
C-5—2 Fixed condensers, .006 mfd.
CD—Crystal detector
Eight binding posts
One panel, 9x12¾x⅜ inches
One sub panel, 5½x11¼x⅜ inches
One cabinet, 7 inches inside depth
25 Ft. tinned bus bar wire
20 Ft. spaghetti tubing

Not Low-Priced Outfit

The Reflex De Luxe cannot be considered a low-priced outfit, but its cost is low when its possibilities are considered. The volume with three tubes has been sufficient to make the diaphragms of the best of loud speakers chatter, and one of the chief difficulties was in getting sufficient control over its volume without loss of the good quality of the reception. The circuit has been arranged for use with both outdoor and loop aerials. Experimental work has been conducted entirely with the use of a loop aerial.

Inasmuch as an outdoor antenna is unquestionably more efficient, there need be no hesitation in the use of this circuit with either type of receiving antenna. The antenna and ground connections can be made direct to the binding posts, whereas the loop can be plugged in on a jack, automatically cutting out the variocoupler tuning unit. In addition, if the two contact switches are turned so the lever on each one rests on contact 15, the circuit can be operated as a single circuit tuner, using the primary and secondary condensers for tuning controls, or by switching just one of the contact switches to 15, a different arrangement is provided.



Circuit Inverse Reflex

The circuit used in this set is not only reflex, but also utilizes the inverse arrangement which both Priest and Grimes found to show great possibilities for development. Various changes have been made after trial in an effort to incor-

(Continued on Page 14)

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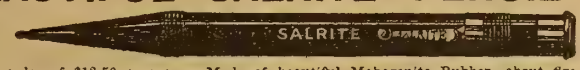

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ADVANCE PROGRAMS

(Continued from page 12)

minister; 2:00-3:00 P. M., Musical program, Arcadia Cafe Concert Orchestra, Fery Sarkozi, director.

WWJ (Eastern, 400), Church services from St. Paul's Cathedral; 2:00 P. M., News Orchestra; Leo Robitaile, Cyril Wezmael, duets.

Monday, May 7

KFI (Pacific, 400), 6:45-7:30 P. M., Peter Rabbit; Talk, Los Angeles Chamber of Commerce; Concert, Junior Music Clubs of Southern Calif.; 10:00-11:00 P. M., Program, Gaumut Club; Female chorus, Woman's Lyric Club of Los Angeles; Program, Hollywood Chamber of Commerce.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Mrs. Emmet Davidson, other artists of Mineral Wells, Texas; 9:30-10:30 P. M., Concert, novelty numbers, De Molay Orchestra of Fort Worth.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Concert, Arcadia Cafe Orchestra; 3:00-3:30 P. M., violin and soprano solos; talk; 4:15-4:45 P. M., Betsy Logan's "Affairs of the Heart"; Musical tea time program; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFI (Eastern, 400), 1:15-2:00 P. M., Meyer Davis Bellevue Stratford Concert Orchestra; 3:30-4:15 P. M., Piano solos, Edna Griffinburg; 6:30-7:00 P. M., Meyer Davis Bellevue Stratford Dance Orchestra.

WGR (Eastern, 400), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico Recital; 7:30 P. M., News Digest; 8:00 P. M., Vocal recital, Philip Small, baritone; Marion Bonning, accompanist; Mr. Bork and his male quartette; George Phelps and Henry Hangaur, piano duet; Richard Lippich and his mandolin trio; Philip Rozemmaget, violinist.

WGY (Eastern, 370), 7:45 P. M., Musical program, "Zenda," Picotte's Paramount Orchestra; "I Hear You Calling Me," "Absent," David T. Williams, tenor; "Call Me Back, Pal O' Mine," Paramount Orchestra; "Topics of the Day," Pathe Exchange; "Don't Forget Me," Orchestra; "Baldwin," from the Welsh Opera "Baldwin," David T. Williams; "One Moonlight Night," Orchestra; "I'll Think of You," Orchestra; Address, "Killing Boll Weevils with Poison Dust," U. S. Dept. of Agriculture; "Lovebeam," Orchestra; "On a Byth na Har' o' Hudd," sung in Welsh, David J. Williams; "I Never Miss the Rain," Orchestra; "Side by Side," Orchestra.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, Heyde C. Conrad, Alamo Theatre organ; Vocal selections, Mrs. C. C. Harne, soprano, Mary Thompson, accompanist; Address, "Give Your Car a Home," J. W. Zimmerman; "Just Among Home Folks," Courier-Journal.

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner Dance Music; 7:00-7:30 P. M., Uncle Wip's bedtime stories.

WOO (Eastern, 400), 11:00-11:30 A. M., Organ Recital, Mary Vogt at the console; 4:45-5:00 P. M., Organ recital and trumpets; 7:50 P. M., Orchestra and organ recital and J.W.C.I. Band; 10:10 P. M.-12:00 P. M., Dance music.

Keep Dust Out of Set

A small brush should be a part of the equipment of every receiving set. Keep the dust from collecting between the terminals, contact points, on the plates of the variable condensers. Dust the set each day. Radio instruments are delicate, and require care and attention similar to a watch if they are to function with efficiency.

FIRST STEPS IN RADIO

(Continued from page 7)

The unit of energy is the watt and is defined as the amount of power in a circuit when the instantaneous values of voltage and current are both unity or one. Which follows that the wattage in a circuit is the product of the voltage and amperage. This is not a measure of power unless a time element is considered, for the watt denotes the rate at which energy is being expended but when we state a time such as a watt-hour, we then have a measure of power. The majority of electrical devices are rated in watts and from the above data it is easy to determine the current consumed in amperes.

Consider a step down transformer rated at 60 watts. Since the wattage is the product of the voltage and amperage it holds that dividing the watts by the volts will give the amperes. Therefore we divide the input of the transformer in watts by the voltage of the line and get the current consumption in amperes.

Kilowatt Hour and Ampere Hour

The usual unit in calculating the cost of electricity is the kilowatt hour. Kilo meaning 1000, this unit denotes 1000 watt hours.

Storage batteries are rated in ampere hours which is the product of the current flowing and the length of time in hours. Thus a battery rated at 60 ampere hours will deliver 3 amperes for 20 hours or 2 amperes for 30 hours and so on theoretically. Practically there is a slight diversion from these figures but they are close enough for most purposes.

From this, one can readily determine the length of time their battery will operate the tube before recharging is necessary. Consider a three-tube set which consumes nearly three amperes it will be seen that a 120-ampere hour battery will operate this set 120 divided by 3, or 40 hours.

It is practically impossible to put any ampere hour rating on a dry cell for its life will be determined not only by the amount of current drawn but the frequency and length of time such withdrawal takes. As a rule the life of a dry cell, either of the large ignition or B battery type, is increased by use in a number of short stretches rather than one long one and allowing time for recuperation between periods of use.

Connecting Cells; Series and Parallel

In connecting cells together they can be connected in either series or parallel. When cells are connected in series, that is, the carbon or positive to the negative or zinc, the resulting voltage will be the sum of the voltages of each cell. Thus two dry cells give 3 volts, three cells 4½ volts and so on. Where storage cells are used each cell in series adds 2 volts. When connected in parallel or multiple the voltage is the same as one cell but the available current is equal to the sum of the current ratings of each individual cell. Thus we see the advantage of using two or more dry cells in multiple on WD-11 tubes. The voltage is not raised but the drain on each cell is less, and two cells so connected will last more than twice as long as one cell used in the circuit at one time.

Milliamperes

When dealing with currents in the plate circuit of a tube, use is made of the term milliamperes. Milli means 1000 and is used here in the sense of one thousandth of an ampere. This small unit is necessary as the current in the plate circuit is so small, usually in the neighborhood of 5 milliamperes which means 5/1000 of an ampere.

The relationship between the various electrical units shown above will enable a clearer understanding of what is to follow. We shall next treat of Radio waves and their propagation through space.

(TO BE CONTINUED)

THREE TUBE REFLEX

(Continued from page 13)

porate every improvement possible. The condenser values have been determined by experiment and should be adhered to as closely as possible. The constructor is strongly urged to consider only the use of good quality apparatus. For example; paper dielectric condensers vary so much in capacity and are usually so poor in quality that their use is absolutely out of the question.

The assembly of the apparatus on both the panel and the sub panel, which will be taken up in the next article, is such as to avoid as far as possible all inductive reactions. This arrangement has been tested and should be followed accurately. Unnecessarily long leads must be avoided. Changes in the circuit or in the apparatus are apt to materially effect the efficiency of operation. Successful operation cannot be assured if any alterations are made.

In any form of tube circuit, consideration must be given to the type of tube used. While there may be an advantage in substituting dry batteries in place of storage cells, the fact must not be overlooked that economy is sometimes accomplished only at the expense of the output. As previously stated, the peanut tubes have not been found very satisfactory for reflex work.

In the circuit diagram all the units of apparatus have been keyed and these key numbers are explained in the list, "Parts Required." The variocoupler should have both rough and fine taps. In the one used there were six rough and also six fine or single turn taps. The contact or inductance switches had fifteen contact points. To avoid dead or open points, 1 and 2 are connected together leading to the first tap, likewise 3 and 4 to the second, and so on, until 11, 12, 13, and 14 are all connected to the last tap. Contact point 15 is connected to the one secondary terminal. This same arrangement holds true for the other contact switch. In this way the lever is always in use and avoids the possibility of making a connection with an open contact, thus saving a waste of time in trying to tune without the circuit in operation.

The Radio frequency transformers used were of a reflex design. Two of the audio frequency transformers are of the average type, while the third (AT-2) should be one designed for higher voltages in order to avoid any possibilities of burned-out windings. The potentiometer should be of 400-ohm type, and is used to control the reflexing of the first stage of audio frequency to the first tube.

Two double circuit jacks are used. One is for plugging in the loop, and the other for use with the phones. In addition, an open circuit jack is added so that the loud speaker can be plugged in if it is not desired to make connection to the binding posts in the back. J-3 is the jack type battery switch used for cutting out the A battery when the set is not in use. R2 should be a 6-ohm power rheostat, capable of carrying at least three amperes current. The condenser C1 need not be necessarily of the vernier type, but C2 should be, especially on account of its use in conjunction with the loop aerial.

The by-pass condensers C3, 4 and 5 should be of the mica dielectric type with accurate capacity range.

The crystal detector CD can be of the fixed adjustment or variation type, although the fixed adjustment avoids the necessity of constantly setting for sensitive contact. Eight binding posts will be required for connections on the sub panel. The layout for the sub panel will be taken up in the next article. Details of the cabinet construction will be covered later. likewise, the wiring routine will be given.

The panel layout shown in Figure 2 indicates not merely the location holes for mounting the instruments, but also shows the dials on the front of the panel, and suggestions for engraving or name plates that can be incorporated on the panel. All instruments are symmetrically arranged about the vertical centerline.

The coupler is located at the top center with the tap switches on each side. The three jacks and battery switch are in the extreme right and left hand sides. The two variable condensers are mounted in the two lower corners of the panel.

The two rheostats and potentiometer are located in the triangular arrangement in the lower center of the panel with a crystal detector in the center of the triangle.

As stated in previous articles telling of panel layouts, apparatus mounting holes will have to be checked up with the actual make of parts used in order to make sure of their location. Provided the outside dimensions of the parts are satisfactory, the location dimensions given can be employed satisfactorily. The twelve holes around the border of the panel are for the fastening of the panel to the cabinet. These are not indicated as countersunk because nickel plated roundhead wood screws were used.

In the next article the layout of assembly of the apparatus on the sub panel will be taken up in conjunction with the mounting of this sub panel on the main panel.

(TO BE CONTINUED)

Length of Aerial

A short aerial gives sharper tuning than a long one, from which it is obvious that a long aerial picks up more energy than a short aerial and causes more difficulty in eliminating interference. On the average, best results are obtained with an aerial from 50 to 75 feet long.

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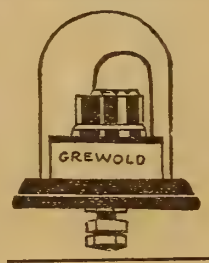

This well-known crystal detector, $2.00 value, special at **$1.49**

W D 12 TUBES

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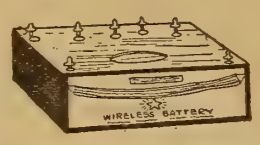

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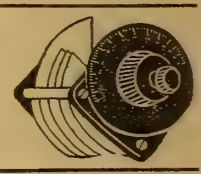

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Questions and Answers

Loose Coupler

(2429) CK, Marvel, N. D.

In a loose coupler, is the secondary and primary coil connected together in any way by wire? What is the use of the rods that the secondary coil slides on? Are they necessary? How do you tune in a station on a crystal set using a loose coupler? I live 15 miles from a sending station. Will a 75-ohm receiver be all right to use? Are the vacuum tubes known as the W-11 the tubes that are used with dry cells.

A.—Answering your inquiry, will advise that primary and secondary of loose coupler are not connected in any way.

Rods are merely used to support the secondary coil, although sometimes the wires from the secondary coil are connected to them for appearance sake. Not necessarily, however.

Tuning is accomplished by experimentation until receiving wave length of broadcasting station desired. It is largely a matter of patience and practice till accomplished.

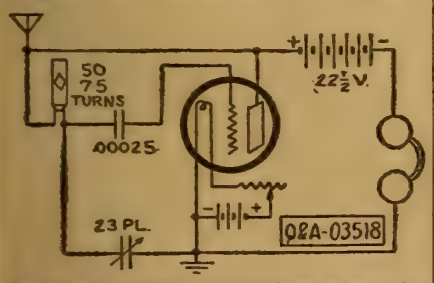
A seventy-five ohm headset is not very efficient. Better have a three thousand ohm set if possible.

WD11 tubes are used with dry cells, as suggested.

Ultra Audion Hook-Up

(3518) IMA, New Orleans, La.

Please give me the ultra audion hook-up. I believe it is the same one certain publications are misnaming the "Gibbons"



and names of other so-called inventors who do not deserve the credit.

A.—Hook-up is given herewith. Dr Lee DeForest is responsible for the discovery of the ultra audion circuit and to him all credit belongs. You are right in saying the other "inventors" do not deserve falsely claimed credit.

Night and Day Reception

(2362) NG, Philadelphia, Pa.

I am using Radio frequency amplification with various types of transformers and receiving throughout the whole day long distance fine, but as soon as night gets on a terrible static is dropping in my receivers and the noise is so great that I cannot receive any distant station except city stuff. I'm using three steps of R. F. and detector three steps of A. F. amplification. Please help me settle my problem. I'm using about 100 ft. single wire aerial 30 ft. high.

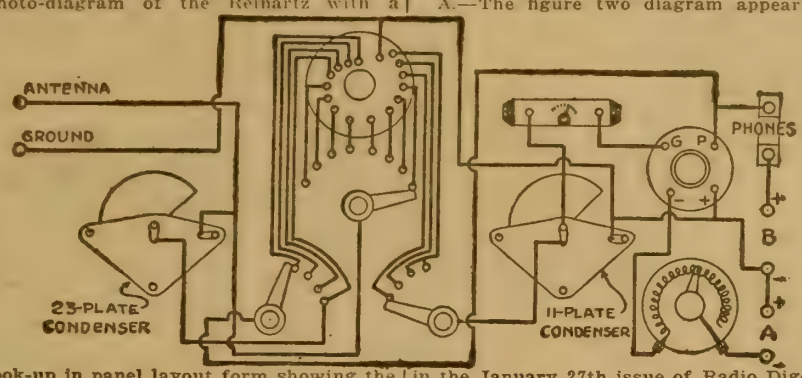
A.—Noting difficulties experienced in night reception will advise that this is contrary to theory and precedent. Reception should far excel that obtained during daytime. It is indicated that there is disturbance occasioned by electrical apparatus in your proximity. Possibly a faulty arc light adjacent to your set. It is not a static disturbance, as suggested.

Your antenna construction is good.

Reinartz Hook-Up

(3571) SHL, San Bernadino, Calif.

Some few issues back you printed a photo-diagram of the Reinartz with a



hook-up in panel layout form showing the instruments connected on a panel. Can you repeat this hook-up?

A.—The hook-up was given in the issue of January 13 and is repeated again herewith.

Choke Coils and Transformers

(2318) EAL, Plymouth, Ill.

I would like to ask a few questions regarding the Reflex circuit No. 3 of the January 27th issue. Could I get as good results by using an R. F. transformer in place of the choke coil and high resistance? What tubes would be best for this circuit. Could the W. E. 216A tubes be used? If so what plate voltage should they require? Would it be possible to light the filament and furnish the plate voltage off the 60 cycle A. C.? What is the wavelength range?

A.—In reference to the Reflex circuit would advise that Radio frequency transformer may be used effectively in place of the choke coil and high resistance.

U V 201 tubes will serve satisfactorily in this circuit. W E 216A tubes may be used with about ninety volts plate potential.

It is possible to light filament from A C supply by employment of rectifiers and transformers.

The wave length range is about one hundred and ninety to six hundred meters.

Squeals and Howls

(2867) RLB, New York City.

In your issue of January 27, on page 13 you published a hook up figure 2. I have built this set, and am writing you to see if you can give me some information as to the tuning of it. The local stations come in very fair (although not as good as a 3 bulb set that I have) and I have only been able to get WDAP Chicago for distance. I get any amount of squeals, howls, etc. I have followed directions very carefully and checked up on them, not once but several times.

A.—The figure two diagram appearing in the January 27th issue of Radio Digest is correct and has given splendid results. It is indicated that a discrepancy exists, possibly inefficient apparatus, since you do not experience the satisfaction afforded to others.

It is difficult to suggest the source of limitation without a personal inspection of set, but having assured you of its possibilities we trust you will not be discouraged before you locate your trouble.

Reflex without Crystal

(2940) FW, New York City, N. Y.

I have made your one tube Reflex. All local stations come in clear and loud on an indoor aerial. I can also receive these stations very faint when I disengage the cat whisker. What is the cause of this?

Can a third R. F. transformer be used in the three tube Reflex? If so where is the best position for it? These two sets were published in the December 30th, 1922 issue.

Do you sell old issues of the Radio Digest, and what is the price? What numbers contain Reflex circuits?

A.—With reference to Reflex circuit will advise that action of same when cat whisker is disengaged is due to inductance between various parts and does not interfere with operation.

For addition of a third Radio frequency transformer in this circuit we are directing your attention to page thirteen of the January 27th issue of Radio Digest for diagram showing method. January 20th issue also contains data on this.

Back numbers of Radio Digest can be secured, unless exhausted, at ten cents a copy.

Resistances

(2852) WGG, Chicago, Ill.

I desire to build the Reflex circuit as described in your January 27th issue, page 13, figure 1. Please tell me how or where to purchase the 50,000 ohm resistances as described and how to make them? I find it almost impossible to secure these resistances. I wish to use three Federal R. F. and two Atwater Kent 9 to 1 ratio A. F. transformers. Will these high resistances be of any advantage in this set? Am I using good judgment in selecting high ratio transformers? Do you consider circuit No. 3 better than No. 1?

I do not quite understand why a jack such as described in this circuit on the second A. F. is used.

A.—Resistances employed may be secured through any responsible dealer.

Would advise the use of lower ratio audio frequency transformers than the 9 to 1 cited. Three and one-half or four to one.

Personally, circuit number one is preferred.

If your reference is to jack used on second stage of audio frequency on number three, this is error. Base of jack should be connected to first prong.

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Radio Illustrated

Pity the poor working girl. However, after a hard day of labor she has the Radio to bring a small share of cheer to her tortured soul. The waving of the ether waves help her to forget her nerveracking day of spent energy. This is Mae Bush, a "hired" girl at the Goldwin studios, listening in after a day of sham love-making under the glare of a Cooper-Hewitt moon that shimmered through the waving asbestos palm trees

Hudson P. Maxim, noted American scientist and inventor, is shown in the accompanying picture before the microphone in the studio of Station WGM, the Atlanta Constitution, Atlanta, Ga. He delivered a lecture recently to the vast invisible audience of WGM's listeners in

The thing that the feminine mind cannot adapt to decorative purposes never has been created. Even Radio has succumbed to the whims of 'ye ladye ove fashyone' © K. & H.

Below is a novel crystal set that an ingenious fan constructed in the case of an old desk telephone. This set has worked very successfully on local stations where there is no QRM © Swastika

MAY 14 1923 ©CI857689

Hazeltine Neutrodyne; Reflex; Flewelling Tuner

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, MAY 12, 1923 | No. 5

RADIO LINKS U. S. FLYERS

CLASS "A" LICENSES GRANTED 16 PLANTS

EACH GETS WAVE EXCLUSIVE IN OWN STATE

Wild Animal Circus, Daily Paper, Three Colleges, National Guard Unit, One Church, in List

WASHINGTON.—Sixteen Class A stations, the first of the newly classified broadcasters, have been licensed by the Department of Commerce. Although several of the licenses are for the same wave length, it will be noted that these are all in different districts and states, so separated as to avoid any marked interference.

Of the sixteen new plants, Louisiana received three, Kansas, Nebraska, Missouri, Oklahoma and Texas each received two, and Illinois, Pennsylvania and Indiana got one apiece.

Represented among the new broadcasters are a daily paper, a church, three universities, a wild animal circus, a national

(Continued on page 2)

The lower left photograph shows Miss Bernice Kazounoff, concert pianist and music instructor. She was one of the feature performers to be heard on a recent program broadcast from the studio of Station WEAF, New York. One critic said, "Miss Kazounoff reminds one of the bouyant Percy Grainger and his individuality of interpretation." The young lady smiling so prettily in the center is none other than Miss Bonnie Barnhardt, "The Bedtime Story Girl" and assistant program director of the Atlanta Journal's Station WSB. In the right circle is Miss Cecil Arden, mezzo soprano of the Metropolitan Grand Opera Company, who sang to the listeners of WDAF a short while ago

'GREAT BOON" SAYS MAJOR GEN. PATRICK

Use Directional Waves

Chief of Air Fighting Forces Writes of Aid Airphones Give Pilots

By Major General M. Patrick, Chief of U. S. Air Service

Of all the discoveries and scientific developments of the past few years, none have been more interesting, nor rapidly exploited than aviation and Radio, two agencies which are destined to play a vital part in both the future military and economic life of America, and which are mutually dependent one upon the other.

(Continued on page 5)

WGI BANS "TRUST" SONG COMPOSITIONS

Independent Publishers Say Broadcast Is of Decided Benefit to Themselves

MEDFORD HILLSIDE, MASS.—The American Society of Composers, Authors and Publishers, controlling by copyright, the compositions of certain song writers and musical composers and also the publication of these compositions by certain publishing houses, has advised that it will not permit the broadcasting of its copyrighted music without payment of a fee for a license to do so. Station WGI, joining with 34 other stations, will not broadcast any composition covered by copyright belonging to the Society named.

KSD TO BROADCAST TEN WEEKS OPERA

Fans Will Hear St. Louis Municipal Opera Thursdays and Sundays

ST. LOUIS, MO.—Ten weeks of light opera, extending through the entire season of the St. Louis Municipal Opera Company will be broadcast this summer by Station KSD, the St. Louis Post-Dispatch. The broadcasting will be on Monday and Friday night of each week, weather permitting. In case of rain the postponed broadcasting will be on Thursday or Sunday night. Each opera will be sent out complete.

The season will open May 28 with Victor Herbert's "Naughty Marietta".

WESTWARD HO—WITH AIRPHONE APPARATUS

PHILADELPHIA, PA.—Two Radio experimenters, Frederick Gannehauer, Bywood, Pa., and Howard Berliner, 2133 Spring Garden street, Philadelphia, have started in an automobile equipped with Radio with which they expect to conduct elaborate researches in various parts of the country to determine factors affecting Radio transmission. The young men have Los Angeles as their destination.

HAVE COURTS RIGHT TO REGULATE AIR?

WILLIAMS-BERGMAN CASE TO DECIDE ISSUE

Youthful "Sparks" Sued by Banker Radiophan for Alleged "Gumming Up of Atmosphere"

By E. E. Pearson

BLOOMINGTON, ILL.—Have the courts jurisdiction over the air? Can legal mandate control the boundless ether which extends from planet to planet and which has puzzled the scientists since the times of Aristotle? Will an injunction extend through the empyrean? These and other problems may be solved when the case is called in a few days in the Livingston county circuit court, the first injunction suit ever instituted to restrain a broadcaster by Radio.

The lawyers for the defense and prosecution have been busy preparing for the hearing, set for the April term of court. The eyes of the Radio world will be centered upon this unique issue. Men of national prominence from many sections of the country will assemble, including Herbert C. Hoover, secretary of commerce; Mitchell Lewis, machine gun manufacturer of New York; Hiram P. Maxim, president of the American Radio Relay League; K. B. Warner, secretary of the league, and other notables.

Banker vs. Youthful Sparks

When Cutter in his "Song of the Lightning" wrote, "Away, away, through the sightless air, stretch forth your iron thread," he had little idea to what marvels the study of electricity would lead. Yet his words were strangely prophetic when he predicted: "The journey ye make in a hundred years, I'll clear at a single bound."

Principals in this initial case, involving the right to use the air, are **Edward McWilliams**, president of the State Bank of Dwight, and W. Wylie Bergman, a youth of 18. McWilliams applied for and was granted a temporary injunction which restrained Bergman, an amateur Radio operator of the same city, from operating his broadcasting station, because it interfered with the receiving of Radio messages in the McWilliams mansion.

Tucked in one corner of the living room of the Bergman cottage is the Radio apparatus which has created such a turmoil. The little cubby hole that houses his instruments is packed and jammed with coils, gaps and other Radio apparatus. On the walls are tacked messages received at various times. He proudly exhibits his commission as chief of the northern Illinois district. High in the air, a distance of 150 feet, are his lofty aerials. Day and night they receive and send the messages from and to other amateur stations from one end of the country to the other.

WORLD WAR VETERANS GIVE ETHER PROGRAM

Picked Men of 300 Broadcast from Station WNAC

BOSTON, MASS.—A special musical program by world war veterans who are students at the Boston Conservatory of Music and other musical schools and colleges throughout New England was broadcast from WNAC (Shepard Stores) station on April 10th. These veterans were selected from some 300 disabled men, veterans of the war in France, studying various branches of music for concert, orchestra or band work, under the supervision of the U. S. Veterans' Bureau, and the program was remarkable, both for its variety and high quality.

LICENSE NEW PLANTS

(Continued from page 1)

guard unit, a Radio Club and three electrical and Radio concerns.

The sixteen new stations and the wave lengths which they will use are:

KFGM, Abilene Daily Reporter, Abilene, Tex., 233 meters; KFHF, Central Christian Church, Shreveport, La., 266 meters; KFGP, Cheney Radio Co., Cheney, Kans., 229 meters; KFHI, Chas. V. Dixon, Wichita, Kans., 224 meters; KFGV, Heidbreder Radio Supply Co., Utica, Nebr., 224 meters; KFGC, Louisiana State Univ., Baton Rouge, La., 254 meters; KFFX, The McGraw Co., Omaha, Nebr., 278 meters; KFGJ, Mo. National Guard, 138th Infantry, St. Louis, Mo., 266 meters; KFHC, Univ. of Okla., Norman, Okla., 254 meters; KFHD, Utz Electric Co., St. Joseph, Mo., 226 meters; KFFZ, Al. G. Barnes Amusement Co., Dallas, Tex., 226 meters; KFGD, Chickasha Radio & Elec. Co., Chickasha, Okla., 248 meters; WABA, Lake Forest College, Lake Forest, Ill., 266 meters; WABB, Dr. J. B. Lawrence, Harrisburg, Pa., 266 meters; KFFY, Pincus & Murphy, Inc., Alexandria, La., 275 meters; WRAF, Radio Club Inc., Laporte, Ind., 224 meters.

A young lady of Mobile, Ala., took an examination for a first-class amateur license and passed with 91 per cent.

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	6:45- 7:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	1:45- 3:45
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	400	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	400	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	400	10:00- 2:00	.....	10:00-11:00	.....	9:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	400	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	400	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	400	8:00-12:30	8:00-10:00	8:00-10:00	.....	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	427	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	710	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00- 10:30	.....
WBAP, Fort Worth, Texas	400	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	6:30- 6:45
WBZ, Springfield, Mass.	422	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	400	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	400	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	400	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	400	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	400	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	400	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	400	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	370	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	400	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	360	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	400	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	400	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	400	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	360	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, Newark, N. J.	360	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	400	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00	.....	.....	.....
WMAQ, Chicago, Ill.	400	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	400	8:00- 9:30	8:00- 9:30	.....	8:00- 9:30	8:00- 9:30	8:00- 9:30	.....
WOAI, San Antonio, Texas	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	400	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	400	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	400	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	400	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	400	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....	6:30- 7:30

(Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific time, subtract two hours. If in addition your city is using Daylight Saving time, add one hour to this result.

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Radio Digest, Illustrated, Volume 5, Number 5, published Chicago, Illinois, May 12, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

Now It's Spring—Moving and House Cleaning Are Over—and the weather is so nice that it would be a fine time to get up on the roof and repair or rebuild that antenna for the coming summer months. And in accordance with this suggestion, Thomas W. Benson, in his beginners' series next issue, will devote Chapter III to "Pointers About Aerials and Grounds." Let's fix up the storm-beaten old copper wires for many merry moments during the cool of the summer evenings.

Mr. Benson's Loud Speaker Construction Article, by the way, stirred up so much interest and brought his so many letters that he has promised to furnish soon an article for the Digest which will be a consensus of the data and information requested by the zealous homemade loud speaker constructors.

Flewelling Next Issue will tell Radiophans more about the making at home of a first-class one condenser flivver super. He's really anxious to help the many misguided Flewellingphans who can't get theirs to work properly, so read his detailed series now appearing in the Digest.

May 15 Is the Date for Many Wave Length Changes—That's why you should have the Digest's weekly three-part Broadcasting Station Directory (Page 8) to help you with the latest information on station wave lengths, schedules, calls, owners, time bands, etc. "An Evening at Home with the Listener In" is a feature that helps, too. Next issue this will contain a complete revision of wave length data.

H. J. Marx and His Reflex De Luxe, will be with us again May 19. He will tell you how the wiring should be done. He also promises—not next issue but soon—some honest-to-goodness data on the Hazeltine Neutrodyne receiving circuits. And another article he is planning is one which will tell how to build loading coils for Reinartz receivers, so that their wave length range will be increased.

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NEW CODE SYSTEM DEVISED BY SQUIER

SPEEDS UP TRANSMISSION NEARLY THREE TIMES

First Presentation of New Alphabet Given Before National Academy of Science

By Carl H. Butman

WASHINGTON.—A new telegraph alphabet for use in Radio, telegraph and cable in all languages has just been given to the world by Maj. Gen. George O. Squier, Chief Signal Officer of the Army and one of America's most prolific electrical communication inventors. With his new code system a speed 2.65 times the present transmitting rate can be achieved, and it is easier to tune to.

The first presentation of this new universal code was made recently by the General in a speech before the National Academy of Sciences in Washington. It now appears that the code used for almost 80 years will be superseded throughout the world, with a gain of over 150% in speed.

Variations to Perfect New Code

Briefly, General Squier proposes to vary the amplification or intensity of each half cycle of alternating current to send a dot, space or dash, each of which requires the same time of transmission. The signals are distinguished in receiving by the three different amplitudes, one each for the dot, dash and space. Six permutations are possible with the three intensities; one arrangement being to represent the dot with a certain intensity, the dash with a larger one and the space with a smaller amplification. The method tried successfully by General Squier in the Signal Corps laboratories was with the dash the largest, the dot intermediate and the space the smallest. Other methods will be tried, however, and a better arrangement may be found.

The system has been studied by Radio experts of the Army and Navy, who, it is reported, find no bugs in it; on the contrary, they see added efficiency, and decreased interference. It is the plan of the inventor to submit the system to the next International Technical Conference on Telegraphy with a suggestion for unification of all codes, Radio, wires and cable, using the same system of modulation for the signals.

Has Many Advantages Over Morse

The present telegraph alphabet was invented by Professor Morse in 1844, before the telephone, alternating arc or Radio transmission, and yet, with advances in nearly every other phase of communication, we have continued to use the same alphabet, which, it was pointed out by General Squier, does not fit. It was for this reason that General Squier "redesigned" the 80-year old alphabet for 1923 use. In the old alphabet the dots, dashes and spaces required different time for transmission, whereas the new plan provides for sending each in the same space of time. In his system in alternating current, no consecutive signals are of the same sign, but different amplitudes. In Morse such letters as S and H, required three or four signals of the same sign and were not as legible as the signs for the letters A and N, where no two signs were alike, they being composed of dots and dashes. The several letters of the old alphabet did not have the same legibility and the whole alphabet was slowed down by the "slow" letters to their speed. This defect has cost the world hundreds of thousands of dollars in transmitting costs, it is estimated.

Result of Eight Years' Work

General Squier's alphabet is the result of nearly eight years of research and experimentation, begun in 1915 in connection with devising a new cable alphabet. Its present application today to all three kinds of code work will make it no longer necessary to learn three code systems.

CFCN CONDUCTS DAYTIME RECEIVING TEST

CALGARY, ALTA.—Tests for the information of the Canadian government are at the present time being conducted by CFCN, The W. W. Grant Radio, Ltd., broadcasting station at Calgary, under special instructions from Ottawa. CFCN is carrying out special daylight transmission tests in order to ascertain how broadcasts are received in the daytime in the provinces of Alberta, Manitoba, Saskatchewan and British Columbia.

BAN STOCK TIPS AND FIRM ADVERTISEMENT

NEW YORK.—Use of the Radio to broadcast market information or forecasts of business by its members is prohibited by the terms of a resolution adopted this week by the governing committee of the New York stock exchange. The resolution prohibits also broadcasting by Radio of any matter intended to advertise firms of members or to stimulate interest in particular securities on the stock market.

SCREEN STAR HEARS OPERA

Above is Florence Vidor, star of the screen, listening in to a concert by the Chicago Opera Company, the music being radiated through the Cuban Telephone Company's Station PWX. Like many of the movie folks, Florence and her husband, King Vidor, the noted director, are ardent Radiophans © Photonews

CFCN USES DIRECT WIRE FROM PLAZA

REMOTE CONTROL PROVES TO BE SUCCESSFUL

Broadcast of Imperial Orchestra, Mile and Half Away, Brings Many Congratulatory Wires

By Jeffrey J. Dingman

CALGARY, ALTA.—Remote control and a telephone cable line one mile and a half in length is now being used by CFCN, The W. W. Grant Radio, Ltd., at Calgary, to broadcast music from a down town dance orchestra. This is the first time this device has been used in Radiophone broadcasting in Canada.

The first test was staged on the night of Saturday, April 14, from 10:30 o'clock to 11:30 o'clock, Mountain Standard Time, the regular broadcast hours for CFCN.

It proved entirely successful and hundreds of telegrams and letters were received, complimenting both Mr. Grant and the splendid orchestra.

Music Magnified 90 Times

Station CFCN, situated on Crescent Heights, one of Calgary's outlying districts which is on a considerably higher level than the city proper, was connected with the Imperial Orchestra at the Plaza Cabaret, in the business section of the city. A pair of cables was used, and they had a capacity and resistance equivalent to an ordinary open air telephone line thirty miles in length, in point of difficulties which it was found necessary to overcome. Music and speech was magnified ninety times regular strength by use of a special voice frequency amplifier designed by W. W. Grant, who also designed and manufactured the special pick-up equipment which was installed at the Plaza.

Plaza Dancers Pleased

The crowd of dancers and pleasure seekers who crowded the floor of the Plaza were immensely pleased by the novelty. However, surprised as they were when they entered the cabaret to find a Radiophone broadcaster installed, they were more surprised later when they learned that all sounds in the room could be heard all over the country. Clapping, applause, calls for encores, laughter and light talk, all could be distinctly heard by the multitudinous invisible audience, as was testified by telegrams received.

Both local and out-of-town Radiophans who listened in told CFCN that the orchestra reproduction was the best they had ever heard. This innovation, following close on many features recently staged by CFCN, has created considerable talk in local Radio circles.

Fans Wire Appreciation

Here are a few of the hundreds of telegrams whic started pouring in one hour after the broadcast had ceased:

"Concert coming in fine many thanks." Noel Kerr, Wenatchee, Wash.

"Congratulations successful transmission tonight enjoying numbers broadcast." J. C. Ruff, Wallula, Wash.

"Initial program remote control being received here perfectly a fine orchestra congratulations please acknowledge by Radio tonight." Frank A. Moore, Walla Walla, Wash.

"Your concert coming in fine good stuff." A. J. Peters and W. J. Easson, Victoria, B. C.

"Tests tonight coming in wonderfully loud and clear." A. F. Dickenson, Wenatchee, Wash.

"Concert coming in splendidly." Vernal Saithers, Helena, Mont.

Similar programs from the Plaza's Imperial Orchestra have been arranged for in the near future, Mr. Grant has announced.

Fire Chief Broadcasts After Putting Out Blaze

Chief Goetz Tells WOAI Listeners About Spontaneous Combustion

SAN ANTONIO, TEX.—A touch of realism, not appreciated by Radiophans, was given to the address recently over Station WOAI, by Fire Chief A. J. Goetz of the San Antonio Fire Department, when Chief Goetz broadcast the fifth of a series of short talks on fire prevention.

Appearing in his "fire-fighting togs," Chief Goetz stepped from his red racing automobile, used in answering all alarms, into the broadcasting studio, and took his place before the microphone. The chief had just returned from directing the work of the city's fire fighters as they battled the blaze and the elements in conquering a stubborn blaze at a warehouse.

The topic of the address was timely. Chief Goetz took as his subject "Spontaneous Combustion," and the fire from which he had just returned is thought to have been caused by spontaneous combustion in the warehouse filled with hay and grain.

Almhouse to Have Set

BIRMINGHAM, ALA.—Radio may be a luxury enjoyed chiefly by the well-to-do but inmates of the Calhoun county almhouse, near Jacksonville, Ala., are going to hear concerts just like anybody else. The set was installed at the expense of the keeper, W. H. Nunnally.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Try This on Your Cane

NEW YORK TO HAVE DUAL STATION SOON

MAY 15TH DATE SET FOR OPENING OF WJY-WJZ

Aeolian Hall Plant of R. C. A. to Give Double Program on 405 and 455 Meters

NEW YORK.—Broadcast Central, the new station of the Radio Corporation of America which has been the subject of considerable speculation among Radio listeners who have heard the station testing, will be opened May 15 at Aeolian Hall with call 2XR.

Located in the heart of the city's musical and theatrical district, where entertainment of the highest order is ever available, this station will offer the American public most elaborate programs with a very high degree of faithfulness in reproduction. The wires, high on Aeolian Hall, which tower 400 feet above the Fifth avenue and 42nd street, provide two distinct antennae. The new super-station will transmit two broadcast programs simultaneously, on different wave lengths.

WJY and WJZ New Calls

The closing of Station WJZ at Newark, N. J., now operated jointly by the R. C. A. and the Westinghouse Company, will coincide with the opening of Broadcast Central. The well-known call WJZ will be retained for transmission from the Aeolian Hall station on 455 meters, while the call WJY will be used for the other wave length of 405 meters, both of which have recently been allocated to the new station.

The new station is fitted with a double antenna and two independent transmitters which will permit a dual program to be broadcast. One program can be a classical or serious entertainment; the other, popular airs, dance music and lectures.

Divide Radiophans into Two Classes

A thorough analysis has been made of the types of programs best suited to the requirements of the public and this study has revealed the fact that generally, the Radio public may be divided into two classes, those who prefer classical or similar entertainment and those desiring dance music and popular airs.

Not only will transmission be carried on from the two studios which are a part of the station, but the main recital hall of Aeolian Hall has been connected to a switchboard in the station, thus providing another source of the finest music obtainable.

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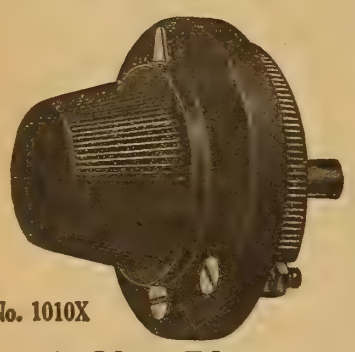

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RECEIVING RECORDS? SEND 'EM IN—

By the Contest Editor

WHAT do you think of these DX records? None of them under 1,200 miles! If you are able to pick up stations at distances approximating these, you can be sure you have a worthwhile set. H. S. Olding, of New Glasgow, N. S., is back again this week with five new records to his credit. The longest record this week, however, is sent in by M. H. Hall, of Boston, Mass., who listens in regularly to Hawaii. Watch for the contest rules next week.

Below are the record holders for this week:

Station Heard—Miles Away—Who Heard

CJCN—1900, Nestor Barrett, Republic, Wash.
KDPT—2600, R. G. Williams, Springfield, Mass.
KDZK—2050, C. E. Carber, Pittsburgh, Pa.
KMJ—1550, H. E. Clark, Monmouth, Ill.
KQI—1650, H. E. Clark, Monmouth, Ill.
KTW—1600, H. E. Clark, Monmouth, Ill.
KYQ—5100, M. H. Hall, Boston, Mass.
WBAU—1200, H. S. Olding, New Glasgow, N. S.
WCAZ—1450, H. S. Olding, New Glasgow, N. S.
WDAX—1500, H. S. Olding, New Glasgow, N. S.
WFAA—2090, H. S. Olding, New Glasgow, N. S.
WMAV—1500, H. S. Olding, New Glasgow, N. S.

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$1.00 Bakelite Socket	.50
5.00 W. D. 12 Audio Frequency transformer	3.75
3.00 Owl Radio Frequency transformer	1.50
5.50 Coto Coil Radio Frequency transformer	3.45
3.00 Sleeper Radio Frequency transformer	1.95
5.00 Acme Audio and Radio transformer	3.45
8.00 Dayton Variometer	5.45
8.00 Dayton Variocoupler	5.45
5.50 Murdock variable condenser, 23-plate	2.95
6.50 Murdock variable condenser, 43-plate	3.25
132.00 Radiola R. C. set	79.50
5.00 Multi-Radioscope	1.50
Little Gem set	6.50
50.00 Turney single tube set	18.50

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R. H. G. Mathews Speaks on So Called "Standard" Parts

COLUMBUS, OHIO.—"Don't buy any 'standard' Radio parts on the market, unless you know something about them," was the message of R. H. G. Matthews, central division manager of the American Radio Relay League and representative of the Chicago Radio Laboratory, in an address delivered at the Second Annual Amateur Radio Convention held in Columbus recently.

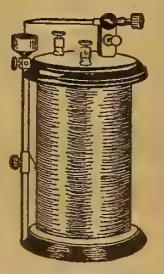
Explaining in detail tests made of "standard" Radio equipment, he asserted much of the higher priced receiving equipment, while of excellent mechanical construction, is very low in electrical efficiency. This condition is the result of many electrical manufacturers entering the Radio field without first obtaining a thorough knowledge of underlying fundamentals, and not in any intent to defraud, Matthews indicated.

Ritter Loop Aerial $1

A knock-down aerial. All parts perfect and made to fit properly. Results guaranteed. Can be assembled in 10 minutes. Loop aerials of this kind never sold for less than $5. We manufacture and sell right from our factory.

Ritter Grand $2.50

Crystal Set



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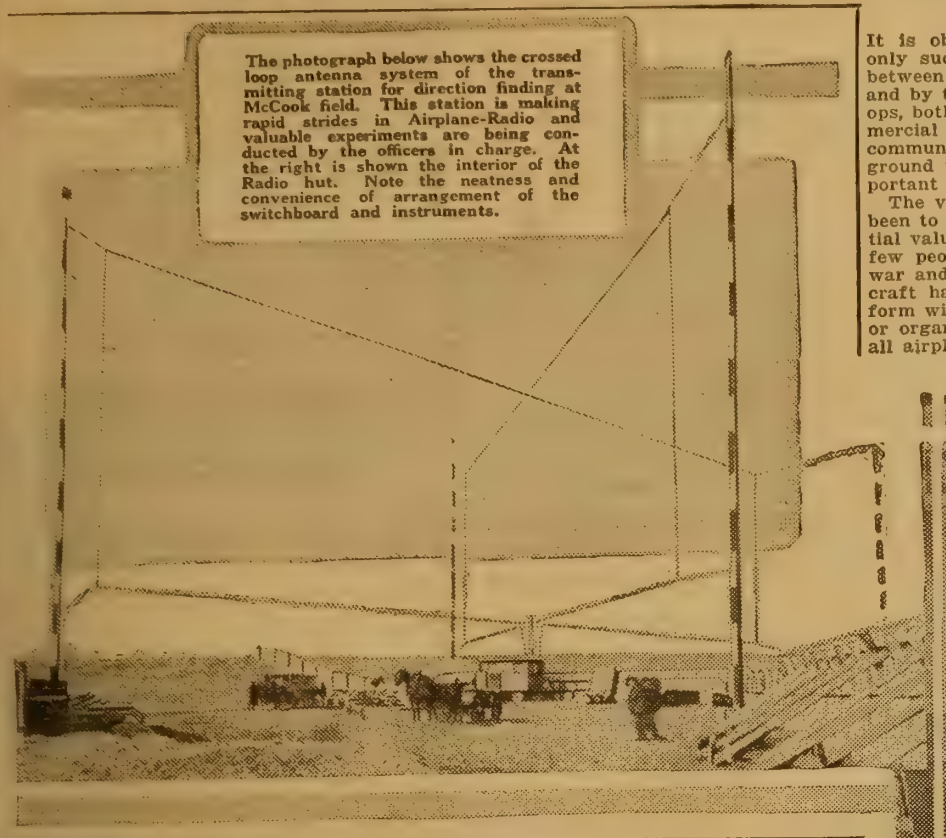
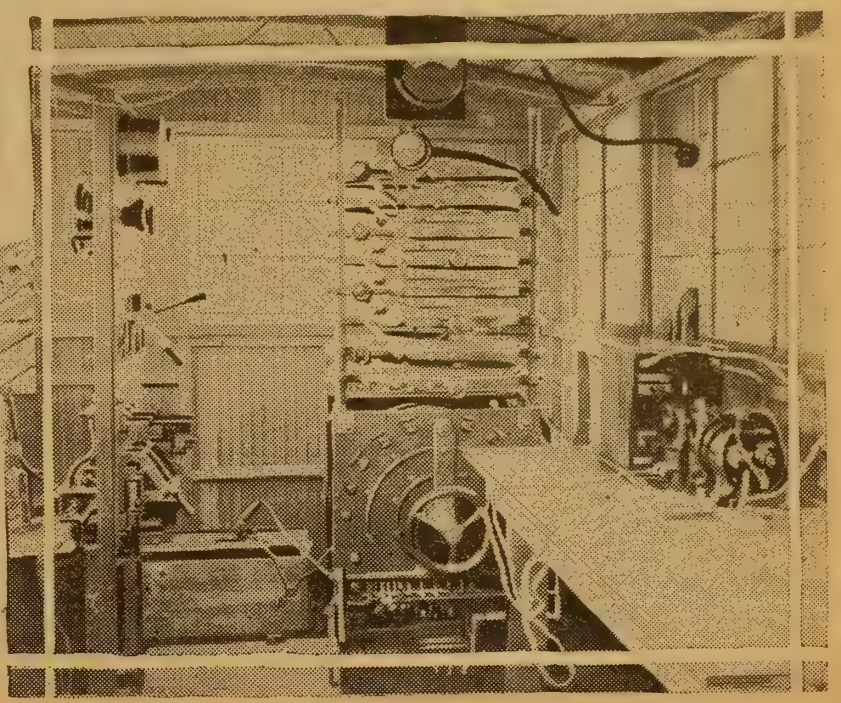


The photograph below shows the crossed loop antenna system of the transmitting station for direction finding at McCook field. This station is making rapid strides in Airplane-Radio and valuable experiments are being conducted by the officers in charge. At the right is shown the interior of the Radio hut. Note the neatness and convenience of arrangement of the switchboard and instruments.

(Continued from page 5)

It is obvious that Radio furnishes the only successful means of communication between the ground and airplanes in flight and by the same token, as aviation develops, both as a military arm and as a commercial agency for transportation, intercommunication between airplanes and ground will become one of the most important functions of Radio.

The value of Radio communication has been to aircraft in the past and its potential value in the future is realized but by few people. In all aviation activities in war and most of the flying in peace, aircraft have some definite mission to perform with reference to certain individuals or organizations on the ground. In war, all airplanes are equipped with Radio apparatus, either telegraph or telephone, for intercommunication with the ground and other planes in the air. In peace time military and in commercial flying, Radio performs two functions: one, in intercommunication between plane and ground, and the other in intercommunication between ground stations and control points. Organized schedules for flying cross-country are still in the first phases of their infancy, yet in the short length of time that has elapsed since the signing of the armistice, much progress has been made. The establishment and operation of an aerial mail route by the Post Office Department from New York to San Francisco, and the success that has been attained in its operation, is well known. In this operation, Radio stations have been established at all landing fields and control stops and are used in the despatch of planes flying along the route, and in the dissemination of meteorological data on conditions along the route.



Army Has "Model Airway"

In addition to this route the Army now has in operation and has had for several months a so-called "Model Airway" along which planes fly on definite schedules. This airway extends north from Washington to Mitchel Field, Long Island; south to Langley Field, Virginia, and west through Cumberland, Maryland; Moundsville, West Virginia; Dayton, Ohio, to Detroit and Chanute Field at Rantoul, Illinois. Airplanes are sent out from all of these stations at regular intervals, and one or more planes are flying along each leg of the airway each day. The intercommunication between ground and planes at this time is limited, but intercommunication between landing fields and control stations along the route is completely established and planes are despatched and meteorological data sent out from these stations by means of Radio with a promptness and regularity such as is found in a well organized railroad system.

Certain of the planes are now equipped with Radio apparatus for intercommunication with ground stations and it is planned in the near future to so equip all planes.

The ultimate value that Radio can render aviation is tremendously great. Not only will it serve its purpose in intercommunication between planes in the air and ground and planes, but utilizing Radio frequency impulses it is being made use of in problems of aerial navigation, and already direction finding apparatus for aircraft has passed its first stages of development.

Pilots to Get Direction

The directional properties for both transmission and reception of coils and loops is well known and it is apparent that any direction finding system will be based on a proper utilization of these properties. In their application, two possible systems can be used. One is directional transmission on the ground and non-directional reception by means of a trailing wire antena in the air, and the second is by means of non-directional transmission from an antena on the ground and directional reception by means of coils on the planes. Both of these systems are based on the same principle, wherein pilots will receive the impulses in the air and determine their location or their direction of flight therefrom. For example, in non-directional transmission, a system of beacons at principal cities throughout the country can be established which will send out signals with their own peculiar tone qualities and wave lengths. These signals are received by either stationary or movable loops on the airplanes and, by means of maximum and minimum points, the direction from which they are transmitted can be established. Having received signals from two or more stations, the airplane then determines its own location by plotting their directions. This system can be made general and can be utilized by a number of airplanes in flight. It requires the presence of personnel in the plane other than the pilot however, and for military purposes is limited in its application. In the system of directional transmission two loops are erected at an angle to each other varying from 90 to 180 degrees and are used as the transmitting antenna for the ground station.

Throw Over Switches Used

Mechanical throw-over switches are provided at the station which permit the transmission from first one loop and then the other. Loop antennae transmit most effectively in the direction of their own plane and least efficiently in a direction perpendicular to their plane. Consequently, in a system of alternate transmission from two loops the line which bisects the angle between them is the line upon which the intensity of signal sent from both planes is equal. In the employment of this system the bisecting line is pointed in the direction of the proposed flight and the plane flies along this line, endeavoring always to keep itself in such a position that this equal signal intensity is maintained. With the knowledge that this condition will obtain if he flies accurately, when one or the other of the signals becomes appreciably stronger than the other, the pilot knows that he has deviated from his line of flight and makes such corrections as will bring him back thereon. This system works equally well in flying either away from or toward the transmitter and furnishes a desirable means of direction finding for planes flying along a definite route.

Another system, and one which is used by commercial planes flying across the English channel between England and France, is one in which by means of directional reception on the ground at a number of stations, of signals sent from a plane in flight, the position of the plane is determined and its location furnished it by Radio telegraph.

ETHER STATIONS TO USE NO PAY SONGS

BROADCASTERS UNITE IN NATIONAL ASSOCIATION

Hold Meeting at Chicago—Composer's Society Gets Little Satisfaction —May 14 Next Meeting

CHICAGO.—At the recent meeting held at the Drake Hotel, in which twenty of the larger broadcasting stations were represented, a national organization was formulated to be known as the National Association of Broadcasters. The aims and purposes of this organization are: To encourage and aid the development of musical and literary genius, to support every movement to advance the art of Radio broadcasting and to encourage the enactment of laws and legislation designed to meet this purpose, and to protect its members from unjust and unfair demands by anyone.

In order to put the newly formed organization on a firm footing a subscription of over ten thousand dollars was raised at one meeting. This amount is a nest egg toward a fund that is expected to reach the eifty thousand mark. All members have been called on to underwrite their stations with the amount considered to be the just share of preliminary expenses of organizing the Association and starting the service of issuing music and song compositions to the members free of charge. It is also proposed by the broadcasters to establish dues on a sliding scale.

To Have Censorship Board

It is the plan of this association to establish a board of censorship in New York to which all musical compositions to be broadcast will be submitted. If the compositions pass this board, they will in turn be given to the individual stations to be put on the programs for the benefit of their listeners. In this manner it is anticipated to keep the standard of such numbers high and offer each member the service of unrestricted numbers free from an excessive tax or license.

Another development that is looked to by the association is the question of paid talent. At the present it has been a rarity to have paid performers on any broadcast program, but if any time in the future the tables should turn the members intend to be organized so as to meet reasonable claims.

Publishers Do Not Fare Well

Representatives of the American Society of Authors, Composers and Music Publishers met with small success when they appeared before the meeting to re-state their demands of royalties on copyrighted compositions. These men were allowed to present their case and then were dismissed with the statement they "were not needed further." At this time the meeting went into closed session at which only direct representatives from broadcasting stations were admitted.

At this session resolutions were passed as follows:

"The members of the association are determined to arrange the operation of their broadcasting so that the officers of a corporation, perhaps located many miles distant from their station, may rest easily in the knowledge that no music will or may be broadcast from their station which could involve them in any legal controversy.

Problem of Self Support

"The members believe that the one unsolvable problem confronting broadcasters has been the question of making broadcasting financially self-supporting. No plan has heretofore been developed which seemed feasible. The committee having charge of this phase of the Association's activities, believes and hereby goes on record as believing that this Association possesses within itself the power to collect very substantial sums of money, which sums should ultimately equal or at least nearly equal the cost of major broadcasting. Make no mistake about what here is being said. Put in other words, the committee believes that a membership in this Association will eventually be a great financial asset."

It was also developed that the American Society of Authors, Composers and Music Publishers controlled a comparatively small amount of the music published in America. The Producing Managers Association has already taken the stand that the society cannot control the songs of their productions and any license they would issue could not carry with it the right to broadcast the songs incorporated in their shows. This serves to cut down the entire list of compositions controlled by the society to about thirty per cent of the total. Of this balance, it was stated, the ones sung in the Broadway productions would be considered far superior, so the remaining few more popular songs are very small in number.

Does Broadcast Popularize Songs?

The question of popularizing the song was raised and met with the statement concerning a certain song that has been discarded from public sales for the past six months. This song was recently used by two powerful stations on several nights and the following week the investigated sales reached forty-five hundred copies. This was after the song had been long considered dead.

In an interview concerning the recent meeting one prominent broadcaster said: "We have been told by the representatives of the American Society of Composers, Authors and Publishers that if we wish to test the legality of their claims they will be pleased to accommodate us."

Rather than wage an expensive court battle our station has decided to refrain from broadcasting any of the selections the copyright of which is controlled by the society. Through the newly formed association we will be able to obtain selections that are the equal of any the society may control and will broadcast them instead."

To Vote on Officers

The Association of Broadcasters has called their next meeting for May 14, 1923 to be held at the Drake Hotel, Chicago. At this meeting the officers who were placed in nomination will be acted upon. The officers appointed at the recent meeting, whose names will be placed before the assembly for vote, are:

President, J. E. Jenkins, Station WDAP, Drake Hotel, Chicago. Vice Pres., Powell Crosley, Crosley Mfg. Co., Cincinnati, O. Vice Pres., Bodin Washington, Cutting Washington, New York. Vice Pres., R. N. Johnston, Station WSY, Birmingham, Ala. Secretary, E. F. MacDonald, Chicago Radio Laboratory. Treasurer, Frank Elliott, Station WOC, Davenport, Ia.

The Week's Advance Broadcast Programs

HERE is the fifth appearance of this new service for Digest Readers. There are only fifty eligible stations for the listening, but already twenty-two of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Station Directory. Much other data on the stations for which advance programs are given, will be found there.

Tuesday, May 8

CFCA (Eastern, 400), 8:00-9:00 P. M., Concert, Selection from "Tumble Inn," Star Orchestra; "Roses," Arthur Davies, tenor; "Pizzicato Polka," Suite, "From the South," Star Orchestra; "The Swan," H. Saunders, cellist; "Until," Arthur Davies; "In Wintertime," Orchestra; "The Evening Star," H. Saunders; "My Dreams," Arthur Davies; "Dolores," Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour, Concert and bedtime story by "Uncle John;" 8:00-10:00 P. M., Concert, Alpha Epsilon Chapter of Phi Mu Alpha, musical fraternity.

KSD (Central, 400), 7:00 P. M., Children's program, Thelma Roller, reader; Edward Meisenback, violinist; Fanny Kusselman, soprano; Lorraine Thessler, pianist; Harriet Thesen, reader; Milton Adler, pianist; Calvin M. Woodward, Manuel Training School Orchestra; Musical program, 8:00 P. M., Olga Buermann, Swiss Alpine Singer; Martin Kiefer, zither; Fred Kiefer, violin; Address, "Turkey and the Turks," Lt. J. I. Connoly.

KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Birdie Gordon, soprano, Sallie Horkes, accompanist; Arthur W. Blake, tenor, Martha Huber, accompanist; Henry Walter Graham, humorist.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Rex Maupin's Original Texas Hotel Orchestra; 9:30-10:30 P. M., Concert, Harmony Club of Fort Worth, Tex.

WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program, String Quartet, courtesy of Louis Brosseau; Mrs. Jane M. Spear, pianist; Clarence A. Pierce, baritone; Jack Chapman's Orchestra.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., Song recital and short talks; 4:15-4:45 P. M., Betsy Logan on "Affairs of the Heart;" Musical program; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, DeWitt McMurray, editor of The Semi-Weekly Farm News; 8:30-9:30 P. M., Readings, Mrs. J. Y. Fincher and pupils; 11:00-12:00 P. M., Musical program, under auspices of W. A. Green Company.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue-Stratford Orchestra; 3:30-4:15 P. M., Musical recital; 6:30-7:00 P. M., Children's Own Half Hour.

WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "Iron Trade Review;" 8:30 P. M., Musical program.

WGR (Eastern, Daylight Saving, 360), 2:00 P. M., Music; 4:00 P. M., Ampico recital.

WGY (Eastern, 380), 7:35 P. M., Address, "Marking Mountain Trails," Arthur H. Hopkins, New York State Conservation Commission; 7:45 P. M., Musical Program, "Psyche," American Trio; "The Old Refrain," Edward A. Rice, violinist; "Bolero," American Trio; "The Swan," Ernest Burleigh, cellist; Address, "Union College Days of John Howard Payne," Dr. Charles Alexander Richmond; "Home, Sweet Home," Union College Glee Club; Address, "John Howard Payne and Home, Sweet Home," Willis T. Hanson, Jr.; "Rigoletto," WGY Instrumental "Quartet," "Spanish Dance," Earl Rice, pianist; "A Little Bit of Harmony," Glee Club; "Canto Amorose," Edward A. Rice and Leo Kliwen, violinist and violist; "March," Quartet.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, H. C. Conrad, organist at Alamo Theater; Musical program, Margaret Monroe, pianist; Ruby Freeman, soprano; Ruth Sharp, accompanist; "Just Among Home Folks," Courier-Journal; 7:30-9:00 P. M., Concert, Resta Trio; Reading, "An Interesting Historical Episode."

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner dance program; 7:00-7:30 P. M., Uncle Wip's Bedtime Stories; 7:30 P. M., Recital; 10:10 P. M.-1:00 A. M., Dance music, Charlie Kerr's Orchestra in L'Aiglon Cafe.

WJAX (Eastern, 360), 7:30 P. M., Concert, Cleveland News Orchestra.

WLW (Eastern, 360), 10:00 P. M., Musical program, Stiles Male Chorus, First Baptist Church, Middletown, Ohio, R. E. Morrison, director, Mrs. R. E. Morrison, pianist; "Over the Hill at Break of Day," Male Chorus; "The Fisherman," R. E. Morrison, tenor, Leonard Boyd, baritone; "Praise Ye the Father," "The Son of God Goes Forth to War," "There, Little Girl, Don't Cry," "The Boys of the Old Brigade," Male Quartet; "De Coppah Moon," Chorus; "On the Road to Mandalay," Mr. Morrison; "Carry Me Back to Old Virginia," Double Quartet; Piano solo, Mrs. Morrison; "Tell Me, Little Maiden," Chorus; Violin solo, George Cope; Negro Spiritual, Chorus; "On the Sea," "Pale in the Amber West," Quartet; "When Shall We Meet Again?" Mr. Boyd and Chorus; Tenor solo, Wells Shartle; "Stars and Stripes Forever," Chorus.

WMAQ (Central, Daylight Saving, 400), 4:35 P. M., Program arranged by Bush Conservatory of Music; 7:00 P. M., Instrumental selections, Chicago Civic String Quartet; Readings, Edmund Vance Cooke; Talk, under auspices of Nat'l Farm & Garden Ass'n; 9:15 P. M., Musical program, Mrs. Elizabeth Jenks, soprano; Sylvia Marburger, pianist.

WMC (Central, 400), 8:00 P. M., Musical program, arranged by Mrs. Nell Murphy; 11:00 P. M., Midnight Frolic.

WOC (Central, 400), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Organ recital and trumpets.

WWJ (Eastern, 400), 8:30 P. M., The Town Crier; Concert, The News Orchestra; Mrs. Fred Kopp, mezzo-soprano; Dean McComb, tenor; Doris McIntyre, pianist.

Wednesday, May 9

CFCA (Eastern, 400), 8:00-9:00 P. M., Concert, "Ballet Egyptian," Star Orchestra; "Sui Ci Dio," from "La Gioconda," Norma Hermiston, soprano; Violin solo, Mannie Roth; "Tarenghi," Star Orchestra; "Yesterday and Today," Norma Hermiston; Selection from "Katinka," Orchestra; "From the Land of the Sky-Blue Waters," Harry Adaskin, violinist; "The Star," Norma Hermiston; "Song of India," Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Program by Boyle Heights Junior High School; 6:45-7:30 P. M., Concert and bedtime story by "Uncle John;" 8:00-10:00 P. M., Program by Chamber of Commerce of Owensmouth.

KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Ellyn Swanson Eugel, contralto, Sylvia Jackson Holsberg, accompanist; Frank D. Greif, tenor, Martha Grief, accompanist; Wilfred C. Marceau, reader.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Denton Epworth League; 9:30-10:30 P. M., Concert, Fort Worth High School Orchestra.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., Tenor and piano solos; 4:15-4:45 P. M., Short talks and song recital; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "The Republic of Texas," Judge Eugene B. Muse.

WFI (Eastern, 400), 1:15-2:00 P. M., Dinner Music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:30-4:15 P. M., Recital; 6:30-7:00 P. M., Surprise feature for children, and short story; 7:30 P. M., Boy Scout Radio Corp., 8:00-9:55 P. M., Musical concert and addresses; 10:30-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Dance Orchestra.

WGI (Eastern, 360), 6:45 P. M., Program, "Camp Fire Girls," Eunice L. Randall; Concert, Amrad Banjo-Mandolin Club; Health talk, Henry Copley Greene of American Red Cross; Talk on Farm, Garden and Lawn, by Breck's; Amrad Banjo-Mandolin Club.

WGR (Eastern Daylight Saving, 360), 3:00 P. M., Music; 4:00 P. M., Ampico recital; 8:00 P. M., Dance program, Rudolf Pinkel Orchestra; Talk, "Give Your Car a Home," F. B. Thompson.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, H. C. Conrad, organist; Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, under auspices of Alice Monroe, soprano, Jeffersonville, Ind.; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, 400), 2:00-3:00 P. M., Short talks and musical program; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories.

WLW (Eastern, 360), 8:00 P. M., Concert, Syrian Temple Shrine Band, Noble Henry Fillmore, conductor, Noble Frank Simon, cornet soloist; "Noble Men," "Morning, Noon and Night," Band; "Willow Echoes," Noble Frank Simon; "Ballet Egyptienne," "The Man Among Men," "Dusty Trombone," "The Only Tune the Band Could Play Was Old Lang Syne," Band; Vocal selections by Syrian entertainers, Nobles Eddie Ball, Howard Hafford and Billie Waterworth; "How NOT to Play the Clarinet," Noble Jake Bohrer; "A Bit of Everything," Noble Clarence Betzner; "Goodbye," Band.

WMAQ (Central, Daylight Saving, 400), 4:35 P. M., Program arranged by Cosmopolitan School of Music and Dramatic Art; 7:00 P. M., Stories, Georgene Faulkner; 9:15 P. M., Musical program, Burdette Cleveland, pianist; Ailene Webster, soprano.

WOC (Central, 400), 3:30 P. M., Educational talk, D. K. Kirk; 6:30 P. M., Bandman's visit; 7:00 P. M., Pipe organ recital, Edwin Swindell, organist, assisted by Mrs. O. D. Doran, soprano, Jessie Howell, reader; 10:00 P. M., Musical program, Second Congregational Church Choir, Moline, Ill.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Organ recital and trumpets.

WWJ (Eastern, 400), 8:30 P. M., The Town Crier; Concert, The News Orchestra; Emma O. Hupe, soprano; Mrs. William Hester, contralto.

Thursday, May 10

CFCA (Eastern, 400), 8:00-9:00 P. M., Concert, Selection from "The Firefly," Star Orchestra; "Salut D'Amour," Harry Adaskin, violinist; "Scenes Poetinues," Orchestra; "I Know a Lovely Garden," Thelma Bateman, soprano; "Serenade Espagnole," Orchestra; "O Prio Ma Vera," Thelma Bateman; Violin solo, Harry Adaskin; Waltzes from 'Flora Bella," Orchestra; "Spring," Thelma Bateman; Soldiers' Chorus from "Faust," Orchestra; 10:00-11:00 P. M., Dance program, Star Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour, Concert and bedtime story by "Uncle John;" 8:00-10:00 P. M., Concert, Santa Monica Municipal Band.

KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Lyon & Healy Concert & Artist Department; 9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. J. Head of Dept. of English, Loyola University.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Choral Club of Stephenville, Tex.; 9:30-10:30 P. M., Concert, under direction of Will Foster, organist of the First Methodist Church.

WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program, Florence Drow, contralto; Lucille Magill, soprano; Bertha Tapper, accompanist; Mrs. Dorothy Fischer, soprano; Philip Weintraub, violinist; Bertha Taub, accompanist; Jack Chapman's Orchestra.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre, Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., musical program; 4:15-4:45 P. M., Betsy Logan on "Affairs of the Heart;" Musical program; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:40 P. M., Dream Daddy with boys and girls; 10:30 P. M.-1:00 A. M., Dance music, Arcadia Cafe Dance Orchestra, songs by Nettie Conrad, Harry Glyn and Thomas W. Huston.

WFAA (Central, 400), 12:30-1:00 P. M., Musical talent from the Melba Theatre; 8:30-9:30 P. M., Musical program, Walter J. Fried, violinist, Viola Beck van Katwijk, pianist; 11:00-12:00 P. M., Program under auspices of Bush & Gerts Piano Co.

WFI (Eastern, 400), 1:15-2:00 P. M., Dinner Dance Music; Meyer Davis Bellevue-Stratford Concert Orchestra; 3:30-4:00 P. M., Song recital; 6:30-7:00 P. M., Children's Own Half Hour with Cousin Sue.

WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "General Conditions in the Shoe and Leather Industry," New England Shoe and Leather Ass'n; 9:30 P. M., Musical program.

WGR (Eastern Daylight Saving, 360), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico recital.

WGY (Eastern, 380), 7:45 P. M., Musical program furnished by Watervliet, N. Y., Chamber of Commerce, "Chansonette," Barclay Jermain Club Orchestra; "Dawn," "Spring Singing," Mr. Gabrielle Grober, soprano; "Nocturne in E Flat Major," "Valse Arabesque," Mary Danaher, pianist; "Cam Ye by Athol," "MacGregor's Gathering," Joseph A. Calhoun, tenor; Address, "The U. S. Army Gun Plant," Col. W. I. Westervelt, U. S. Army, Commandant, Watervliet Arsenal; "Viennese Popular Songs," "Souvenir of Wieniawski," Elva Vincent, violinist; "Nola," James A. Ball, pianist; "The Bridge," "Mrs. Winslow," Masonic Quartet; "Traumerei Romanza," "My Heart at Thy Sweet Voice," Robert Hayden, cornetist; "Erin's Flag," Thomas H. Fischer, reader; "Tally

(Continued on page 9)

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Any amount (assorted) up to $100 list 35% off.

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TUBES

We have for immediate distribution
201A, W. D. 12, 199

WERNES & PATCH
159 N. STATE ST., CHICAGO, ILL.

U. S. Navy Tubes, $5.25
THREE IN ONE
Detector, Amplifier and Transmitter
Cost Government $11.50—Gold Tips

List Price		Our Price
$ 6.50	UV-201-A Tubes	$ 5.75
5.00	UV-200 Tube	4.55
6.50	UV-199 Tube (Dry Cell)	5.90
6.50	WD-11 Tube (Dry Cell)	5.85
6.50	WR-21 Tube (Dry Cell)	4.95
.75	3" Dials—Hard Rubber	.22
.25	Binding Posts—Hard Rubber	.05
.10	Metal Binding Post	.02
.35	Switch Points and Stops, dozen	.10
.50	Fada Switch Lever	.19
.75	Single Circuit Jacks	.29
1.00	Double Circuit Jacks	.39
.75	Freshman Variable Grid Leak	.49
5.00	43 Plate Variable Condenser	1.70
5.00	S. & S. Variometer (Mahogany)	1.90
5.00	S. & S. Variocoupler	1.90
1.00	.006 Micadon Condensers	.60
12.00	Nathaniel Baldwin, Type C	8.95
6.00	Baldwin Single Units, Type C	4.25
15.00	Western Electric Phones	9.25
5.00	Frost Phones (2000 ohm)	3.95
6.00	Frost Phones (3000 ohm)	4.45
8.00	Brandes Superior	5.65
5.00	Murdock No. 55	2.75
5.50	Murdock Special No. 57	3.85
12.00	Dictograph Headset	5.65
5.00	Multiphones (4 pr. phones in one)	2.98

Complete parts, including Mahogany Cabinet, for 1500 mile Regenerative One Tube Set. Value $35.00. Special $12.85.

Everything guaranteed as firsts. We pay the postage. Money order or check accepted.

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World Radio Batteries SAVE YOU 50%
WRITTEN 2 YR GUAR

Every World User Is a Booster

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Because you deal direct with a manufacturer who is responsible for the performance and quality of the Battery.

World-Radio-Batteries

6 Volts—40 Amps., **$8.50**	6 Volts—80 Amps., **$12.50**
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MAIL YOUR ORDER TODAY. WE SHIP EXPRESS C. O. D., SUBJECT TO INSPECTION, OR WILL ALLOW 5% FOR CASH WITH ORDER. ALL ORDERS SHIPPED SAME DAY AS RECEIVED.

WORLD BATTERY COMPANY,
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GREBE RADIO

Write for "Musings of Dr. Mu"

"Get rid of small wisdom, and great wisdom will shine upon you!"
—Chuang Tzu

When small wisdom prompts you to accept a receiver of doubtful value, show your great wisdom by acquiring the infinite satisfaction that comes through possession of a Grebe Receiver.

Doctor Mu

Licensed under Armstrong U. S. Pat. No. 1113149

A. H. GREBE & CO., Inc.
Richmond Hill, N. Y.
Western Branch—451 East 3rd St., Los Angeles, Cal.

WIRE DIRECTED AIR WAVES MAKE GOOD

TESTS MADE ON PACIFIC COAST BETWEEN CITIES

500-Watt Transmitters Work over Power Lines for 200 Miles—Use High Waves

SAN FRANCISCO.—The "directed Radio system of dispatching," a new method of broadcasting, has recently been put into operation near this city by engineers of the Pacific Gas and Electric Company.

Messages were successfully transmitted a distance of 200 miles, between the Vaca Dixon substation, near Vacaville, Calif., and the Pitt river power house. Specially constructed 500-watt transmitters and standard receivers were used.

In explaining the experiments, Roy Wilkins, Radio engineer, stated that the electromagnetic waves were transmitted to the high voltage power lines at the point of sending and picked off at the receiving end.

High Wave Lengths Used

These waves followed the course of the steel tower lines in a straight line due north 120 miles from Vaca-Dixon to Cottonwood, then on a right angle turn going 80 miles into the Pitt region. Mr. Wilkins said tests were made using wave lengths of from 10,300 to 23,000 meters. Under this system of directed Radio, the energy or sound wave is not broadcast, but travels in the vicinity of the high power transmission lines and will not interfere with other sending or receiving stations.

The system will be used for transmitting messages between power houses in the mountains and large centers of distribution. This system will be especially valuable in maintaining a continuity of service during heavy storms when telephone lines and other systems of communication are unavailable.

FAN WORKS COPP SET SANS AID OF PHONES

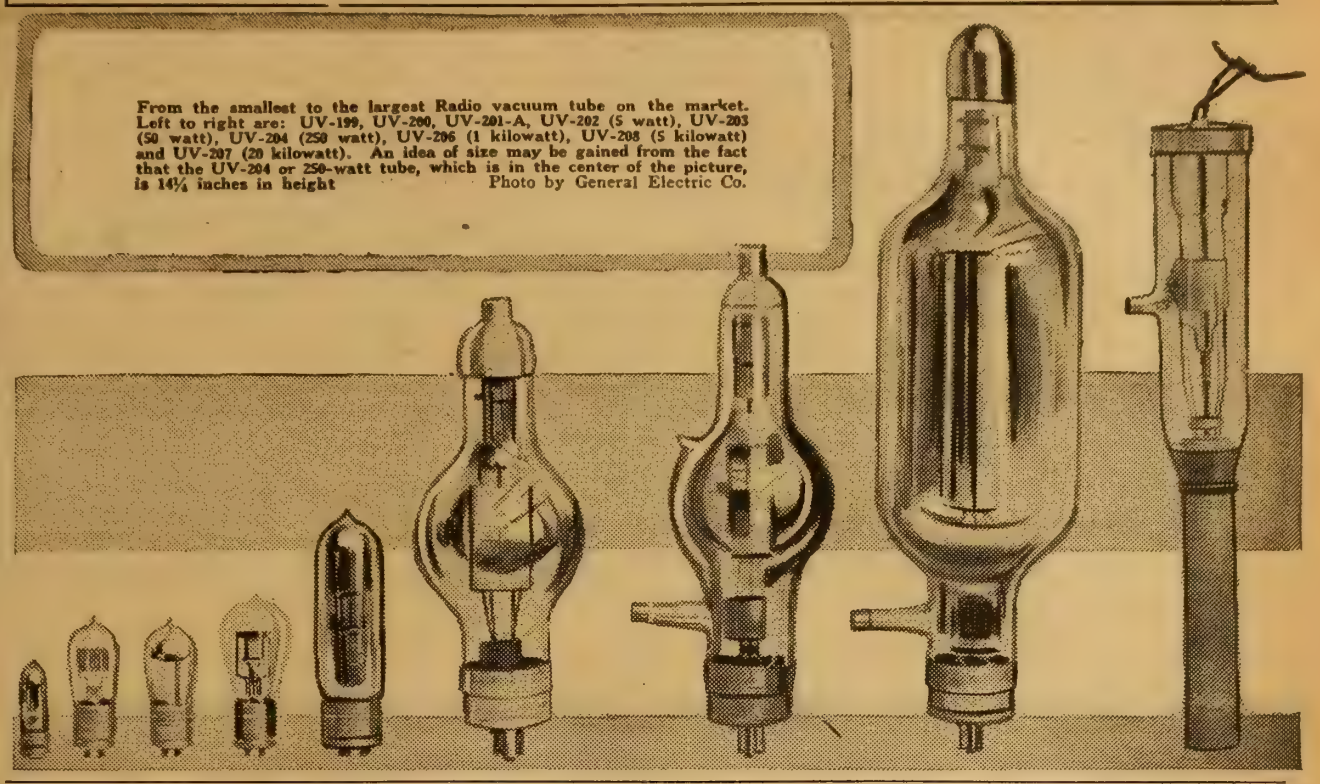
"Loud Speaking Transformers with Five-Foot Cord"—Next!

CLEVELAND, O.—Why worry about a little thing like telephone receivers? Just listen to J. T. Curtis, 7221 Dellenbaugh avenue. "Just recently, after using my Copp set, detector and two stages of amplification, I removed the phones, put them away, and detached the batteries without turning down the rheostats. I had been listening in on most all of the United States.

"The next evening I hooked on the batteries preparatory to the nightly seance but did not hook on the phones. I stepped out of the room for a moment and when I returned I was surprised to hear music. I found that it was coming from the set, but couldn't tell from just what part. When I turned off the amplifier rheostats the music ceased, so I think that in some way the music came from one of the transformers. Sounds fishy, doesn't it? But it sure is true."

From the foregoing we may expect to see advertisements reading like this: "Loud speaking transformers complete with headband and five foot cord."

PA AND MA RADIOTRON AND A GROWING FAMILY



From the smallest to the largest Radio vacuum tube on the market. Left to right are: UV-199, UV-200, UV-201-A, UV-202 (5 watt), UV-203 (50 watt), UV-204 (250 watt), UV-206 (1 kilowatt), UV-208 (5 kilowatt) and UV-207 (20 kilowatt). An idea of size may be gained from the fact that the UV-204 or 250-watt tube, which is in the center of the picture, is 14¼ inches in height. Photo by General Electric Co.

Mathematical Broadcast First Given by Station WOR

NEWARK, N. J.—During the next few weeks Radio Station WOR will conduct an educational experiment very possibly the first of its kind.

This station has secured the services of Mr. William W. Strader to give several talks under the general topic of "Some Tools of Algebra." Mr. Strader is a teacher of mathematics of considerable experience, not only in the school room, but also as a lecturer before classes held in industrial plants. These talks will be from fifteen to twenty minutes long. They will no doubt interest many groups of listeners-in.

A lightning arrester is not needed with an indoor aerial.

Beware of the "bootleggers" who sell imitations of patented articles.

ROBBINS RADIO DESK
-PATENT APPLIED FOR-

An attractive piece of furniture designed and so constructed to accommodate the Radio set and its entire equipment. With it you make a neat installation of Radio in the home. Its many advantages and moderate cost make it almost indispensable.

For sale by first class Radio and Furniture Dealers or write

Robbins Woodworking Co.
Dept. C.
LIBERTYVILLE, ILLINOIS

PREMIER
"MICROMETER" VARIOCOUPLERS
Satisfy
The Most Critical

$5.00 COMPLETE WITH DIAL.

A HIGHLY SELECTIVE VARIOCOUPLER having 180-degree orientation and 20 Antenna taps which facilitate very sharp tuning. Wound with No. 21 single silk or black enameled pure copper wire. Eighty turns on stator—fifty-five on rotor. All metal parts range from 150 to 750 meters. All metal parts brass—contacts positive—stays "Put" at any angle. Adaptable for either single circuit or loose coupled tuned plate hook-ups. Bakelite button on each tap wire permitting easy and safe soldering.

Our Complete Parts Bulletin on request.

DISTRIBUTORS—We make a most complete line of Radio parts. Some territory open for live, responsible concerns.

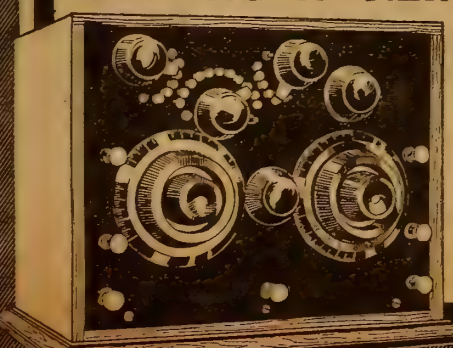
PREMIER ELECTRIC COMPANY
Manufacturers Est. 1905.
3810 Ravenswood Avenue, CHICAGO, ILL.

How to Make a Reinartz Receiver

COMPLETE BLUE PRINTS
for the construction of a Reinartz Receiving Unit and two step amplifier.

INSTRUCTIONS FOR ASSEMBLY
Description of apparatus and accessories and details of tuning.

WINDING A REINARTZ COIL
Cabinet Dimensions
Panel Layouts
List of Parts



Send only money orders—no checks or stamps. Coins at your own risk.

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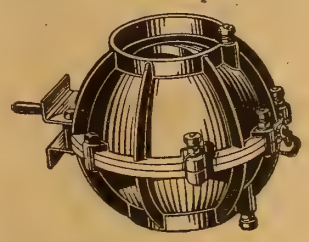
CHICAGO, ILL.

Only 50¢

Kellogg Radio Equipment
For Better Results



The Kellogg Variometer

The stator and rotor are of Kellogg Bakelite, with properly proportioned windings of well insulated copper wire.

Two terminals are provided for the rotor and three of the stator, permitting the variometer to be used in all known variometer circuits.

Kellogg variometers have no sliding contacts; nothing to wear or short. A spring takes up all play and allows the rotor to turn with a smooth even motion.

No. 501.....Each $8.00

KELLOGG SWITCHBOARD & SUPPLY COMPANY
CHICAGO

ARTHUR PUDLIN'S
Variable High Resistance Leak

Used and endorsed by all leading Radio Engineers of the country.

Price 75c-with .0025 condenser, $1

Just Completed our

Artmica Condenser

All Capacities, 25 Cents

If you cannot buy our products at your local dealer, send orders and remittance direct to us. Send 2c stamp for blue print of Rosenblum's wonder circuit. Hear 3000 miles on 1 tube. We absolutely guarantee this with the Arthur Pudlin high resistance.

ARTHUR PUDLIN
Engineering Co.
1540 Broadway New York, N. Y.

Radiophone Broadcasting Stations

Corrected Every Week—Part I

AQ6, Canton, O. 425 only. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.

AS6, San Antonio, Tex. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.

AV7, St. Paul, Minn. 400 only. 500 mi. 6th Inf. Minn. Nat'l Guard. St. Paul Armory. Daily ex Sun, 2-2:30 pm, music, announcements. Tues, 8:30-10 pm. Thurs, 8:30-9:15 pm. Central.

BEI, Tacoma, Wash. 400 only. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 6-7 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 only. 1,000 mi. Western Radio Co., Ltd., (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm, Mountain.

CFCA, Toronto, Ont., Can. 400 only. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 5:45-7:20, 7:45-8:45 pm, concert. Eastern.

CFCB, Vancouver, B. C., Can. 440 only. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.

CFCE, Halifax, N. S., Can. 440 only. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.

CFCF, Montreal, P. Q., Can. 440 only. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 only. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.

CFCK, Edmonton, Alta., Can. 410 only. Radio Supply Co. Daily ex Sun, 8-8:30 pm. Music. Sun, 3:30-4:30 pm, Concert. Mountain.

CFCN, Calgary, Alta., Can. 275, 440 only. 1500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

CFCX, London, Ont., Can. The London Advertiser.

CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.

CFTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.

CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.

CHBC, Calgary, Alta., Can. 410 only. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.

CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.

CHCB, Toronto, Can. Marconi Co. No regular program.

CHCF Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.

CHCS, London, Ont., Can. London Radio Shoppe.

CHCX, Montreal, Que., Can. B. L. Silver.

CHVC, Toronto, Canada. Metropolitan Motors Co. Licensed only.

CHYC, Montreal, Que., Can. Northern Elec. Co.

CHXC, Ottawa, Ont., Can. 450 only. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.

CJBC, Montreal, Que., Can. 420 only. 75 mi. Dupuis Freres. Wed, Fri, 9-10 pm, music. Eastern.

CJCA, Edmonton, Alta., Can. 450 only. 1000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour, 8:30-9:30 pm, concert, reports. Mountain.

CJCB, Nelson, B. C., Can. 400 only. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.

CJCD, Toronto, Canada. 410 only. 200 mi. T. Eaton Co. No regular program.

CJCE, Vancouver, B. C., Can. 420 only. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.

CJCH, Toronto, Ont., Can. United Farmers of Ontario.

CJCI, St. John, N. B., Can. 400 only. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.

CJCN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only.

CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.

CJCY, Calgary, Alta., Can. Edmund Taylor.

CJGC, London, Ont., Can. 430 only. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.

CJNC, Winnipeg, Man., Can. 400 only. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm. Fri, 8-10 pm. Alternate Sun, 8:30-10 pm. Central.

CJSC, Toronto, Ont., Can. Evening Telegram. Licensed only.

CKAC, Montreal, Que., Can. 430 only. 1,000 mi. La Presse. Daily ex Sun, 2 pm, weather; 4:30-4:35, reports; 4:15-5:15, dance music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-8:30, concert; 8:30-9:30, music; 10:30-11:30, dance music. Sun, 4-4:45 pm, 5-6, music. Eastern.

CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.

CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.

CKCK, Regina, Sask., Can. 420 only. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9, concert. Sun, 9 pm, sacred concert. Mountain.

CKCR, St. John, N. B., Can. 400 only. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.

CKCZ, Toronto, Ont., Can. Westinghouse Co., Ltd. Licensed only.

CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.

CKOC, Hamilton, Ont., Can. 410 only. 100 mi. Wertworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8.30-9:30 pm, concert. Sun, church services. Eastern.

CKQC, London, Ont., Can. 410 only. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.

CKY, Winnipeg, Man., Can. 450 only. 500 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-1:30 pm, news, music; 1:45-2:00 pm, markets. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert. Central.

CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.

DD5, Denver, Colo. 412 only. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.

DM4, San Antonio, Tex. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.

DN4, Denver, Colo. 340 only. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDKA, E. Pittsburgh, Pa. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 vesper service. Eastern.

KDN, San Francisco, Calif. 485, 510 also. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.

KDYL, Salt Lake City, Utah. 485 also. 1,500 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. Savoy Theater.

KDYQ, Portland, Ore. 25 mi. Oregon Institute of Technology. Tues, 9-10 pm, educational lectures. Pacific.

KDYS, Great Falls, Mont. 485 also. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYW, Phoenix, Ariz. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.

KDYX, Honolulu, T. H., Hawaii. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.

KDZA, Tucson, Ariz. Arizona Daily Star.

KDZB, Bakersfield, Calif. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDZE, Seattle, Wash. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. Automobile Club of Southern California.

KDZG, San Francisco, Calif. Cyrus Pierce & Co.

KDZI, Wenatchee, Wash. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal.) Wed, Fri, 7-8 pm. Pacific.

KDZQ, Denver, Colo. Pyle & Nichols.

KDZR, Bellingham, Wash. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.

KDZT, Seattle, Wash. Seattle Radio Assn.

KDZZ, Everett, Wash. 50 mi. Kinney Bros. & Seppell. Daily ex Sun, 2:30-3:30 pm, 4:30-5:30, 8:15-9:15. Pacific.

KFAD, Phoenix, Ariz. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock, reports. Mountain.

KFAE, Pullman, Wash. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.

KFAF, Denver, Colo. 3,750 mi. Western Radio Corp. Daily ex Wed and Sun, 8-9 pm, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. Standard Pub. Co.

KFAQ, San Jose, Calif. City of San Jose.

KFAR, Hollywood, Calif. Studio Lighting Service Co.

KFAT, Eugene, Ore. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Sun, 8:30-9:15 church service. Pacific.

KFAU, Boise, Ida. 485 also. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.

KFCY, Le Mars, Ia. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.

KFCZ, Omaha, Neb. Omaha Central H. S.

KFDA, Baker, Ore. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDB, San Francisco, Calif. 400, 485 only. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories. Pacific.

KFDC, Spokane, Wash. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.

KFDD, Boise, Idaho. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDF, Casper, Wyo. 485 also. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.

KFDH, Tucson, Ariz. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.

KFDJ, Corvallis, Ore. Oregon Agri. College.

KFDL, Denver, Colo. Knight-Campbell Music Co.

KFDO, Bozeman, Mont. H. Everett Cutting.

KFDP, Des Moines, Iowa. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3 pm, reports, music. Mon, 9 pm, music. Thurs, 9:30 pm, music, entertainment. Central.

KFDR, York, Neb. Bullock's.

KFDS, San Francisco, Calif. John D. McKee.

KFDU, Lincoln, Neb. Neb. Radio Elec. Co.

KFDV, Fayetteville, Ark. Gilbrech & Stinson.

KFDX, Shreveport, La. First Baptist Church.

KFDY, Brookings, S. D. S. D. State College of Agri. & Mech. Arts.

KFDZ, Minneapolis, Minn. Harry O. Iverson.

KFEB, Taft, Calif. 200 mi. City of Taft. Mon, Wed, Fri, 6:15-7 pm, music, news. Pacific.

KFEC, Portland, Ore. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, reports; 4-5 pm, music; 6:30 pm, reports. Thurs, 9-10 pm, concert. Sat, 11 am-12 m, children's hour. Pacific.

KFEJ, Tacoma, Wash. Guy Greason.

KFEP, Denver, Colo. Radio Equipment Co.

KFEQ, Oak, Neb. J. L. Scroggin.

KFER, Fort Dodge, Ia. Auto Electric Service Co.

KFEV, Douglas, Wyo. 485 also. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.

KFEY, Kellogg, Ida. Bunker Hill & Sullivan Mining & Const. Co.

KFEZ, St. Louis, Mo. American Society of Mech. Engrs.

Continued—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules, given here, are listed alphabetically by call letters. Following the call is given the city and state, the wave length (PROVIDING a wave length other than 360 meters is used), the miles range of the station, the owner of the station, the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KFAV, Venice, Calif. 340 only. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW, Santa Ana, Calif. 485 also. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Medford, Ore. 485 also. 500 mi. Virgin Radio Service. Mon, Fri, 9-10 pm. Special programs other days. Pacific.

KFAZ, Reedley, Calif. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.

KFBB, Havre, Mont. 485 also. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, San Diego, Calif. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFBD, Hanford, Calif. 485 also. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.

KFBE, San Luis Obispo, Calif. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.

KFBG, Tacoma, Wash. First Presbyterian Church.

KFBH, Marshfield, Ore. Thomas Musical Co.

KFBJ, Boise, Ida. 70 mi. Jenkins Furn. Co. (Owyhee Hotel.) Daily, 8-9 pm. Mountain.

KFBK, Sacramento, Calif. 485 also. 300 mi. Kimball-Upson Co. Daily ex Sun, 3-4 pm, 6-6:45, concert, news, codes. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.

KFBL, Everett, Wash. Leese Bros.

KFBS, Trinidad, Colo. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. Bishop N. S. Thomas.

KFCB, Phoenix, Ariz. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.

KFCD, Salem, Ore. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. Frank A. Moore.

KFCH, Billings, Mont. 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. 485 only. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.

KFCM, Richmond, Calif. 500 mi. Richmond Radio Shop. Mon, 8-9 pm, music. Sun, 1-2 pm, music. Pacific.

KFCP, Ogden, Utah. Ralph W. Flygare.

KFCQ, Casper, Wyo. Motor Service Stn.

KFCV, Houston, Tex. 300 and 600 also. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.

KFFA, San Diego, Calif. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.

KFFE, Pendleton, Ore. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.

KFFG, Hillsboro, Ore. Dr. E. H. Smith.

KFFP, Moberly, Mo. First Baptist Church.

KFFQ, Colorado Springs, Colo. 250 mi. The Markshieffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.

KFFR, Sparks, Nev. Jim Kirk.

KFFV, Lamoni, Ia. Graceland College.

KFFY, Alexandria, La. 275 only. Pincus & Murphy, Inc.

KFFZ, Dallas, Tex. 226 only. Al. G. Barnes Amusement Co.

KFGB, Pueblo, Colo. Lowenthal Bros.

KFGD, Chickasha, Okla. 248 only. Chickasha Radio & Elec. Co.

KFGF, Mt. Vernon, Wash. 50 mi. Buchanan, Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Sun, 2-3 pm. Pacific.

KFGL, Arlington, Ore. Arlington Garage.

KFHA, Gunnison, Colo. Colorado State Normal School.

KFHB, Hood River, Ore. P. L. Boardwell.

KFGH, Stanford Univ., Calif. 500 mi. 300 and 410 also. Leland Stanford Junior University. No regular schedule

KFHH, Neah Bay, Wash. Ambrose A. McCue.

KFHJ, Santa Barbara, Calif. Fallon Company.

KFHR, Seattle, Wash. Star Elec. & Radio Co.

KFI, Los Angeles, Calif. 400 only. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.

KFIF, Portland, Ore. Benson Tech. Student Body.

KFV, Yakima, Wash. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.

KFZ, Spokane, Wash. 300 mi. Doerr-Mitchell Elec. Co. Tues, Wed, Fri, 7-8:30 pm, music. Sat, 7-8 pm. Pacific.

KGB, Tacoma, Wash. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.

KGG, Portland, Ore. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment, 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.

KGN, Portland, Ore. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 350 only. 300 mi. Altadena Radio Lab. No regular schedule.

KGU, Honolulu, Hawaii. 485 also. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat. special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 400 and 485 also. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30, weather. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 250 mi. St. Martins College. Tues, Fri, Sun, 8:30-9:30 pm, news, concert, bedtime story. Pacific.

KHJ, Los Angeles, Calif. 400 only. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-9:30. Sun, 10-11 am. Pacific.

KHQ, Seattle, Wash. Louis Wasmer.

KJJ, Sunnyvale, Calif. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.

KJQ, Stockton, Calif. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.

KJR, Seattle, Wash. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.

KJS, Los Angeles, Calif. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30, 6-6:45 pm, 8-9, church services. Pacific.

KLB, Pasadena, Cal. 300 mi. J. J. Dunn Co. Mon and Fri. 7:30-8:15 pm, concert. Sun, 3-4 pm and 8-9. concert. Pacific.

KLN, Del Monte, Calif. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert Pacific.

KLS, San Francisco, Calif. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm, Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 500 mi. Oakland Tribune. Daily ex Sun, 3:30-4:30 pm, 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.

KLZ, Denver, Colo. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.

KMJ, Fresno, Calif. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.

KMO, Tacoma, Wash. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7, 9:15-10, concert, news, lecture. Pacific.

KNI, Eureka, Calif. T. W. Smith.

KNJ, Roswell, New Mex. Temporarily discontinued.

KNN, Los Angeles, Calif. 100 mi. Bullock's. Temporarily discontinued.

KNT, Aberdeen, Wash. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 5-6 pm, 7-8, news, concert. Pacific.

KNV, Los Angeles, Calif. Radio Supply Co.

KNX, Los Angeles, Calif. Elec. Lighting & Supply Co.

KOB, State College, N. M. 485 also. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

KOP, Detroit, Mich. 1,500 mi. Detroit Police Dept. Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 300, 400 and 600 only. 1,500 mi. Hale Bros., Inc. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sat, 3-4:30 pm. Sun, 11-12:30 pm, church services. Pacific.

KQI, Berkeley, Calif. Univ. of Calif.

KQP, Hood River, Ore. Apple City Radio Club.

KQV, Pittsburgh, Pa. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose, Calif. 345 and 485 only. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.

KQY, Portland, Ore. 200 mi. Stubbs Elec. Co. Wed, Thurs, Fri, 6-7 pm. Mon, Tues, Sat, 9-10 pm. Pacific.

KRE, Berkeley, Calif. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.

KSD, St. Louis, Mo. 400 and 485 only. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Fri, 11:30 pm, concerts. Central.

KSL, San Francisco, Calif. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

KUO, San Francisco, Calif. 485, 525 also. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 5:15-6:45 pm, concert; 9 am, 12 m, 6:45 pm, weather reports. Wed, 3:30 pm, health bulletins. Sun, 9-10 am, 2-4 pm, 5-6, concert, news. Pacific.

KUS, Los Angeles, Calif. 360 mi. City Dye Wks. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Cal. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 485 also. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYI, Bakersfield, Calif. Bakersfield Californian.

KYQ, Honolulu, Hawaii. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 400 and 485 only. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central, Daylight Saving.

KZM, Oakland, Calif. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 485 also. 1,000 mi. Deseret News. Daily ex Sun, 8-9:30 pm, music, news, bedtime stories etc. Mountain.

KZV, Wenatchee, Wash. 485 also. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 710 only. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3, (Tues. only) Dept. Interior; 3:25-4:40, 5:05-5:20, markets, weather; 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 only. 1,500 mi. International Tel. & Telg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAI, Dayton, O. McCook Field, U. S. Army.

WAAB, New Orleans, La. Valdemar Jensen.

WAAC, New Orleans, La. Tulane Univ.

WAAD, Cincinnati, O. 200 mi. Ohio Mechanics Inst. No regular schedule. Central.

WAAF, Chicago, Ill. 485 also. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program at 3 and 4:30 pm. Central.

WAAH, St. Paul, Minn. 500 mi. Commonwealth Elec. Co. Tues, 8:30-10 pm, entertainment. Sun, 10:30 am, 3:30 pm, church service. Central.

(NOTE—The second part of the station schedule list will appear next week.

ADVANCE PROGRAMS

(Continued from page 6)

Ho." "Wondering." "John Fogarty, baritone; "Rally Ho." Frank L. Purcell, Thomas S. Morris; "Caprice." "The Top." "Seguidilla Castilian Dance." Lucia P. Walker, pianist; "A Son of the Desert Am I." Daniel A. Gilmore, baritone; "School for Scandal." "Comprenez-vous." Mary Rose Rogers, reader. "Wild de Moon, Moon, Moon." "I Have a Dream." Helen Ford, contralto; "Pastorale." "Gavotte." Ernest A. Meneely, pianist; "Our America." Orchestra.

WHAS (Central, 360), 7:30-9:00 P. M., Concert. Optimists' Club of Louisville, Address, T. A. Luman; Piano solo, Marie Pfeiffer. Soprano solo, Florence Lynn; Piano solo, F. L. Speiden; Soprano solo, Elizabeth Shelton; Optimist Quartet; Violin duet, Mrs. Nicholas Bosler, Jr., Sibby Lottman; Soprano solo, Mrs. George Schuele; Reading, Mrs. Albert Idson; Sunday School Lesson, Rev. Paul R. Zwilling; Talk, "The Four Sided Boy." Frank Gregg.

WIP (Eastern, 400), 1:00-1:15 P. M., Short talks; 2:00-3:00 P. M., Artist recital; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories.

WJAX (Eastern, 360), 8:00 P. M., Concert, Baldwin-Wallace College Glee Clubs, Berea, O.; "Marching to Meet One Buonaparty," Men's Glee Club; Piano solo, Elma Werner; "The Persian Serenade." "Twelve by the Clock," Girls' Glee Club; Soprano solo, Fay Slate; Violin solo, Leo Schwing; "Sylvia," "Echo." Mixed chorus; Popular selections, Rae Mueller, Fred Williams; "Old Man Noah," Male quartet; Bass solo, Kingsley Sears; "By Babylon's Wave," Mixed chorus; Alto solo, Evelyn George; Xylophone duet, Rae Mueller, Fred Williams; "Bedouin Love Song," Men's Glee Club.

WLW (Eastern, 360), 10:00 P. M., Concert, The Louis Law Trio, The Opera Quartet; "Cavatina," Trio; Cello solos, "The Swan," "Tarantella;" Quartet from "Rigoletto." "Copper Moon." Quartet; "The Great Awakening," Herbert C. Schatz, baritone; Duet from "Blossom Time," Helene Kessing, soprano, Richard Pavey, tenor; Soprano solo, Helene Kessing; "Liebestraume," Trio; "When Will the Sun Shine for Me?" "Little Rover," Quartet; "Hungarian Dances, 5 and 6," Trio.

WMAQ (Central, Daylight Saving, 400), 7:00 P. M., Readings, Edmund Vance Cooke; Talk, "Auto Tralls," Rockwell Stephens, automobile editor of Daily News; Talk, "The History of the American Flag," J. M. Wagner, Field Scout Executive, Stock Yards, Chicago; 9:15 P. M., Musical program, Ruth Radkey, pianist, Geo. H. Bigler, tenor.

WMC (Central, 400), 8:00 P. M., Concert, Hotel Chisca Philharmonic Orchestra.

WOC (Central, 400), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman's visit; 7:00 P. M., Musical program, Mrs. A. L. Farley, W. Walbourne, Mrs. John Hickey, Mrs. John Mallos; 8:00 P. M., Educational lecture, "Mooseheart," General Dictator Wardle, L. O. O. M.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Organ recital and trumpets; 7:50-9:00 P. M., Short talk and WOO Orchestra, Robert E. Golden, director and violin soloist; 9:00-9:55 P. M., Organ recital, Mary E. Vogt, organist.

WWJ (Eastern, 400), 8:30 P. M., The Town Crier; Concert, The News Orchestra; Lillian G. Grant, coloratura-soprano; George F. Abbot, tenor; Earl Upton, pianist; 11:00 P. M., News Orchestra; Tari Upton, pianist.

Friday, May 11

CFCA (Eastern, 400), 8:00-9:00 P. M., Concert, Selection from "The Merry Widow," Star Orchestra; "Dannie Boy," Agnes Adie, soprano; "Valse Bluette," Orchestra; "O Dry Those Tears," W. Woods, cornetist; "Skaters' Waltz," Orchestra; "Sing Me Love's Lullaby," Agnes Adie; "For You Alone," W. Woods; "Same Old, Dear Old Place," Agnes Adie; Serenade, "Through Battle to Victory," Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour, Concert and bedtime story by "Uncle John;" 8:00-10:00 P. M., Concert, Presbyterian Choir, of Hollenbeck Heights.

KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Laurette Finnegan, soprano; Helen Klusella, reader; Allen Ray Carpenter, tenor, Margaret Wilson, accompanist; Mildred E. Studebaker, pianist; 9:05-8:25 P. M., Book review, Llewellyn Jones, literary Editor of the Chicago Evning Post; 10:00 P. M.-1:00 P. M., Midnight Revue.

WBAP (Central, 400), 7:15-8:00 P. M., Concert, Junior Euterpean Club, of Fort Worth; 9:30-10:30 P. M., Concert, School of Music, Texas Christian University.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., Piano and song recital; 4:15-4:45 P. M., Song and piano solos; Betsy Logan on "Affairs of the Heart;" 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:45 P. M., Dream Daddy with boys and girls; 7:45 P. M., Short talk; 8:00 P. M., Short talk by prominent Philadelphian; 8:20-9:50 P. M., Musical program; 10:10 P. M.-1:00 A. M., Dance music, Arcadia Cafe Dance Orchestra, songs by Harry Glyn.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "The Sunday School Lesson," Dr. Robert Stuart Hyer, Southern Methodist University; 8:30-9:30 P. M., Recital, Leland Johnson, pianist; J. J. Simmons, raconteur.

WFI (Eastern, 400), 1:15-2:00 P. M., Dinner Dance Music, Meyer Davis Bellevue-Stratford Dance Orchestra; 3:30-4:00 P. M., Short talks and song recital; 6:30-7:00 P. M., Children's Own Half Hour of Stories with Cousin Sue.

WGI (Eastern, 360), 9:30 P. M., Program, "Silversmith" series, David M. Cheney; Concert, Gitana Fabian, mezzo-soprano; Talnah Fabian, reader and pianist.

WGR (Eastern Daylight Saving, 360), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico recital; 8:00 P. M., Dance program, Bagadore's Orchestra.

WGY (Eastern, 380), 7:45 P. M., Concert program, "Rustle of Spring," Daniel Murphy, pianist; "Until," Marion Swanik, soprano; "Adagio," "Gavotte," Elise de Grood, violinist; "Machushla," Robert Massey, tenor; Talk, "The New Tubes, UV-201-A and UV-199," J. C. Warner; "Butterflies," "The Star," "Now Sleeps the Chimson Fetal," Marion Swanik, soprano; "Adagio," Elsie de Grood, violinist; "Mavis," Robert Massey, tenor; Topics of the Day, Pathe Exchange; "Kamennoi-Ostrow," Daniel Murphy, pianist; "Annie Laurie," soprano; "Hungarian Dance," violinist; "Little Old Log Cabin," tenor; 10:30 P. M., "The Storm," Radio drama; "The Erl King," "Meditation," "Prelude," "Aria," "Amour," WGY Instrumental Quartet.

WHAS (Central, 360), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theatre; Concert, Mary Anderson Theatre Orchestra; 7:30-9:00 P. M., Concert, under auspices of Junior Historical and Nature Study Society, New Albany, Ind.; Reading, "An Interesting Historical Episode."

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories.

WMAQ (Central, Daylight Saving, 400), 4:35 P. M., Program arranged by Columbia School of Music; 7:00 P. M., Talk on the music of Ethelbert Nevin, by Marx E. Oberndorfer; Grace La Rocca, contralto; 9:15 P. M., Musical program, Arthur Middleton, Jr., baritone, Grace Wallace, soprano.

WMC (Central, 400), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gaspar Pappalardo, director; 11:00 P. M., Midnight Frolic.

WOC (Central, 400), 3:30 P. M., Educational talk, C. E. Willeut; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman's visit; 7:00 P. M., Musical program, The P. S. C. Orchestra.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Organ recital and trumpets.

WWJ (Eastern, 400), 8:30 P. M., The Town Crier; Concert, The News Poet; News Orchestra; Vocal selections, pupils of Marcus Kellerman.

Saturday, May 12

CFCA (Eastern, 400), 8:00-9:00 P. M., Concert; Selection from "Floradora," Star Orchestra; Bass solo, W. R. Curry; "Dream of Summer," Clarence Causton, violinist; "La Czarine," Star Orchestra; "The Two Grenadiers," W. R. Curry; "The Blue Danube Waltz," Orchestra; "Minuet in G," Clarence Causton; Bass solo, W. R. Curry; "Are Maria," Clarence Causton; "Selection of English Airs," Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Program by Lincoln High School Girls' Glee Club; 6:45-7:30 P. M., Children's Hour, Concert and bedtime story by "Uncle John;" 8:00-10:00 P. M., Concert, Donald Campbell's Orchestra.

KYW (Central Daylight Saving, 447), 8:00-8:56 P. M., Musical program, Lauramae E. Kuhles, soprano, Mrs. Nell C. Floss, accompanist; Morgan L. Eastman's Guessing Contest; 9:05-9:25 P. M., "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 400), 7:00-7:20 P. M., Review of Sunday School lesson, Mrs. W. F. Barnum, leader of the Barnum Bible Class of the First Methodist Church.

WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program, Rosemary Hughes, soprano; Auburn Park Mandolin Club, Jack Chapman's Orchestra.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., Song recital; 4:15-4:45 P. M., Music from Cafe Lattiviere; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFAA (Central, 400), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Mozart Choral Club; 11:00-12:00 P. M., Musical program, Mrs. Albert Smith, J. Ramsey Brown, vocalists, Emmett B. Peck, violinist.

WFI (Eastern, 400), 1:15-2:00 P. M., Dinner Dance Music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:30-4:00 P. M., Short talks and music recital; 6:30-7:00 P. M., Concert, Meyer Davis Bellevue-Stratford Concert Orchestra.

WGI (Eastern, 360), 7:00 P. M., Talk; Musical program; "The Traitor," Amrad Players; "A Black Trump," Amrad Players.

WGY (Eastern, 380), 8:00 P. M., Dance music, Cain's Castle Orchestra.

WHAS (Central, 360), 7:30-9:00 P. M., Concert, direction of Mme. Cara Sapin, faculty Louisville Conservatory of Music; Reading, "An Interesting Historical Episode;" Tenor solo, Edward J. Wolf.

WIP (Eastern, 400), 2:00-3:00 P. M., Musical program; 6:00-6:30 P. M., Dinner dance music; 7:00-730 P. M., Uncle Wip's bedtime stories; 10:10 P. M., Dance music, Charlie Kerr's Orchestra in L'Aiglon Cafe.

WMAQ (Central, Daylight Saving, 400), 7:00 P. M., Talk, "Worlds in the Making," Arthur D. Carpenter; Ihla G. Johnson, mezzo-soprano; 9:15 P. M., Musical program, Western Electric Glee Club.

WMC (Central, 400), 8:00 P. M., Concert, Rotary Club Boys' Band.

WOC (Central, 400), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman's visit; 7:00 P. M., Musical program, E. H. Hass, Margaret Louise Frank, Hugo Schroeder, Bert Lovette; 8:00 P. M., Lecture, "The Efficient Mothers," Mrs. E. M. Light, representing St. John's King's Daughters Circle, of Davenport, Iowa; 9:30 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Band concert, organ recital and trumpets.

Sunday, May 13

WBAP (Central, 400), 11:00-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor; Will Foster, organist.

WDAP (Central, Daylight Saving, 390), 9:15 P. M., Concert, Henry Selinger and Drake Concert Ensemble; Hans Muenzer, violinist.

WFAA (Central, 400), 2:30-3:00 P. M., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor of First Presbyterian Church, Dallas; 3:00-3:30 P. M., Concert, Hella Temple Band; 9:30-10:30 P. M., First Presbyterian Choir; 10:00-11:00 P. M., Harris Bros.' Orchestra.

WFI (Eastern, 400), 4:00 P. M., Chapel services conducted from one of Philadelphia's churches; Sermon and organ recital; 7:30 P. M., Arch street Presbyterian Church services; Sermon by Reverend Clarence Edward MacCartney; Organ recital, Alton K. Dougherty, organist and director of choir; 9:30 P. M., Organ recital.

WGI (Eastern, 360), 4:00 P. M., Twilight program, "Adventure Hour," Youth's Companion; Concert, Amrad Pianoforte and Organ Club; 8:30 P. M., Church services, Mass. Federation of Churches; 9:00 P. M., Musical program.

WGR (Eastern Daylight Saving, 360), 3:00 P. M., Vesper services, Rev. Louis Suedmeyer, St. John's Evangelical Church, Buffalo; music.

WGY (Eastern, 380), 9:30 A. M., Church services, First Methodist Church, Schenectady, N. Y.; "The Heavens Are Telling," choir; "Adore and Be Still," Mrs. Charlotte B. Gilbert, soprano; Sermon, "The Invincible Christ," Rev. Philip L. Frick; "He Sendeth the Springs Into the Valleys," double quartet; 3:00 P. M., Symphony concert, "A Shepherd's Tale," "Lullaby," orchestra; "With Verdure Clad," Mrs. Fred Ellison, soprano; "Shepherds All and Maidens Fair," orchestra; "O Divine Redeemer," Mrs. Fred Ellison; "The Tournament," orchestra; "These Are They," Mrs. Fred Ellison; "Siegfried Idyl," orchestra; 6:30 P. M., Church services, First Methodist Church, Schenectady, N. Y.; "Bameses II," Mrs. J. William Loane, organist; "Save Me, O God." John Lloyd, tenor; "The Drama of Isaiah," Bible Pageant.

WHK (Eastern, 360), 8:00 P. M., Musical program, WHK Trio and Orchestra; Edith Church, soloist.

WIP (Eastern, 400), 11:00 A. M., Church services, Holy Trinity Memorial Chapel, B. Janney Rudderow, minister; Ernest Felix Potter, organist and choir leader; 2:00-3:30 P. M., Concert, Arcadia Cafe Concert Orchestra, Fery Sarkozi, director.

WWJ (Eastern, 400), 11:00 A. M., Church services from St. Paul's Cathedral; 4:00 P. M., News Orchestra.

Monday, May 14

WBAP (Central, 400), 7:15-8:00 P. M., Concert, L. L. Withers. Miss Duncan, and others; 9:30-10:30 P. M., Concert, Saxophone Sextette, Ballinger, Tex.

WDAR (Eastern, 400), 12:02-1:00 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 3:00-3:30 P. M., Song recital; 4:15-4:45 P. M., Musical program; 5:45-6:00 P. M., Dream Daddy with little tots; 7:30-7:50 P. M., Dream Daddy with boys and girls.

WFI (Eastern, 400), 1:15-2:00 P. M., Concert, Meyer Davis Bellevue Stratford Concert Orchestra; 3:30-4:15 P. M., Song and musical recital; 6:30-7:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGR (Eastern Daylight Saving, 360), 2:00 P. M., Music; 3:00 P. M., Music; 4:00 P. M., Ampico recital; 8:00 P. M., Dance program, Jack Brindley's Orchestra.

WGY (Eastern, 380), 1:00 P. M., "Early Colonial Music," Mrs. Howard Chadwick, Schenectady Women's Club; 7:45 P. M., Polish music. "Gora Piesn," "Marsz Sokolow," Liberty Bell Male Chorus; "Wiej Wietrzyku," M. Szalwinska, soprano; "Minuet," Edmund Stanina, pianist; "Legende," Stanley E. Grabowski, violinist; "Wisla," "Podkoweczki Dajcie Ognia," chorus; "Valse," "Chant du Voyageur," Edmund Stanina, pianist; "Old Black Joe," "My Old Kentucky Home," chorus; "Polish Lullaby," "Caprice Valse," Alexander Koszalka, violinist; address, "The Polish Song," Stanislaus Belniak; "Polonaise in A Minor," Edmund Stanina, pianist; "Nocturne in E Minor," "Polonaise in D," Alexander Koszalka, violinist; "Modlitwa Jagielly," chorus.

WIP (Eastern, 400), 2:00-3:00 P. M., Recital; 6:00-6:30 P. M., Dinner dance music; 7:00-7:30 P. M., Uncle Wip's bedtime stories.

WMC (Central, 400), 8:00 P. M., Program, Lions Club of Memphis.

WOO (Eastern, 400), 11:00 A. M., Organ recital, Mary E. Vogt, organist; 4:45-5:00 P. M., Organ and trumpets; 7:50 P. M., Business talk; 8:10 P. M., Concert, John Wanamaker Commercial Institute Band, Arthur A. Rosander, director; 9:00-9:50 P. M., Organ recital, Mary E. Vogt, organist; 10:10-12:00 P. M., Concert.

Sales Promotion By Ether

CLEVELAND, O.—Sales by Radio. A St. Louis paper box company recently canvassed the Bailey company here for an order for 100,000 cardboard cartons, sending the message from Station 9EKF, St. Louis, Mo. It is stated that the order was landed and that many amateur Radio experts heard the unusual stunt.

Largest Radio Store in America

Radio

BUY HERE FOR LESS

Largest Radio Store in America

Radio Supplies purchased here are sold under a positive guarantee of satisfaction. We carry the largest new stock of first quality merchandise.

RADIO CORPORATION OF AMERICA WR-21 DETECTOR AND AMPLIFIER TUBES

4 VOLT FILAMENT, 7 AMPERE. FORMALLY EQUIPPED IN AERIOLA GRANDS. FITS WD-11 SOCKET, OR STANDARD SOCKET WITH ADAPTOR.

WR-21 DETECTOR.....$3.95
WR-21 AMPLIFIER.....4.25

THESE TUBES WILL OPERATE ON 6 VOLT STORAGE BATTERY

Complete Parts for Ultra Audion Circuit (Known as the Wonder Circuit) $11.90

FREUND'S WONDER CIRCUIT $13.20

COMPLETE PARTS FOR REINARTZ SETS . . . $11.45

COMPLETE PARTS FOR 2 STEP AMPLIFIER . . $12.45

WD-12 TUBES.....$6.50
The Genuine WD-11 Tube Equipped with Standard Base to Fit Standard Socket

ADAPTERS FOR WD-11 AND WR-21 TUBES.....50c

Moulded Variometers	$3.45	Master Baldwin Type C. Head Sets	$6.95
180° Moulded Variocouplers	$3.45	Brandes Superior Headset	$5.75
Mahogany Variometers	$1.95	Antenella Aerial Plug	$1.15
180° Bakelite Variocouplers	$1.75	3 Coil Honeycomb Mounting	$3.45
Freshman Variable Grid Leak and Condenser	.75c	2 Coil Honeycomb Mounting	$2.60
CRL Adjustable Grid Leak and Dubilier Condenser	$1.35	WD-11 Bakelite Sockets	50c
Master Baldwin Type C Units with Cord	$3.95	Barchass Coils	$1.95
		Firth Cord Tip Plugs	60c
		Thordarson Amplifying Transformers	$2.95

Radio Corporation of America New and Improved Radiotron Tube.

UV-199 Detector and Amplifier **TUBE.....$6.50**

Operates on 3 Volts (2 Dry Cells); Consumes .06 (1/16) Ampere. Same Characteristics for Sensitiveness and Loudness as UV-201.

Socket for UV-199 Tube....75c; UV-199 Adapters....$1.25

Complete Parts for Knocked Down Receiving Set $17.95

COMPLETE PARTS FOR FLEWELLING CIRCUIT $12.45

VARIABLE CONDENSERS

$4.30 Value, 43 Plate, now	$1.75
$2.70 Value, 23 Plate, now	$1.45
$3.30 Value, 11 Plate, now	$1.35
$3.10 Value, 5 Plate, now	$1.25
$2.70 Value, 3 Plate, now	$1.15
$7.00 Value, 43 Plate Vernier Variable Condenser	$3.95
$6.50 Value, 23 Plate Vernier Variable Condenser	$3.45
$6.00 Value, 11 Plate Vernier Variable Condenser	$2.95

PARTS FOR SINGLE TUBE REFLEX SET as listed in Radio Digest..... $27.65

Radiotron UV-201-A Tubes, 6 Volt Filament, .25 (¼) Ampere..$6.50
Formerly Sold for $9.00
Operates on 6 Volt Storage Battery or 4 Dry Cells in Series

U.S.A. SIGNAL CORPS (Aviation Type 194-W) WESTERN ELECTRIC PHONES, $7.95

Each Phone Cap is covered with soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

ORIGINAL BALDWIN PHONES

These are the Genuine Nathaniel Baldwin "Mica Diaphragm" Phones, complete with silk cord and headband. Special at..... $9.95
Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special..... $4.65

3000 Ohm GUARANTEED HEADSETS, $8.50 Value $3.65

MAGNAVOX, LOUD SPEAKERS, Type R3 . . . . $27.45

CABINETS
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6x 5⅜" by 6" deep	$1.45
6x 7⅜" by 6" deep	1.95
6x14" by 6" deep	2.45
6x16½" by 6" deep	2.95
6x22" by 6" deep	2.95
9x12½" by 7" deep	3.95
9x10½" by 5½" deep	2.95

JACKS

Pacent Single Circuit	$0.35
Pacent Double Circuit	.50
Federal Single Circuit Filament Control	.35
Federal Double Circuit Filament Control	.50

HONEYCOMB COIL

1,500 Turns	$1.50	150 Turns	$0.60
1,250 Turns	1.50	100 Turns	.50
1,000 Turns	1.25	75 Turns	.40
750 Turns	1.00	50 Turns	.40
250 Turns	.75	35 and 25 Turns	.40

Rheostats	45c	Spaghetti Tubing, yard	10c
Sponge Rubber Ear Caps, Pair	50c	Lightning Arresters	95c
Dials, 2, 3 and 3½ Inch	25c	2-Slide Tuning Coils, at	$1.95
Grewol Detectors	$1.65	Phone Caps, for mostly all phones	25c
Signal Corps Super Sensitive Microphone Transmitters	$2.45	Anti-Capacity Switches	$1.50
Solid Copper Aerial Wire, 100 ft.	35c	Lightning Switches	$2.65
		Hydrometers, now at	45c

Formica Panel, ⅛" thick, black or brown, square inch . . 1½c

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, 2126 Broadway, New York
Telephone Endicott 2390

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, May 12, 1923 No. 5

Public Health Service Aids Seamen

Wide Range of Ailments Prescribed Via the Air

ONLY a year ago the U. S. Public Health Service announced that it had completed arrangements to expand the medical aid service to American seamen by prescribing by Radio for any sailor who might be taken ill at sea and to make application for aid.

The range of diseases and mishaps for which aid has been envoked during the first year has been amazing. The list includes many of the common ailments. Many of the diagnoses were made on board ship because sailors are resourceful in meeting emergencies.

When the patient grows better and the captain's apprehension is relieved the case usually drops from observation. Weeks afterwards, perhaps, the interested hospital receives direct information as to what occurred later. All in all Radio has been pushing ahead in lines little known to those who just listen in for entertainment.

High School Instruction by Air

Possibilities Suggested as a Result of Experiment

WHAT are the possibilities of the Radio in school teaching? Is it going to be feasible to select the best teachers and have them broadcast their instruction throughout the city and country? We have correspondent courses of all kinds and as impersonal as they are, since they lack contact with the instructor, they are very successful and are being extended. A Radio course now comes within the realm of a possibility.

No doubt high school examinations will be the first thing to be broadcast. It will give thousands of students the benefit of a single lecture. Just picture the superintendent of the future sitting at his office desk listening in upon the recitations or tests.

Recently as an experiment a test was made in a high school where the instructor broadcast his lesson from a broadcasting station to the class room. The officials at the Board of Education were listening in all the time. The experiment was a success.

Standardization Needed

Efficiency and Appearance Should be Considered

THE time has arrived to take stock again and to ascertain what standards are good, what standards are unsatisfactory, and what additional ones will be required to bring Radio up to date. Where potent reasons stand in the way of standardization it is well to consider the desirability of making such concessions on the part of the patent owners as may be necessary to the mutual advantage of the public, the manufacturer, and the military.

It is not necessary that the various manufacturers approve a standard in efficiency and appearance of equipment, or improvements to aid in salesmanship, but it is highly desirable that standardization be required as regards interchangeability of accessories and moving parts to a certain degree, and above all that a standard of quality be adopted so that the service will not be a laughing stock to the detriment of the trade and the interest of the nation.

Summer Reception

Slight Changes Are Needed for Summer Outfits

ALL that is said about static does not dampen the ardor for the out-of-door enthusiast who has become a Radiophan during the past winter. Indications of an active summer with the ether waves are quite evident. Information gleaned from last summer's operation of sets then available has been used to devise outfits that are far ahead of the 1922 model in scope and efficiency.

There will be a greater number of portable sets with super-regenerative characteristics. In this class fall the Armstrong and the Flewelling. These sets are compact, they admit of a certain amount of rough handling, and they do receive if properly assembled and tuned up. Furthermore, they operate on a small collapsible loop with or without ground or with neither antenna or ground. Such sets are ideal for the hobo vacationer.

Another change will be noted in the sets arranged for the permanent camp. While multi-stage amplifiers will magnify the music to an amount loud enough for dancing it is probable that these camp sets will be equipped with more phones and fewer loud speakers. Audio frequency amplifies the stray sounds more than the desired sounds, hence for purest tones the set using phones and less amplification will be preferred.

RADIO INDI-GEST

LEM STEBBINS SWOONS AS HE TUNES IN RADIOKNUT'S EPISTLE

BULLETIN

As this issue goes to press Mr. Stebbins has just regained consciousness and has been heard to murmur, "I'll bet he was kiddin.' "

By Pisces Parvum

Squedunk, Minn.—Lem Stebbins, inventor, agriculturist, postmaster and local constable, is now confined at the local Quick Service (Veterinary) Hospital suffering from a severe attack of brain fever complicated with static.

Mr. Stebbins was found on the steps of the post office last Monday morning when Judge Tibbitts called for his mail. A letter, was found clasped in his right hand and it was necessary to amputate three fingers to remove it. This letter which is believed to be the cause of the entire trouble was as follows:

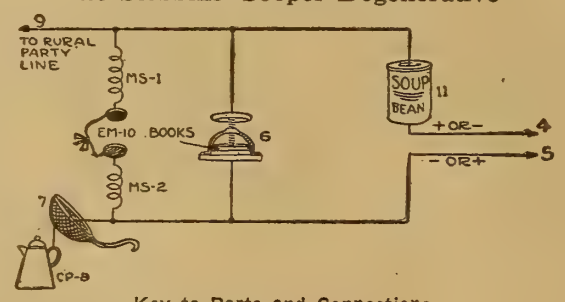
CENTRAL HOSPITAL FOR
HARMLESS INSANE
Sophopolis, Ind., 456, Padded Lane.

Mr. Stebbins:

It is with great pleasure that I take this method of letting you know that I am a thorough convert to the use of your hook-up. I rigged it up last night in my quarters and had hardly had it in operation for over five minutes until I got supper, in addition I got several other things which space and modesty forbids me to mention.

Yours radiofrantically,
Sliphen Burst.

The Stebbins' Sooper Degenerative



Key to Parts and Connections

MS-1, Marcelled coil; MS-2, Waterwave coil; 3, Nothing; 4 and 5, Connections to 110 or 1½ volt D. C. generator that has A. C. output; 6, Letter-press type condenser; 7, Strainer to keep out static and coffee; 8, Coffee pot for grounds; 9, Connection to rural party line; 10, Pair of D. C. C. ear muffs; 11, Campbell or Van Camp Sooper Detector.

(Due to Lem Stebbins' touch of static we have to disappoint you by only running the drawing of his circuit.—Indi.)

QUESTIONS AND ANSWERS

Dear Indigest: I am still in the crystal set category but ankshus to learn and seeing the letter from Alagonquin Tonsils III, in No. 3 Vol. 5, am deeply interested. Will you pleese advize if it is necessary to use a gas pipe antenna in order to receive the illicit licore from the American Rum Running League? Also where should I attach a fauset in the thing? Would it be O. K. to shunt a spigut across the phones, or does this go in the ground pipe? —Malt St., St. Louis.

A—We are at present experimenting but have not tuned in a thing. We don't think they are broadcasting but have heard rumor they intend to observe dry night Mondays. As to hook-up would suggest a bung starter (can be obtained from any local antique store) in place of the tickler coil.

Dear Indigest:—I would like to ask one question of your Q. & A. department. I have made a crystal set of the resistance tuned type also adding the Flewelling principle but I can not get my crystal to oscillate in the proper manner. Could you tell me my trouble. Yours truly, —Radio Bunk.

A.—We recommend you try the Stebbins Sooper Degenerative. Shake well before using.

Hen, You Move Us to Tears

Sir: This is to compliment you on your most excellent column, and your removal of the rest of the paper one column to the right of you. In the words of Henry Ford, "Sic Semper Tyranus, Nox Vomica, Acetanilide, FOB Detroit." Were it possible for you to put aside your humble modesty for one moment and publish my effusion, I would be excrutiatingly flattered by having my contribution accepted for the first time out of forty-two attempts.
—Henry the Ninth.

We Threw Ours Away the Night of Pagliacci

Dear Sir—Hurrah, Hurrah! They've gone an' did it themselves. We thot for a long time we would have to do it. Then we decided we would attempt pacific persuasion to tell them to do it. Finally we decided we would have to throw our set away 'cause they wouldn't do it, and now—THEY'VE DID IT! Hurrah! What's that? You don't know? The Am. Sy. of So-Called Authors, etc., have took jazz off the air. Wheeee!
—Opery Oriville.

Al's Versatile—He Can Draw 'Em Any Old Way

Dear Indigest: In Al Brown's cartoon, page 10, May 5, I see the bird has on a black vest in the first picture. In the third picture it is striped and in the last it is GRAY. Canyu beat it? —Voice of the West.

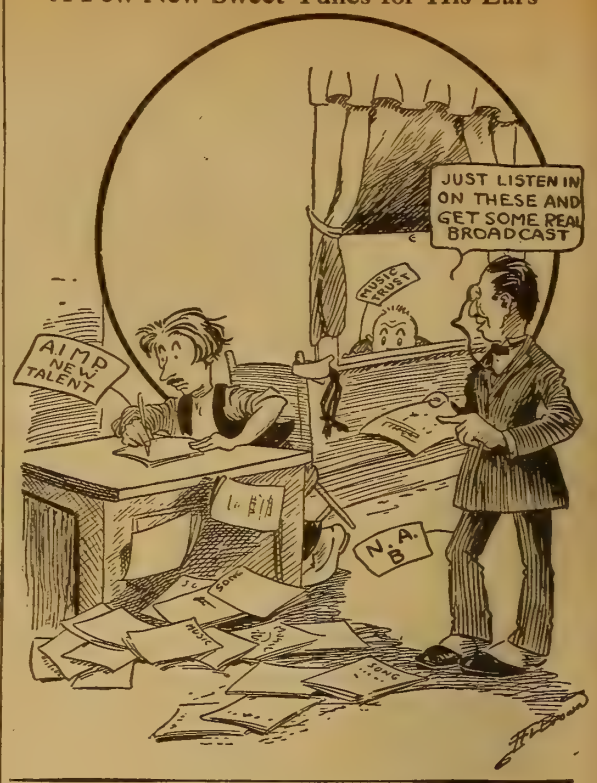
ALL PARTS COMPLETE FOR THE "SOOPER CIRCUIT"

Invented by Lem Stebbins

One Campbell Sooper detect., 1 letter press (U. S. Type), 1 pr. Ear Muffs, 1 Coffee Pot (inc. extra grounds), 1 w. w. coil, 1 marcelled coil, 1 strainer (large or small), 10 ft. pink ribbon for connecting circuit, and INDIGEST book on hook up. All Parts Complete **$19.99**

CYCLONE LOUD SPEAKER CORP.
(Of America)
11111 1st St., Benzine, Mont. (Postage Pd. West of Pacific)

A Few New Sweet Tunes for His Ears



Condensed

By DIELECTRIC

If the broadcasters adhere to the new schedule provided to eliminate much of the interference that has almost ruined Radio entertaining we should be able to pick and choose from among the many stations sending out varied programs. The results of the recent conference bid fair to boost broadcasting to a new high level and to encourage those hesitant ones to invest in a receiving set. DX fans will benefit greatly by the new ruling.

The popular movie star "Dug" Fairbanks gave permission to Station KPO in San Francisco to broadcast a complete "Robin Hood" program. "Dug" owns the rights to this play and evidently was unafraid of reducing the gate receipts by so doing. WJZ has on several occasions been used to broadcast acts of plays direct from the theaters and so far as I am able to learn the attendance at these houses was subsequently as large, if not larger, than before listeners in were invited.

We called attention to the use of Radio in detecting latent power of hearing in those supposedly mutes, and now your attention is called to the remarkable results obtained by Dr. Winslow, a New York specialist, who is accomplishing great things with the aid of Radio in restoring hearing to the partially deaf. He hopes to be able to put aside his surgical instruments and effect cures with Radio alone. More and more is the practical phase of this science emphasized.

The experiment made from station WGR in Buffalo, N. Y., whereby an airplane was directed by broadcast instructions points to a new field for using receiving sets. It proves the practical asset Radiophony may be to those engaged in flying either for pleasure or profit. Upon reaching rather high altitudes the reception was poor, but this feature is being investigated by Radio experts. Advice may be given as to location, landing conditions, etc., which would be quite a help.

We in this country have been enjoying our Radio concerts while speeding along in railway trains and the novelty of the thing has worn off to some extent. In Canada, however, the first such experience was had quite recently when the Winnipeg-Vancouver train reported hearing concerts from several States of the Union besides Canadian stations. The Canadian Pacific railway company has the honor of first successfully receiving broadcasting on board its express train.

Radio has been made a part of hospital equipment in several instances. One of the latest to be recorded is that at the Fordham Hospital in New York City. A man was brought there for an operation which permitted of administering a local anaesthetic. While the four surgeons were engrossed in their work, the patient was noticeably enjoying some jokes that came through the headset provided for his amusement. Both the operation and the Radio reception were entirely successful.

It is evident that the proposal to install receiving sets in hospitals for the entertainment of the patients, and in quarters occupied by ex-service men, is receiving increased attention. The men who fought in the World War and are now in the Boise Barracks are enjoying the use of a five hundred dollar set presented to them by the War Mothers of Idaho. Better follow suit, if you have not already done so. You will be more than repaid by the genuine appreciation shown by these men.

Another huge transmitting plant is in course of construction near Miami, Fla., which it is estimated will be the second largest in the United States. It is being built by the Tropical Radio Telegraph Company for the purpose of handling South American, Central American and West Indian business at a cost of about two hundred thousand dollars. Not so long ago there were sceptics who scoffed at the idea of Radio being used extensively for commercial purposes. How about this?

First Steps for Beginners in Radio

Chapter II—Radio Waves and Their Propagation

By Thomas W. Benson, A. M. I. R. E.

THE USUAL practise of using waves on the surface of water as an analogy in describing the action of Radio waves has nothing to recommend it but its simplicity. As a matter of fact it may lead to erroneous belief for several reasons. Radio waves travel through the mass of ether, if we may call it a mass, and not on the surface as the water analogy would indicate.

Substance in Which Radio Waves Travel

In order that the Radio waves may travel we must assume that a certain medium exists in which they may move. Since they travel freely through all known matter that is not a conductor in the usual sense of the word and pass through a vacuum where physical matter is absent we must then assume the existence of some subtle substance permeating all matter and extending to the uttermost end of space. This substance we term ether and its existence is generally accepted by science and used to explain many and varied phenomena in the fields of light and electricity.

Ether possesses great elasticity, has no inertia and exists in and around all matter. This is the medium through which the electromagnetic and electrostatic waves known as Radio waves travel.

When the ether is put under electrical stress at any point and the stress released a wave motion is created in the ether that travels in all directions in an expanding circle. This action takes place in the manner shown in Figure 3.

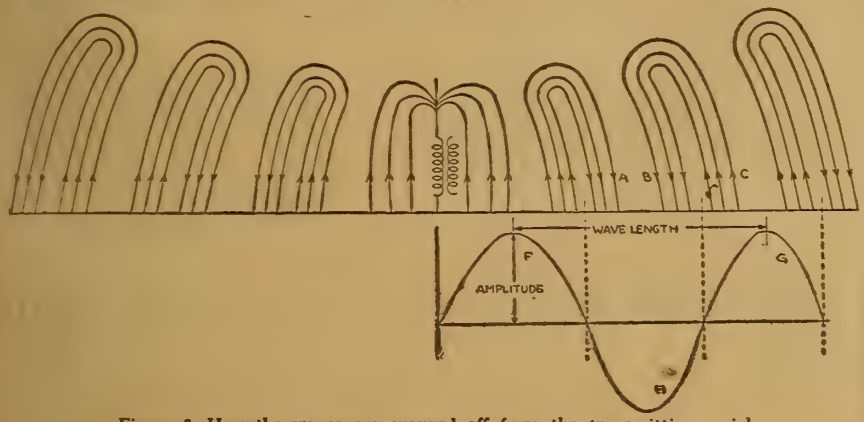


Figure 3—How the waves are snapped off from the transmitting aerial

Waves Thrown Out From Aerial

Consider the aerial as shown, coupled inductively to a primary circuit excited with a high frequency current. The aerial is then charged alternately positively and negatively. At the instant the aerial is charged positive the condition shown in the illustration exists. There is an electrostatic field extending from the elevated wires to the ground. When the polarity changes the ends of the lines of force run down the aerial and a wave is snapped off that travels in all directions away from the aerial in a constantly widening circle. It should be remembered that it is only the change in the lines of force that creates the wave. The waves increase in height as they travel, following the surface of the earth.

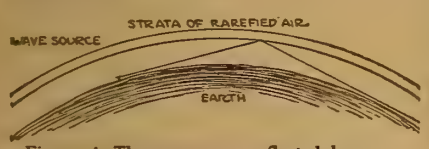


Figure 4—The waves are reflected by upper conducting strata of atmosphere

These waves travel at the speed of light, that is 185,000 miles per second and result in the ether in all directions, being put under electrical stress in a vertical direction at equal distances. This may be clearer by observing the arrows marked on the waves. At A the stress is down, at B up, C down and so on. We can represent this stress by a curve as shown below where F and G may represent positive halves and H negative halves of the waves. When undamped waves are emitted the intensity of the electrical strain in each succeeding waves is the same, hence the amplitude is constant.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:

Chapter III—Pointers about Aerials and Grounds.
Chapter IV—About Condensers and Inductances.
Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

The Wave Length

The wave length of the wave is that distance between points where the strain is in the same direction. The wave length is then equal to the distance between humps in the wave as shown.

Bearing this in mind it is evident that the closer the waves are the shorter the wave length. Since the speed of the wave is constant they follow each other closer as the frequency of the exciting current increases. This should clearly demonstrate the relation between frequency and wave length. For instance, where a station is transmitting on a 400 meter wave length, and knowing that the waves travel with the speed of light being 300,000,000 meters per second, we can readily realize at the end of one second the first wave would have traveled that distance and the waves between would be spaced 400 meters apart. Since one wave is emitted per cycle the frequency of the exciting circuit is equal to the total distance 300,000,000 meters divided by 400 meters or 750,000 cycles per second. Conversely, the wave length can be determined by dividing the frequency in cycles per second into the distance traveled by a wave in one second.

Magnetic Field of the Wave

In addition to the electrostatic strain or rather because of it there is a magnetic field in each wave parallel to the surface of the earth. This magnetic field is equal to and identical with the electrostatic field and one cannot be emitted without the other.

As the waves travel over the surface of the earth there are several conditions acting to hinder and others to assist in their propagation. The ideal medium for their transference would be a perfect insulator for there would then be no absorption. However, they must pass through the air, and as this substance is not always a perfect insulator, due to the presence of moisture and dust which act to absorb some of the energy and dissipate it in heat, it weakens the wave. On the other hand the propagation is assisted by having a good conductor as a guide, which is naturally the earth.

Where the conductivity of the earth is low the waves are also hindered and energy absorbed in overcoming this resistance. This accounts for the fact that the range of a given set is much greater over water than land. Furthermore the upper strata of the atmosphere are much rarified and hence more conducting than the denser air near the earth's surface.

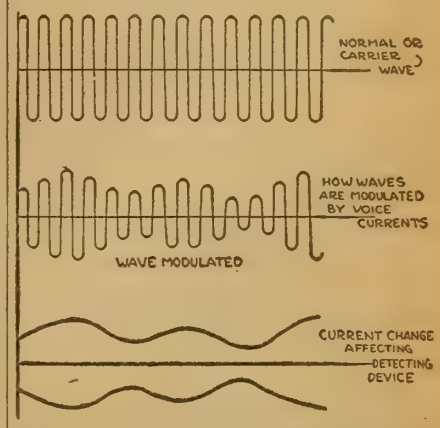


Figure 5—Current changes affecting the detecting Device

(Continued on page 16)

CARTER RESISTANCE UNIT

By placing this Resistance Unit in the Rheostat circuit, regular 6 ohm Rheostats will properly operate the new No. 201-A and No. 199 Tubes.

Each
Code No. 15-A, 15 ohm, for No. 201-A Tube..50c
Code No. 25-A, 25 ohm, for No. 199 Tube....50c
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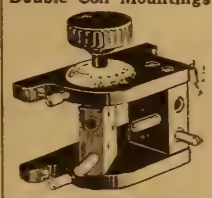
ADJUSTABLE COIL MOUNTINGS FOR FLEWELLING CIRCUIT

Triple Coil Mounting.....$5.00 List
Double Coil Mountings..... 3.50 List



A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in.

Licensed under U. S. De Forest Pat. 1365170

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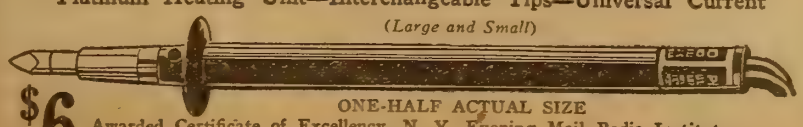

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GRAND RAPIDS, MICHIGAN

Single Circuit Receiver Easily Tuned

Local Broadcasters Cut Out by Simple Receiver

Most Radio men regard the single circuit receiver as being very inefficient. I have given both the single and the three-circuit hook-up to men who were building their first tube set, and found that the single circuit was best for the beginner, because of the ease in tuning. The signal strength of a single circuit set is greater than a three-circuit set.

Now then we will come to the part that gives us the trouble. After the Radiophan has the single circuit set in operation for some time he finds that he is bothered with local interference, or in other words when a local broadcasting station is going he cannot hear the distant stations.

The usual way to direct him is to buy two variometers and change his set to a three-circuit tuner. This circuit is more or less complicated to operate and does not give the same results at first that the single circuit set did, and our friend thinks he has been fooled.

I have had this very thing put up to me ever since broadcasting began and I have found a solution to this problem. With the parts as given in the material list a single circuit set can be built that will be found very selective.

MATERIAL LIST
1 Moulded variometer
1 23-Plate vernier condenser
1 3-Plate variable condenser
1 Rheostat
1 Tube socket
1 Variable grid condenser
8 Binding posts
1 6x12x3/16 Inch formica panel

By referring to the hook-up you will note that the variometer has been disconnected so that the stator windings can be used independent of the rotary windings. The stationary winding forms the main inductance and the rotary winding forms the tickler or feed-back inductance.

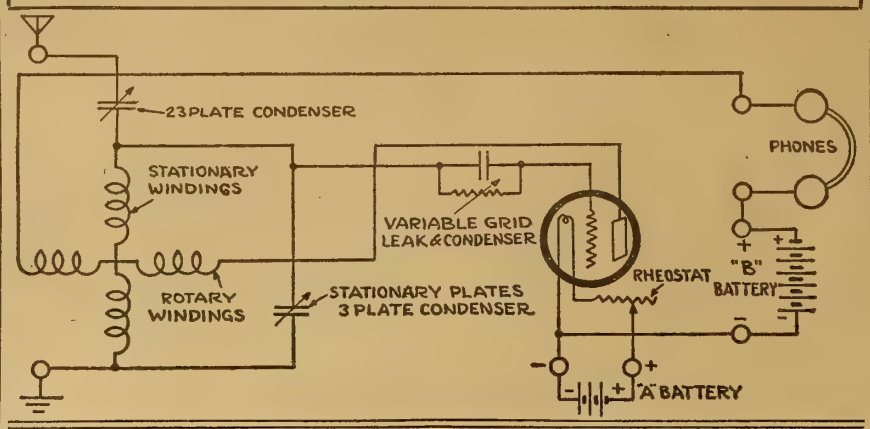
The ordinary single circuit hook-up is used except that the 3-plate condenser is connected across the main inductance. The aerial binding post should be connected to the stationary plates of the variable condenser to reduce the capacity effect. If this is done and the variometer is a good moulded one it will not be necessary to shield the panel.

Another important item is the variable grid leak. Be sure and use a good one.

In operating this set tune in some distant station and adjust the B battery and the grid leak until the best results are obtained. After this is done it is only necessary to tune the variable condensers and the variometer, and the grid leak will not need adjustment in tuning, if the music you are listening to does not sound just right tune in another station and see if they are not better, sometimes the trouble is in the broadcasting station and you will only get your set out of adjustment by trying to clear them up.

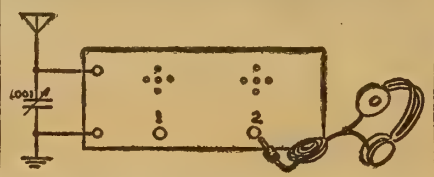
If these directions are followed out carefully you will find this a wonderful set, so be sure and read the article carefully before building the set.—John H. Boos, Jr., St. Louis, Mo.

SPLIT VARIOMETER IN CIRCUIT



Simple Long Wave Set

In the illustration is shown how to make connections in an aerial system for receiving long wave signals. With this hook-up I can plainly hear NSS. The diagram is self-explanatory.—Fritz Franke, Chicago, Ill.



The Idle Battery

Storage batteries which are to stand idle for a month or two should be fully charged before being put away. If the battery is permitted to stand for any length of time in a discharged condition, the plates will become white, an indication that sulphate is forming, which is very harmful to the cells.

Care of Storage Battery

The following pointers will be helpful in keeping your A battery in proper condition: Do not allow the battery to become completely discharged. Always maintain the level of the electrolite (acid and water) above the tops of the plates, usually ¼ inch. Keep the battery well charged at all times, as it is difficult to revive a dead battery which has been standing idle for a long time.

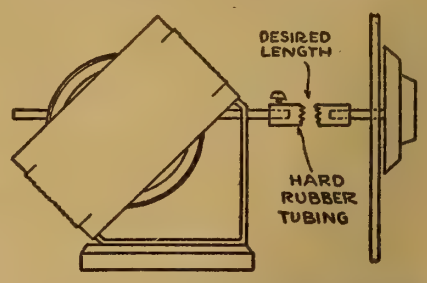
Do not allow the electrolite to bubble over on to the tops of the cells. If this happens, reduce the charging rate. Keep the top clean to avoid leakage loss.

Determine the gravity range of your particular battery and keep it within proper limits by frequent tests with a hydrometer.

Rubber Tube in Shaft Shields Variometer

In your March 31st issue under the Question and Answer department you informed Number (2150) HCH, Charleston, W. Va., that there was no practical means of reducing body capacity except by shielding the panel of the receiving set. The accompanying sketch shows the methods employed to eliminate body capacity.

The condenser and coupler are set back



from the panel and the shafts are made short with a piece of hard rubber tubing connecting them.—Judson C. Sullivan, Akron, Ohio.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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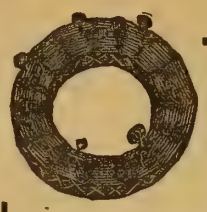

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EVERY PART COMPLETE

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Two-Stage Radio Frequency Amplifier—Parts complete in every detail for this Circuit—$11.00.

CONDENSERS

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REINARTZ CIRCUIT EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1-13-plate .00025 MFD. variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM and complete instructions..... $10.00

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Four years of careful attention to the details of manufacture of this type of inductance unit has yielded a product of unquestioned superiority. And with increased efficiency in manufacturing methods, moderate prices prevail for all sizes

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Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

R.F. Added to Flewelling Receiver

Two Steps Gives Better Control Over Flivver

Two stages of Radio frequency added to the Flewelling circuit adds greatly to the reception. The accompanying diagram shows the connections. I am using a 23-plate variable condenser in the antenna circuit. The coil has fifty turns of No. 20 double cotton covered wire, tapped at every fifth turn. The potentiometers are 200 ohms each.

Radio frequency is better than audio frequency because it is not so noisy. It gives better control on the Flewelling set. I found that the filament is very critical. I am using 201A tubes, but find that 201, or even WD-11 works about the same. I am only using 201A for battery economy sake.

I would like to try this on two stages of audio frequency, but I am not sure my phones will stand the high signals. I have tried it with one stage of audio frequency and all the phones will do is to rattle.

I found that using the Radio frequency that I can tune in waves that could be just heard on the Flewelling set. I believe that by using this combination and two stages of audio frequency and having a set of phones that will stand the high strain it would be superior to any set or hook-up that has ever been made.—Joe Stickler, Mt. Carmel, Ill.

Laying Out the Set

First decide definitely what kind of set is to be built. Purchase the best quality of apparatus, having the electrical characteristics that the particular set requires. Take special care to select parts of good mechanical construction as well.

Lay the instruments on the table, trying different arrangements of the parts until an arrangement is found with symmetrical appearance, and with as short wires to the tuning, grid and plate circuits as can be secured.

When the proper layout is found, a scale laid alongside of the parts will give an approximate idea of the size panel it will be necessary to buy. Try to arrange the parts to fit a standard size panel, which may be purchased at almost any Radio store.

Particular care should be taken in the wiring of the set to keep grid and plate wires separate and away from the filament wires. This will reduce the liability of squealing and broad tuning to a minimum.

The filament circuit may be of almost any length, provided the wires that carry the current are large enough to prevent an excessive drop in voltage. Number 14, or the square bus wire sold for wiring sets, is very good for this purpose.

The output circuit of a two-stage amplifier should never be brought near to the grid circuit of the detector tube, as howling almost inevitably results. More cases of howling amplifiers can be traced to improper placing of the wires than to any other one cause.

In wiring a set don't try to do too many things at once. Start at the input end and work across to the output end. When connecting a set with vacuum tubes, connect the filament wires to the sockets and rheostats first, and then follow from input to output circuits.

A grounded copper sheet on the back of the panel where the condenser or variometer is mounted is of considerable value both as a shield against the effects of the operator's hands when tuning, and as a convenient place to solder such wires as need to be grounded. Especial care should be taken to cut out around all screw and shaft holes, or any other places where the metal parts of condensers or other instruments may touch the shield.

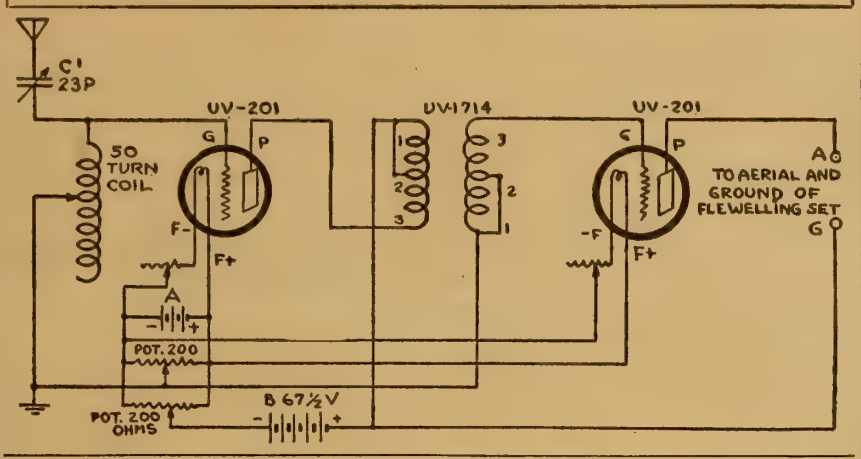
Inside Antennae

Remarks about excellent quality of indoor aerials with crystal sets are as frequent as comments upon their efficiency. This difference is, of course, due to the conditions under which the aerials were operated. As a rule, indoor aerials are unsuccessful on the first floor of a building or where surrounding high structures may intercept the waves before they strike the antenna. In suburban locations or in elevated sections of the city considerably better results may be obtained.

Length of Aerial

When the aerial is too long (over 150 feet), wave lengths may be reduced to a better value by putting in a variable condenser in series. For the aerial that is too short (under 75 feet), it is advised to put in either a variable condenser across the antenna inductance, or a loading inductance in series with the antenna to boost the wave length to a higher value.

HOOK-UP FOR TWO R. F. STAGE



Door bell wiring often furnishes an excellent antenna for a crystal set, although where a bell-ringing transformer is used the results are not so good. Both terminals of the bell should be tested to obtain the best side of the line.

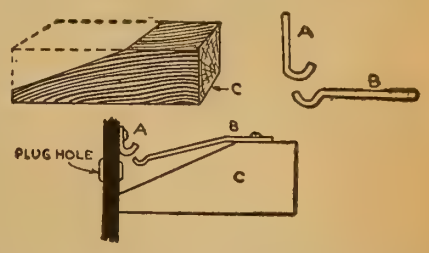
Voltage of Storage Batteries

Storage batteries, immediately after being charged, have a slightly higher voltage than that which they are rated. Care should be observed in using vacuum tubes when batteries are in this condition. It is best to allow the battery to stand for a time after being charged.

Open Circuit Jack Made From Wood and Copper

I find that a very good open circuit jack can be made as follows: A block of wood ¾ inch square and 3¾ inches long is cut as shown at C. Procure two small pieces of copper and cut one of them ¼ by ¾ inch and the other ⅜ by 1 inch. Bend the first piece as shown at A and the second one as at B. A hole large enough to allow the plug to pass through it is bored in the panel exactly in front of the place where the block of wood is to be nailed.

The strip of copper A is screwed against the panel above the hole so that when the



plug is pushed in it will make a good contact. The strip B is also screwed in place on the block so that the tip of the plug is connected to it. The block is now fastened in place and the jack is completed.—Jesse T. Bonney, Franklin, Va.

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This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.
My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.
Either set is easy to build, easy to operate. Everything clearly shown.
These high quality silk insulated coils are machine wound on fiber forms. I wind coils to your specifications in lots of 100 or more. Write for prices.
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Reinartz Coils $0.98
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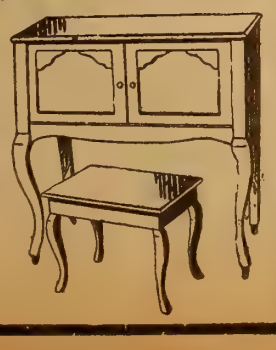

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Regal 43 pl. .001 mfd. Cap	2.65
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Dubilier condensers, all types and capacities including Variadons, in stock	Special Price
American Bell 43 pl. with Vernier	5.50
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Regal (High quality 6 ohm)	.85
Klosner Vernier	.75
Paragon Standard	1.05
Framingham	.70
Bradleystats	1.85
Roberts (6 ohm standard)	.70
General Radio (Any and all resistances)	Special Pr.
Radio Corp.	Special Pr.
Fada	Special Pr.
POTENTIOMETERS:	
Radio Corp. PR 536 (200 ohm)	Special Pr.
General Radio (400 ohm)	Special Pr.
Atwater-Kent	Special Pr.
Framingham (200 ohm)	1.10
Paragon (200 ohm)	1.60
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TRANSFORMERS (Radio Freq.):	
Tricoil (of Subway Reception fame)	1.50
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Murad T-11 (Old standard)	3.80
Radio Corp. UV 1714	Special Pr.

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Kesco 3½-in. Moulded	$0.30
Kesco 3-in. Moulded	.25
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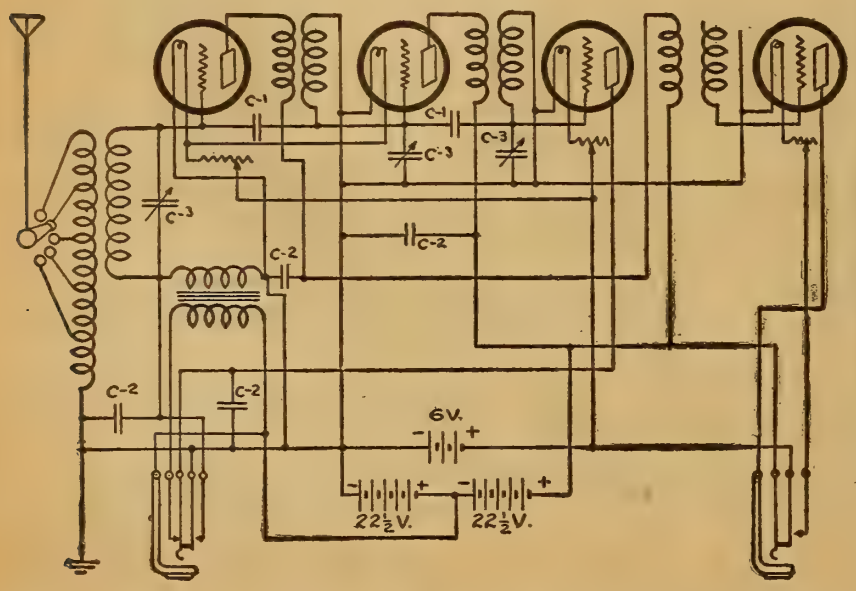
What Now of the Hazeltine Neutrodyne Circuit?

Latest Addition to Hook-Up Family Presents Possibilities

By H. J. Marx

THE latest development in Radio is the popular craze for new circuits. The rankest amateur plays with his apparatus, hooks it up in a slightly different way, hears a station and promptly advertizes that he is the inventor of a new circuit. The Radio publications, hard pressed by a clamoring rank of fans for new stuff, promptly fall and announce that they are going to feature another new wonder circuit.

The question of the practicability of these new circuits can only be decided through an actual set-up of the apparatus and a test of operation. Considering the number of these new wonder circuits, the reader can readily conceive the fact that it is not an inexpensive proposition. In doing this, though, the real worth of the circuit is soon disclosed. The simplicity or difficulty of the hook-up becomes apparent.



There are many circuits that are unusually good and efficient, but perhaps are much too complicated for the average fan to construct; then, too, they are difficult to operate. Sometimes the difficulty may not necessarily be one of construction but rather a question of theoretical balance of the circuits. This last factor is one that the greatest percentage of fans will find it extremely difficult to overcome.

One of the new circuits that is effected by this last factor is the Hazeltine Neutrodyne. The word "circuits" is used but actually it is a misnomer. The Hazeltine Neutrodyne is not a circuit but rather a method of overcoming, through neutralization, the various capacities in the coupling from tube to tube of any multi-tube receiving set.

Theory of Neutralization

Every amateur knows that the internal capacity, due to the condenser action between turns in the windings of any tuning unit, should be kept as low as possible. Because of this, the peculiar method of winding honeycomb coils was developed and in like manner lattice and spider web coils were placed on the market. This same condition holds true of transformers and even in vacuum tubes, between the three elements because of the dielectric value of the vacuum in the bulb. Even the wiring of the set creates capacity reactions if closely spaced. The actual microfarad value of this capacity effect may be small, but its ultimate effect on the operative efficiency of a receiving circuit is very important.

Professor Hazeltine discovered a method of fighting fire with fire—namely, of applying an external capacity to the circuit from tube to tube which offsets or neutralizes the internal capacity of the coupling. The values of these neutralizing capacities are so small that they are expressed in units of micro-microfarads. And one million micro-microfarads make one microfarad. Expressed in microfarads the value of the neutralizing capacity runs from .000001 to .00001 microfarad.

It is in this respect that the writer feels that the application of this principle to the average receiving set is a little beyond the ability of the average Radio fan.

The best method of obtaining such low capacity values is by connecting two or more very small condensers in series, then the capacity value of the series becomes—

$$C = \frac{1}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}}$$ (depending on the number in series)

Because of the low value necessary the adjustment becomes exceptionally difficult unless the proper equipment, methods and facilities are available. As a manufacturing proposition, with testing equipment available, it is a simple matter, but rare is the amateur that can boast of all this.

The method used in manufacturing the Neutrodyne condensers is illustrated in the small insert. There is a small composition tubing of good dielectric value into which there is inserted copper wire at each end—the thickness will be about No. 8 gauge. Over the tube is slipped a

copper sleeve. There is then a condenser capacity between the tube and the wire at each end, but since the wires are not touching or connected, the whole is equivalent to two condensers in series. By pushing the wires in or pulling them further out, a very minute control of a low capacity value is obtained. After the proper value has been reached the wires are held in position and the hole unit sealed. In other words, a permanent variable is not necessary.

A Neutrodyne Hook-up

In the hook-up is given a circuit in which the neutrodyne system has been incorporated. The two condensers marked C-1 are the neutrodynes, the adjustment of which will be detailed later. The circuit consists of two stages of Radio frequency amplification, tube detector and two stages of audio frequency amplification, one of which is reflexed to the first Radio frequency tube. The second stage of audio uses a separate tube, making four tubes in all.

Condensers C-2 should have a capacity of .001 to .002 mfd. Condensers C-3 are variable, with a capacity of .0005 mfd. One rheostat is used for the two Radio frequency tubes, one for the detector and one for the separate audio frequency tube. Depending on the type of tubes used, the plate voltage may require changing.

Adjusting the Neutralizing Capacity

The set is completely set up and tuned in for reception. In adjusting the first neutralizing condenser the wire to the filament terminal of the socket of the second tube is disconnected. This shuts out the filament current of that tube without removing it from the socket. There will still be sufficient capacity coupling to pass signals through and reception will be heard in the receivers. The first condenser is then adjusted until this reception in the receivers is completely shut off. In this way the capacity coupling has been completely neutralized. The filament wire is connected and the same way is followed for the second condenser and the third tube. After the adjustments are completed these condensers are sealed and should not be further adjusted. But any alteration in the coupling apparatus nullifies the action of the neutralizing condensers. The internal capacity of vacuum tubes of the same type does not vary to any great extent and does not necessarily require new adjustment of the neutrodyne when a tube is changed. A change in the type of tube will, however.

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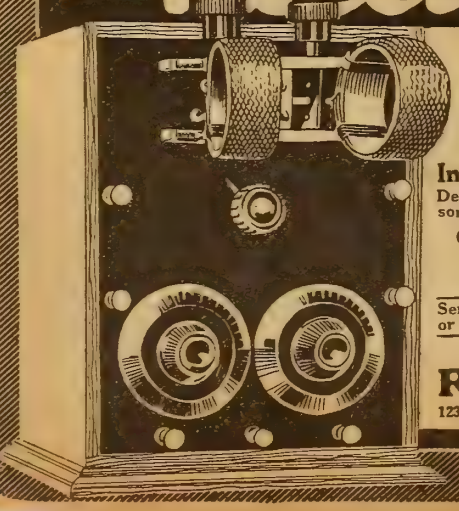

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How to Make One Condenser Flivver Super Set

Part II—Construction of Variocoupler

By E. T. Flewelling

IN OUR last article we began a description of how to build the new one condenser Flewelling super set, and started the details of the tuning inductance and tickler coil. Before going on with the constructional details I believe that it would be a very good idea to show some of the advantages that might be expected from the construction of this receiver.

Securing the Best Reception

We are going to describe how to secure the most from the set, and because of the construction we will find ourselves in possession of really two sets instead of one and can then take our choice of the one that we like best, or of the one that best suits our local conditions. Really, what we will describe will be this—a single circuit straight regenerative receiver and the Flewelling super receiver, and we will be able to change from one to the other as we wish, simply by moving one switch, and possibly a slight adjustment of the grid leak.

Such a receiver is wonderfully adapted to local conditions of any kind and will enable one to receive broadcasting of some kind, no matter where one may be located, whether in the woods, an apartment, or an automobile, and too, the builder may be confident of securing very much greater volume than is obtained with a one-tube set, reports of loud speaker operation on local stations are very common.

To builders of this set, the writer promises that he will use every possible effort to describe it, that the most may be obtained from it and it may not be amiss to say here that he uses such a set himself in preference to any other, and that aside from any personal feeling in the matter.

Panel Mounted Apparatus

In this series we are going to use panel mounted apparatus with coils, etc., in the rear, so that if it is desired the completed set may be put into a suitable cabinet. A great many persons do not like outside mounted coils and for this reason we began our description of the set by describing how one might build his own self-contained tuning inductance and tickler coil for mounting in the rear of the panel.

This inductance is of the tapped type so that one may choose the required number of turns and therefore differs from the honeycomb coils that were called for in previous articles. Honeycomb coils are very suitable for the circuit, but because of the difficulty of mounting them on the rear of the panel and because of so many who wish to build their own coil and set together with the difficulty that some have in choosing the right size coil to match up with the antenna used, we will use the good old reliable tapped inductance for this particular set.

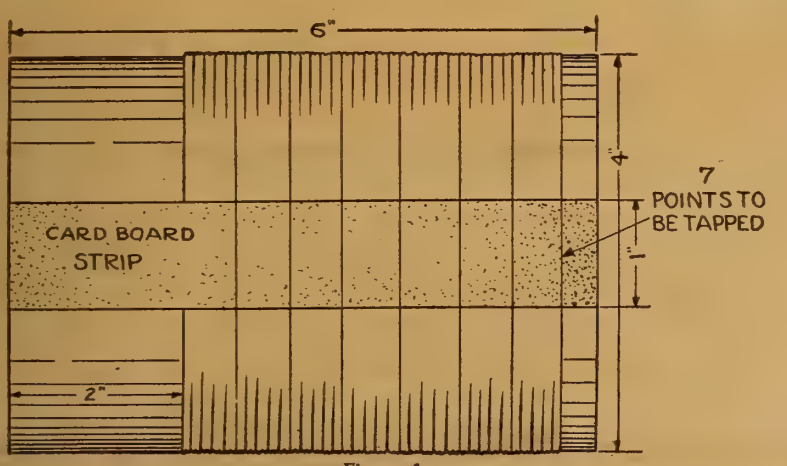

Figure 1

The tuning inductance described in our last article, if wound on the 4-inch tubing that was specified, would have a wave length range of about 300 to 600 meters on the average antenna.

Last week some of the broadcasting stations were re-assigned wave lengths that went as low as 225 meters and in order to reach this point it will be best if taps are taken off of the coil at the 30 and 40 turn points. That will give us the following for the completed coil: 130 turns of No. 22 or No. 24 double-covered wire wound on a cardboard or bakelite tube 4 inches in diameter, with taps taken off at the following points: 30, 40, 50, 75, 100, 115, 130 turns, or a total of 7 taps.

As stated before, no attempt should be made to bring out taps from separate turns. A typographical error gave the tap as 85 turns when it should have been 75 turns, which is the preferable point.

Winding on the Coil

The winding may be put on the tube without leaving any opening for the tickler shaft as sufficiently close coupling will be obtained by mounting the tickler ball at one end of the tube, as will be shown.

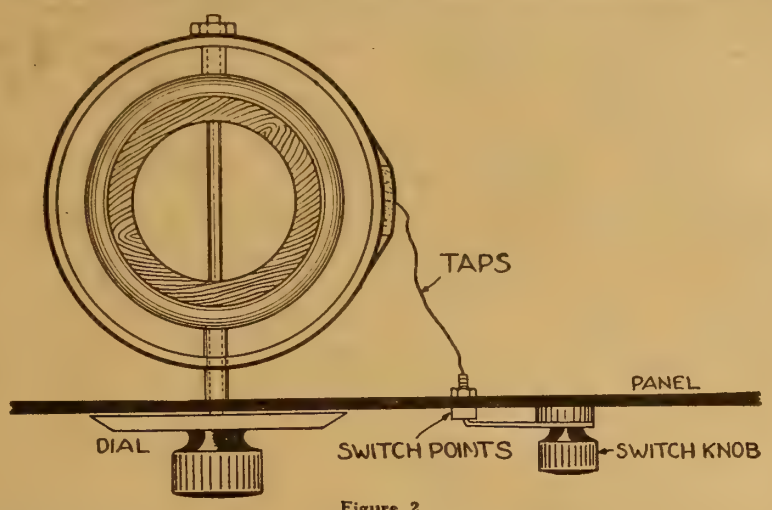

Figure 2

Perhaps the easiest way to take off the tap is to wind to the point where a tap is desired, clean off the insulation at this point for ½-inch, then lay under the bared section a piece of cardboard one inch by 6 inches long. Continue around the tube until the cardboard strip is met again, bend the strip back out of the way and continue winding until the next tap, when the strip is bent back to go under the bared section again. This gives a tight winding throughout and leaves the bare sections free from the rest of the winding so that we may solder our taps to them without interfering with the rest of the coil. The completed coil would look like the sketch, Figure 1.

Winding the Rotor

Suitable holes must be drilled into the tube for the mounting of the tickler ball and this detail will be left to the builder of the set. The holes may either be drilled through the sides of the tube or, you can if you wish, mount the ball and its shaft at the end of the tube—it is simply a matter of preference.

The ball should be large enough that it will fit the tube fairly snug and yet not interfere with it. One hundred to 125 turns of wire on the rotor ball will be

(Continued on page 18)

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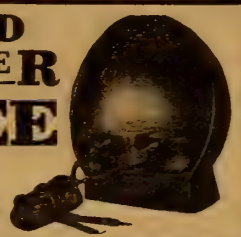

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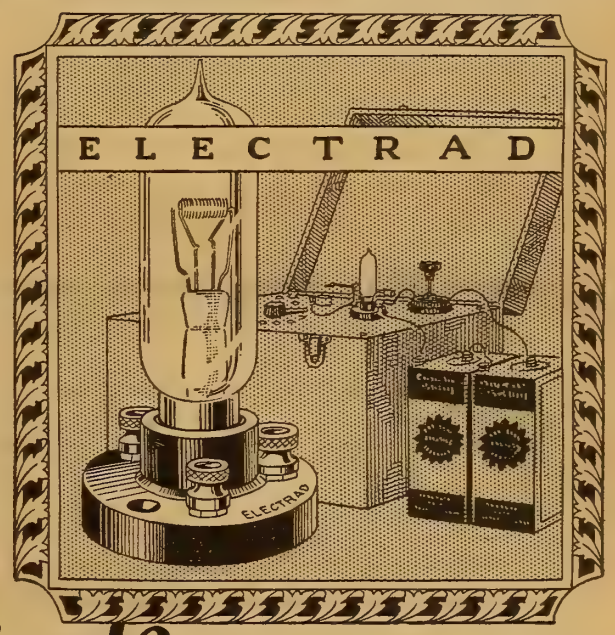

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FIRST STEPS IN RADIO

(Continued from page 11)

At night this strata of rarified air is presumably rather clearly defined and acts as a reflector to reflect the waves back to earth as shown in Figure 4. This accounts for the greater night range of Radio sets. When the sun is shining the upper layers of the atmosphere are ionized or electrified and thus made partially conducting, but since this area of conducting medium is not as clearly defined as at night more or less absorption takes place.

Local Condition Affects Reception

The above are natural conditions existing about the earth, but we have in addition local conditions that affect the reception of Radio waves. As a rule the waves follow rather closely the surface of the earth, but when mountains are reached part of their energy is absorbed resulting in the valley beyond being in a sort of wave shadow that weakens the received signals materially.

In a similar manner large conducting structures such as the metal framework of a building serve to cast shadows, figuratively speaking, that often makes reception difficult if not impossible from certain directions. The waves have no difficulty in passing through masses of matter provided they are good insulators, but when conducting masses are encountered a short circuiting effect takes place that absorbs the energy. The effect of this is to cut a sort of gap in the wave front, but the rest of the wave travels on and closes up the gap again but the total energy in the wave is reduced.

In using a loop aerial the presence of conducting masses in the neighborhood causes distortion of the wave's front and thus gives erroneous directional effects when the loop is used as a compass.

Aerial at Receiving Station

So much for the emission and propagation of the waves. Let us consider how they affect the aerial at the receiving station. In a generator we have a fixed magnetic field through which wires on the armature are rapidly moved, resulting in a current being generated in them. A similar phenomena takes place at a receiving station for Radio waves with the exception that we have a stationary conductor, the aerial, across which the Radio waves with their magnetic field sweep, thus generating a current. At the same time the electrostatic component of the wave induces a current in the aerial to assist that induced by the magnetic field. Since the electrostatic stress reverses in direction with each wave with the magnetic field being likewise reversed, an alternating current is induced in the receiving aerial.

By properly tuning the receiving aerial so that its period of oscillation is the same as the transmitting aerial each succeeding wave will add to the energy in the circuit with an increase of current value to act on the detecting device used. The two aerials are said to be then in resonance and maximum signal strength results.

Waves Modulated

We have considered a simple wave without modulation for the sake of clearness but it is necessary that the waves be modulated or changed in order to transmit signals or speech. In Continuous Wave Telegraphy this is done by simply starting and stopping the waves to form the telegraph code or to throw the transmitting aerial in and out of resonance with the receiver. The frequency of the waves at short wave lengths is too great to be audible, so it is necessary to produce beats in the receiver circuits that they may be audible but this will be covered later on.

In Radio telephony the problem is more difficult. Upon the plain wave emitted at Radio frequency is impressed the audio wave or the variations of the currents from a microphone. The voice wave modulates or clips off the tops of the emitted waves as shown in the illustration, Figure 5. Here we see the voice wave forms a sort of envelope for the waves of higher frequency. However, we cannot hear the individual carrier waves because of their high frequency, but we can detect variations in the amplitude of the waves, which takes place at audible frequencies. In this manner the sound waves affecting the microphone in the transmitting station are carried by the Radio waves and impressed upon the receiving aerial to produce intelligible speech.

(TO BE CONTINUED)

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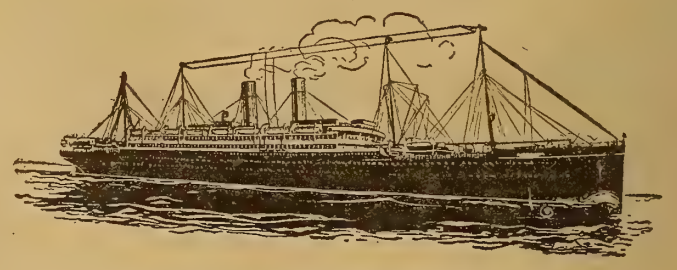

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Making a Three Tube Reflex De Luxe Receiver

Part II—Sub-Panel Layout

By H. J. Marx

NOT only the present but also the prospective popularity of reflex circuits is indicated by the considerable amount of interest that is being shown by Radiophans in the different types of these circuits. Many are the questions that are asked relative to the efficiency of operation and results that can be anticipated. Details are being requested of the many variations that are possible.

Two Classes of Circuits

For review, there are two classes of reflex circuits, one of which covers that form of circuit where each stage of audio frequency is reflexed through the tubes in the same order as the Radio frequency, called the straight reflex, and the other where the audio frequency passes through the tubes in reverse order of the Radio frequency stages, known as the inverse reflex.

A further sub-division can be made on the basis of the types of intertube coupling, such as transformer, resistance, tuned impedance, etc. Of these the transformer coupling has received the most attention. Other types of coupling show promising indications but have not been fully developed for maximum results. One fan asks for an analysis of the Neutrodyne Reflex—this is not a special form of reflex, but rather an application of a method of neutralizing intertube coupling capacity effects. As this will be taken up in an article on the subject no details will be given at this time.

Efficiency of the Reflex

A typical question asked, is "What can one expect from an average working reflex?" Unfortunately a satisfactory answer is very difficult, not because the operation of reflex circuits is unreliable, but on account of variations found in the efficiency of all apparatus used in Radio. For example, as has been stated before, the efficiency of a reflex circuit depends to a great degree on the vacuum tubes and how the coupling methods match up with the characteristics of the tubes. As an illustration, the impedance value of the average peanut tube is such that it will not operate satisfactorily with the average transformer. Therefore in a reflex circuit this handicap is increased because of the necessary relation of the two transformers to the tube. Then again, even a poor circuit will, in some places, give good results, while in other places, big cities for example, even the best of circuits will often refuse to do anything but the ordinary class of reception. One man may have a wonderfully efficient aerial while the other fellow with a similar set gets nothing on account of a poor antenna. Some fans have the knack of wiring a set up right without inductive reactions between leads which always furnish a fine variety of howls and squeals. Who then can figure what can be expected?

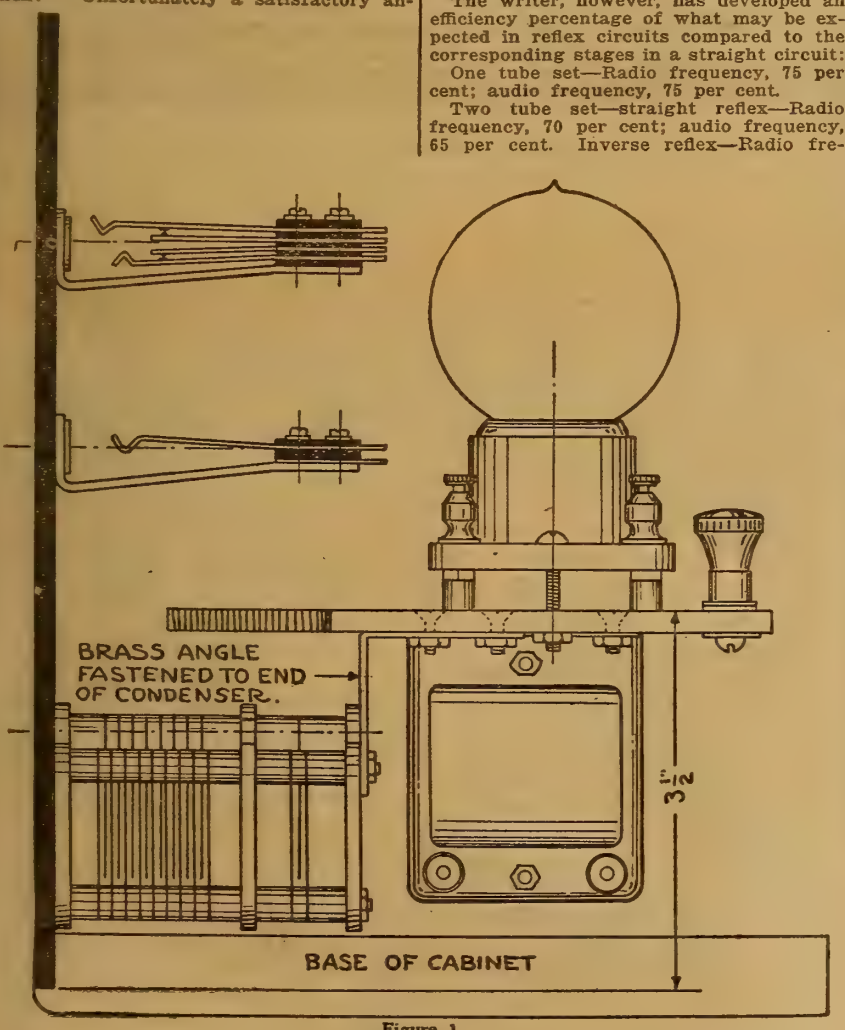

Figure 1

What May be Expected in Reflex Circuits

The writer, however, has developed an efficiency percentage of what may be expected in reflex circuits compared to the corresponding stages in a straight circuit:

One tube set—Radio frequency, 75 per cent; audio frequency, 75 per cent.

Two tube set—straight reflex—Radio frequency, 70 per cent; audio frequency, 65 per cent. Inverse reflex—Radio frequency, 75 per cent; audio frequency, 75 per cent.

The use of a crystal detector may decrease the volume that may be expected from the detector stage, provided a tube were used, but it makes up for it in the simplicity of operation and clearness of the reception. The crystal volume then may be considered as 80 per cent of that of the tube.

Applying these rules to the Reflex De Luxe the relative efficiency should be that of a good five tube set. Theoretically this hook-up is equivalent to two stages of Radio frequency, detector and three of audio frequency—the summation of the efficiency values gives a relative value of 80 per cent on the whole or equivalent to about five tubes. This has been substantiated by the results obtained with this set. Naturally the various factors effecting the efficiency of all circuits may alter these values considerably.

The Sub-Panel

Since no baseboard was used, it was found necessary to assemble all apparatus on the main panel. This was finally accomplished by means of a sub-panel that was mounted on the ends of the variable condensers by means of brass angles as shown in Figure 1. Four of these angles were used, two each on each condenser on the right and left side of the main panel. Depending on the condenser construction, this mounting method connects the brass angles in direct electrical circuit

(Continued on page 18)

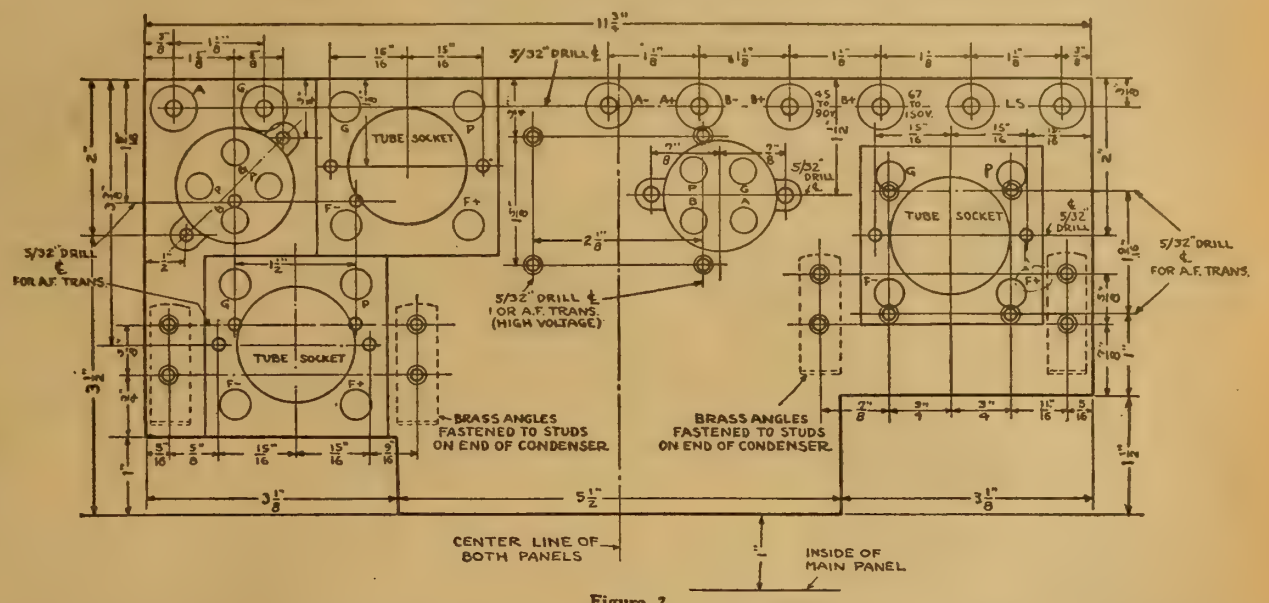

Figure 2

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1/8"	THICK	1½¢	PER SQ. INCH
3/16"	THICK	2¢	PER SQ. INCH
1/4"	THICK	2½¢	PER SQ. INCH
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THREE TUBE REFLEX

(Continued from page 17)

to the fixed plates of the variable condensers. For this reason care should be taken that neither the angles or the brass screws for mounting come in contact with any of the apparatus or wiring, this creating a short circuit. If the holes for the mounting screws are sufficiently countersunk in the sub-panel they will not come in contact with any of the apparatus mounted on the top of the panel.

Sub-Panel Layout

The layout of the sub-panel is shown in Figure 2. It will be noted that the two Radio frequency or reflex transformers are mounted on top with the three tube sockets and the binding posts. The three audio frequency transformers were suspended from the underside of the panel. The center transformer was found long enough to rest on the base of the cabinet when the panel was in place and thus acts as an additional support for the sub-panel.

All holes for mounting suspended apparatus were countersunk sufficiently so that the heads of the screws for mounting were at least $\frac{1}{8}$-inch below the surface of the panel.

It might be well to suggest that a number of holes about $\frac{1}{4}$-inch in diameter should be drilled in this sub-panel before any mounting is done. These are for passing through the leads for connections between the upper and lower instruments. It will probably be necessary to drill some after the apparatus is in place but some trouble will be saved.

In the next part of this series the details of wiring will be taken up.

(TO BE CONTINUED)

FLIVVER SUPER SET

(Continued from page 15)

found suitable and no absolute number is given because it is not critical and will vary with the ball used and the size of wire, and No. 28 or 30 wire will be found very good. Do not attempt to put as many turns of wire on the ball as you can because you will only defeat your purpose.

We have simply described the ordinary variocoupler with more than the usual number of turns on the rotor and so one can, if they desire, use a standard variocoupler and rewind the rotor ball to meet the requirements of this receiver, that is to the 100 to 125 turns. If more than this number of turns are used, one will encounter trouble when using the set as a straight regenerative set.

The shaft for the rotor should be in such relation to the taps on the tube that when it is mounted on the panel the taps will be on the side of the tube and not on the back or front in relation to the panel. This point is shown in Figure 2. This results in increased efficiency of the set because of the short taps that it allows us to make.

Connections Should be Short

This point brings us to a very important thing to be considered when any kind of a Radio receiver is being built or designed. That is the very great importance of making all of the connections in the set as short as we possibly can. If we remember this point and do our best to carry it out in our set it will result in our having a receiver that not only looks good and works good, but one in which it is very easy to follow connections, and it will often be found that this last is no small consideration being of especial value in amplifier circuits.

In order that we may start to assemble this set we will take up in our next article the layout of the panel, and why; and I believe that the why of panel layouts will show several things of interest to some of us.

(TO BE CONTINUED)

Stops Singing Noise

If there is a continual singing noise when the amplifiers are used it is caused by the tubes or amplifing transformers being too close together. If available space is limited place the transformers at right angles. It is not advisable to use more than two stages of audio frequency amplification.

At least 50 per cent of the efficiency of a receiving set depends on the skill of the operator who is tuning it.

The Reader's View

Flewelling Set

Just finished a Flewelling set with no other information or directions than that published by your valuable paper and say boy! she sure puts the old crystal set in the shade on the north hill side.

Everything but the WD 11 tube is homemade, including variable Vernier condenser, honeycomb coils and B battery.

Hale Brothers, KPO, of San Francisco are now broadcasting and it sounds just like it was in the same room. Calgary, Alberta and Kansas City (Sweeney Auto School) and Ft. Worth come in like a house-afire and the Portland Oregonian Hoot Owls need a muffler to hold the volume down so that they can be heard. The Los Angeles Examiner comes in splendid and occasionally Denver.

Am going to assemble the set on a panel and expect to get some real good results then.

There has been a good deal of criticism of the Flewelling in Spokane but that's the builders' fault, not Flewelling's.

Well, I must sign off but want to tell you want the Radio Digest is the best and most up-to-date literature on the art of Radio communication seen in these parts. Good luck to you. I'd sooner miss my meals than the Radio Digest.—Carl Raney, Spokane, Wash.

Advance Programs

Permit me to congratulate you on the innovation in this week's issue—"Advance Broadcast Programs"—that alone is worth more than your subscription price warrants and will be of inestimable benefit to all "phones."—F. W. Sykes, Chicago, Illinois.

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$5.00 Variocoupler, 180°	2.25	$1.00 Freshman Var. Leak & Cond.	.75
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$1.00 Phonograph attach single	.50	$5.00 Elect. soldering Iron	3.75
$6.50 1½ Volt Tubes Guar.	3.95	$5.00 Detector Tube Guaran.	3.50
.50 W.D.11 Bakelite Socket	.35	$6.50 Amplifier tube, Guaran.	3.95

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Questions and Answers

The Radio Digest Q. & A. Department does not consider it ethical to divulge circuits of manufactured sets. We request that all such inquiries be mailed to the manufacturers.

Bugbear of Body Capacity

(2427) ARM, Chicago, Ill.

Tell me how to get rid of body capacity in the Flewelling set. It is something awful. I have shielded the panel and grounded the shield and, while I get some relief, it is still bad.

While sitting at the instrument things go along well. If I get up on my feet the music is gone and it takes about one minute while standing before it comes in full tone again or if I split my head piece and give one of the phones to my wife I retaining the head piece, it deadens the sound the moment she handles it.

Why can't I get out-of-town signals? I can only use 21 to 45 volts on the plate, more than that seems to deaden the sound. I am using a peanut tube and I notice one newspaper says as a detector use only 20 and one or two amplifying stages use not more than 45 volts. Why? Will it kill the tube or shorten its life?

Can I use 20 volts on detector and 45 volts on a one or two step and will I get better results?

I cannot receive unless I use antenna. My antenna is 100 ft. two wires, 50 each, and about 50 ft. drop to second floor, or 150 ft. in all.

Please tell me about body capacity and voltage on plate using peanut tube. The newspaper says do not use in super circuit.

When it comes to going from KYW to WDAP or between any other local broadcasting outfit the Flivver can't be beat.

A.—Answering your inquiry with reference of Flewelling circuit will advise that the bugbear of body capacity effect which is so pronounced in this, as in all super-regenerative circuits, is engaging the attention of our experts towards a reduction if not a complete elimination. As soon as developments are perfected our readers will promptly be apprised of findings in the matter.

Excessive voltage will shorten the life of the tube of course, but in the case of a WD-11 tube that would mean about one hundred and fifty volts. You can with perfect assurance use sixty-five volts on the plate of a WD-11 tube.

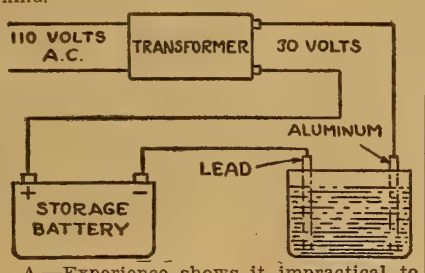
You can use 20 volts on detector and 45 on a one or two step, as suggested, although we would advise high plate potential on all tubes in the Flewelling circuit. WD-11 tubes will function satisfactorily in a super-regenerative circuit.

Your antenna construction of two 50-foot wires does not constitute 100 feet. That must be accomplished in each wire, including lead-in. A single wire of that length is an ideal antenna construction, generally speaking.

Charging Batteries

(3636) DBS, Crawfordsville, Ind.

Please tell me how to make a rectifier out of a pair of 1,000-ohm telephone ringers. I understand this can be done. If a transformer is used, please tell me what kind.



A.—Experience shows it impractical to make a rectifier from a 1,000-ohm telephone ringer. Theoretically it would work out by connecting the coils to the A. C. current and arranging contacts for the clapper to strike. In practice it will be found that the ringer will stick because the armature is too heavy to keep in step with the alternations of the A. C.

The majority of telephone ringers are tuned to work on about 40 cycles. Hence, 60-cycle current is a little too fast for them.

As a rule the electrolytic rectifier is more practical for home construction, and if not pushed too hard will prove very satisfactory.

A very good arrangement is shown in the accompanying illustration, using a transformer to step down the current to 30 volts. A simple rectifier cell can be made by placing an aluminum and a lead plate in a jar large enough to hold two quarts of water. The solution consists of four tablespoonfuls of baking soda and two tablespoonfuls of vinegar and sufficient water to nearly fill the jar. Connect the rectifier cell in series with the transformer secondary and the battery, the lead plate being connected to the negative lead of the battery. This rectifier will pass four or five amperes, depending on the size of the plates, and keep a battery well charged up. A transformer rated at from 100 to 150 watts should be employed.

Remagnetizing Phones

(2381) WG, Detroit, Mich.

I have a pair of phones of a good make but the magnets are getting very weak with resultant loss of audibility. Can you please tell me if I can remagnetize them myself and how?

A.—Answering your inquiry with reference to remagnetizing phones,—it is, in our opinion, doubtful if you could accomplish it practically. New magnets can be secured from manufacturer at a reasonable cost and they may be substituted for the present ones. This would be much the better method.

Windmill Tower Aerial

(3446) JAK, Paxton, Ill.

Is it advisable to attach a 120-foot single wire aerial to the top of a 35-foot steel windmill tower? Wire would run northeast and southwest, the southwest end running to the house. If so, how far away should the aerial proper commence? Would placing a long style insulator in the wire running from the tower to the end of the aerial do any good? Is it necessary to have both ends of the aerial the same height from the ground?

A.—Answering your several inquiries, would advise as follows: Construction of aerial from steel tower, as suggested, is all right if wire is properly insulated from the tower. The aerial proper may begin at about three feet from the tower. An incline in aerial will be all right, however; the highest end should be furthest from receiving apparatus for best results. Any standard insulator will serve effectively.

Aerial Masts

(3477) CWH, Cedar Rapids, Ia.

Kindly give me a little information through your Questions and Answers column when convenient. I have two steel masts and eight guy wires on each. None of these are insulated. Should they be insulated?

A.—Answering your inquiry, we are advising that masts used in antenna construction are not necessarily insulated unless used for a transmitting circuit.

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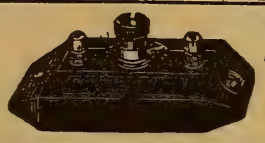
Base  Type
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Radio Illustrated

Frank Grey, an eight months' old citizen of Irvington, N. J., is one of the constant listeners of Station WOR. It really makes little difference to him just what is on the air for he had not acquainted himself with the full use of the English language when last interviewed by a Digest representative. If smiles mean anything in kiddie language Frank must be saying, in his own way, "I think J. E. K. is the berries"

"How do you do?" says Helen Flaishman, as she doffs her new Radio bonnet, made by her fifteen-year-old brother, Nathan. This ingenious young man built a Radio set in his hat, and carries an umbrella about as an aerial
© International

It took John Osborne, a well known Philadelphia business man and member of the Riders' and Drivers' Assn. to devise the horseback Radio
© P. & A.

Wouldn't you like to go canoeing with Miss Ann May, the Radio-canoeist shown at the left? Ann has her canoe all freshly painted and the aerial set and it looks like she will spend some enjoyable evenings this summer in the stream near her Los Angeles home. She said, "It is all right as long as there is only the ether waves to bother about, but when the other kind start to punctuate the music—well you have to forget the set and grab a paddle"
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MAY 21 1923

Beginner's Series; 3-Tube Reflex; Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF.

Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, MAY 19, 1923 | No. 6

RADIO FINDS RARE ORES

MOVIE STAR BROADCASTS ON COAST-TO-COAST TRAIN

Listeners In Hear Ruth Roland's Message—Shower Her with Bouquets At Stations Along Route

(See Photo Below)

LOS ANGELES, CALIF.—Ruth Roland, pretty star of the silver sheet, was heard from coast to coast when she recently broadcast from a moving train an invitation to Radiophans to attend the Motion Picture Exposition, to be held during the Monroe Doctrine Centennial at Los Angeles July 2 to August 4, inclusive.

When the Momus Special, a Southern Pacific train, sped from the train shed of the Los Angeles terminal station the huge generator on board was turned on and the Pacific coast fans heard the clear voice of Miss Roland issuing them her cordial invitation to come to Los Angeles. This was repeated from time to time, and as the huge Mogul plowed its way across the arid wastes of the great desert other fans came within range and those on the back trail lost-out.

Upon arrival at the various stations en route the train was met by throngs of enthusiastic fans who had heard the message and Miss Roland was the recipient of numerous huge bouquets and other offerings of appreciation by those who had followed her exploits of the

(Turn to page 2)

Station WDAP, Chicago, to Be Entirely Remodeled

Board of Trade to Construct New Mushroom Antenna

CHICAGO.—Board of trade members and friends of station WDAP on the Drake hotel will have an opportunity of seeing "the wheels go 'round" in a few weeks. The transmitting apparatus, which is being installed in one room, will be glass-enclosed, with a runway around the room, so that visitors may see the set in operation. Each part of apparatus will be named and its function explained on a card attached. The new antenna tower 135 feet high is built like a mushroom.

NEW INVENTION LOCATES VALUABLE MINING SITES

D. G. and Carl Chilson, Inventors, Demonstrate Device Before Board from University of Arizona

By F. J. Huntley

DOUGLAS, ARIZ.—A Radio set that promises to revolutionize the mining industry was recently given a successful demonstration before a board from the University of Arizona by the inventors, D. G. and Carl Chilson. The two brothers have been working on the instrument for the past six years and have now perfected the apparatus to where it will locate valuable sulphide ores without the slightest degree of guesswork. Further experiments and tests will be given.

In the set there are the usual triode tubes, two stages of amplification and other parts common to the regular Radio apparatus. The feature is a coil about nine feet in circumference which turns on an axis, at the center of which is a compass level and gradient scale. The coil contains several thousand feet of very fine insulated wire.

The device was tried recently at the Verde Central property at Jerome, Arizona. It is said that as the coil was changed in position the vibrations varied. The minimum of vibrations, the inventors found, occurred directly away from the shaft, and as the coil was

(Turn to page 2)

At the left is Ruth Roland, star of the silver sheet, who recently broadcast from coast to coast on the "Momus" Special. Miss Roland is A real Radiophan as well as Madge Bellamy, another charming star of the screen. Miss Bellamy (right) recently spoke from Station WJAX

Princess Waukomis (below) is a real Indian Princess of Cherokee blood. She was recently heard on a WOR program

WOMAN FAN MAKES PRACTICAL RECEIVER

ALLSTON, MASS.—Miss Edna Trezice of this place is the first woman Radiophan to design a Radio receiving set. The apparatus is of a very efficient type and is made to sell for $15.

It was tried out recently and surpassed all expectations. The circuit was the principal feature designed by Miss Trezice, who is one of the most enthusiastic fans in New England.

WGR Off Air Two Days

BUFFALO, N. Y.—WGR station will be transferred to the New Hotel Statler, May 19. It is doubtful whether the transfer can be completed on this date and it may be necessary to cancel the programs of May 19 and 21.

LARGEST STATION IN WORLD BEING BUILT

SAN FRANCISCO.—The most powerful Radio broadcasting station in the world is to be constructed in Oakland, Calif., by the General Electric company, according to an announcement made recently by officials of the company. The giant plant is to be located at East Fourteenth street and Fifty-fourth avenue, and will have a range of several thousand miles.

RADIO FINDS RARE ORES

(Continued from page 1)

swung around facing the shaft, the maximum of vibration was observed. At this point the telephone receivers gave forth a thunderous roar, but on the opposite side there practically was no sound.

Before going to the Verdi Central, the experimenters took their apparatus to the United Verde mine, where a large deposit of sulphide copper ore was exposed. They found on setting up the instrument some distance from the deposit that the maximum vibration was directly in line with the ore body. Following this they experimented in other locations at some distance from the ore body, and the result was always the same.

Mining Official Gives Okeh

In an interview, George A. Newett, director of Calumet and Arizona mining concerns, said: "Undoubtedly there is merit in the device and it is my opinion it will be of inestimable value in the location of sulphide ores in any part of the world where they are suspected to be found."

Local mining officials are very enthusiastic over the new device. Following the experiments and tests to prove the practicability of certain changes and adaptions in the hook-up the apparatus will be put in actual field work.

MOVIE STAR BROADCAST

(Continued from page 1)

screen. And yet of all the countless thousands who appeared at the stations this was only a small part of the vast audience who heard Miss Roland by Radio.

During the time the train's broadcasting plant was not in operation the receiving set was tuned in in the observation car and entertainment was furnished the passengers from many of the large stations en route.

Radiophans from all parts of the United States heard Miss Roland's broadcast with unusual clarity and the exploitation of transmission from train board was considered a huge success.

Train Equipment Practical

The outstanding fact gained from the tests is that with specially designed receiving equipment on a train, it is quite possible to communicate from any part of the United States with the train while it is in motion, no matter what its speed.

The specific lessons taught by the experiments are: That tunnels and cuts will not affect this communication so seriously as was at first thought. Lakes and other large bodies of water near the railroad tracks have the peculiar property of increasing the signal strength. Mountains rising directly above the railroad tracks completely wipe out the signals when the mountain stands between the fixed Radio station and the train.

Flat Top Aerial Directional

The tests in other directions confirm many theories, particularly that of the directional effect of the flat top aerial. This was very pronounced when the train was rounding a curve. The position of the antenna in regard to the station, from which signals were received was another important factor, for often going around a curve on a perfectly level plain would make one station fade out and bring in another.

A right angle crossing under high tension and 500-volt trolley wires completely cut out reception for a fraction of a second.

The antenna on the train consisted of one No. 16 copper strand stretched the full length of the car 18 inches above the center line of the roof, also a loop aerial inside of the car.

WNAC HARD TO HEAR ON 286 WAVE LENGTH

Roger Babson's New Plant to Be on 337 Meters

BOSTON, MASS.—Varying reports are coming in from Radiophans regarding reception of WNAC on the new wave length of 286 meters. Those living nearby report they notice little if any change, but others report reception much weaker, while still others report that they cannot get the station at all. Since WNAC is rated as a 100-watt station, under the new grouping, it is excluded from the 360-meter wave length, in spite of the high-class programs it is broadcasting, and has been sending ever since it was built—programs the equal of any in the East, and superior to many programs given elsewhere.

Until the WNAC engineers have solved the problems confronting them, Radiophans will have to be patient, but they may rest assured that everything will be done that can be done to make the station heard by as many and as far away as possible. As the former wave length was extremely broad, fans found it easier to tune in, and now they will have to be more critical in their tuning. Perhaps if they are careful and work finer in their tuning, they may get better results with WNAC.

Roger Babson's new station at Wellesley Hills, being of 500-watt power or more, will be allocated a wave length of 337 meters.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	6:45- 7:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	309	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	1:45- 3:45
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	469	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	455	10:00- 2:00	.....	10:00-11:00	.....	9:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	423	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00	.....	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	448	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00- 10:30	.....
WBAP, Fort Worth, Texas.	476	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	.....	6:30- 6:45
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	492	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	360	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	390	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	390	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, New York, N. Y.	455	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R.	360	.....	.....	.....	7:30- 9:30	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	417	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00- 9:30	.....	8:00- 9:30	8:00- 9:30	8:00- 9:30	.....
WOAI, San Antonio, Texas.	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....	6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

Loud Speaker Builders—Next issue Thomas W. Benson will elaborate on his recent article telling how to make a moving coil loud speaker. He has had many queries as a result of the first article and has "boiled" these down into a round table discussion.

Then, Too, His Beginners' Series Chapter—next week—will explore the realm of loop antennae.

H. J. Marx Winds up His Three-Tube Reflex Series Next Issue—telling how to put the set in a cabinet and the tricks of operation. In another part of the same issue he will give some "dope" on a very good Four-Circuit Tuner—something new.

E. T. Flewelling Believes—and He Ought to Know—that panel layout is very important in the functioning of his circuit. In Part IV, next week, he will tell how to arrange the panel for the One Condenser Super Set.

More Reasons for Buying Next Issue—Advance programs for the big stations; new wave lengths for stations as they change; an interview with C. Francis Jenkins, inventor of Radio motion pictures.

Looking Ahead into the Summer—a Portable Set Number. The latest Radio vacation aids will be described. Radio is a GO this summer. Plenty of big stations are on plenty of different waves. Fish for broadcasts with your trout.

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STOLEN BOY FOUND BY BROADCAST AID

SON OF RADIO ENGINEER RETURNED HOME

Sheriff of Watertown, N. Y., Hears Broadcast Description and Discovers Child in Lonely Hut

SCHENECTADY, N. Y.—Little Vernon Alexanderson, age 5, was recently returned safely to his home here after being kept in a lonely hut by kidnapers for nearly a week. The child was rescued by the direct results of Radio broadcast.

Vernon, the son of E. F. Alexanderson, chief engineer for the Radio Corporation of America, was lured away from his home by a man who promised him some rabbits. The man sent Vernon's little sister for a box to keep the rabbits in and when the girl was out of sight the boy was thrown into a waiting auto which sped away.

Upon learning of his child's disappearance, Mr. Alexanderson brought into play one of the most powerful forces of news spreading known to man—Radio. Complete description of the lost child and full information of his disappearance was broadcast from all the larger plants in the eastern and central states.

Find Lad in Watertown

The lad was later found in a hut near Watertown, N. Y., in the care of Mrs. M. L. Grennell, 66, who alleges she was paid to care for the child and knew nothing of the kidnapping. The sheriff of Watertown became suspicious of the new occupants of the house in which Vernon was found after hearing the broadcast sent out from a local station. He at once investigated and the result is Vernon is safe at home with his Mom and Dad.

Complete descriptions of two men who are said to be implicated in the child stealing have been obtained from Mrs. Grennell and Vernon's sister and a net has been spread by the Radio broadcasting stations that is practically impossible to be escaped. The capture of the men is expected at an early date.

K. C. Broadcast Fourth Degree

BUFFALO, N. Y.—For the first time in the history of the Knights of Columbus in Albany speeches that were delivered at a fourth degree dinner were broadcasted.

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Unique Stunt of Broadcasting and Listening in at Same Point Accomplished Through WMC

By G. P. Newbern.

MEMPHIS, TENN.—Broadcasting and receiving the same concert at the same point which has been unsuccessfully tried many times, was successfully accomplished recently by WMC, station of The Commercial Appeal, during the celebration of Radio week in Memphis. During the week, 28 special concerts were broadcast from an upper box in the main auditorium of the theater, in plain view of the audiences, and were heard only through loudspeakers placed in various parts of the theater. Persons seated in the adjoining box from where the broadcast took place heard only the notes of the singer and musicians as they came from the Radio receiving sets in the theater.

A specially constructed microphone (homemade) and speech amplifier were installed in the front, upper, left box at the theater. From the amplifier a special telephone line ran directly to WMC studio and into the broadcasting set. It was broadcast from WMC in exactly the same manner that other broadcasting is done from points remote from the studio.

Much Depends on Artists

Receiving sets of several types, installed by Memphis Radio dealers in Loew's Palace Theater, received these broadcasts, turned on the several loudspeakers in the theater and the audience heard the singer and musicians and announcements, not as they were delivered into the microphone, but by Radio.

Much of the success of this stunt is due to the artists who furnished the songs and music. In order that those in adjoining boxes and other parts of the theater could not hear them, it was necessary for the songs to be sung as low as possible. Mr. Harry Bruton, tenor, varying his song number each day of the week, sang almost in a whisper but each and every note was perfect. While singing, his face was about three inches from the microphone.

The same is true of the violin solos played by Mr. Dave Love, director of Loew's Palace Symphony Orchestra, and Mr. Harry Blix, cornetist, of the orchestra. Their notes although perfectly rendered were pitched so low that they were not audible six feet away.

Movies Show WMC in Action

Radio Week not only included the above mentioned feature but included the showing at Loew's Palace Theater, of Gloria Swanson in "Prodigal Daughters," a Radio romance of the films. The Mystery Box which explains in detail the principle of Radio, and special motion pictures showing WMC in action. This latter picture showed the announcer of WMC introducing before the microphone Mr. Harry Bruton, tenor, and Mr. Dave Love, director of the orchestra. As Mr. Bruton was introduced, as shown on the screen, the announcer's voice could be heard making the identical announcement as lipreaders saw him repeat in the picture.

DEVICE IS INVENTED TO CUT INTERFERENCE

New Instrument to be Known as "Interference Eliminator"

WASHINGTON.—Designed to reduce atmospheric disturbance for Radio receiving sets, a new device to be known as an interference eliminator has just been patented.

The device comprises a resonant circuit, with an amplifier connected to the circuit and a current limiting relay connected to the output amplifier with the detector and telephones connected to the output of the current limiting relay.

The resonant circuit and the output of the current limiting relay are interconnected, whereby an electromotive force derived from the current limiting relay is impressed upon the resonant circuit opposing the flow of currents having a frequency equal to the natural frequency of the resonant circuit.

Never get impatient with your set. Nine chances out of ten a man familiar with Radio can find your trouble in a half-minute. If you will take the trouble to familiarize yourself with the principles of Radio you can do the same.

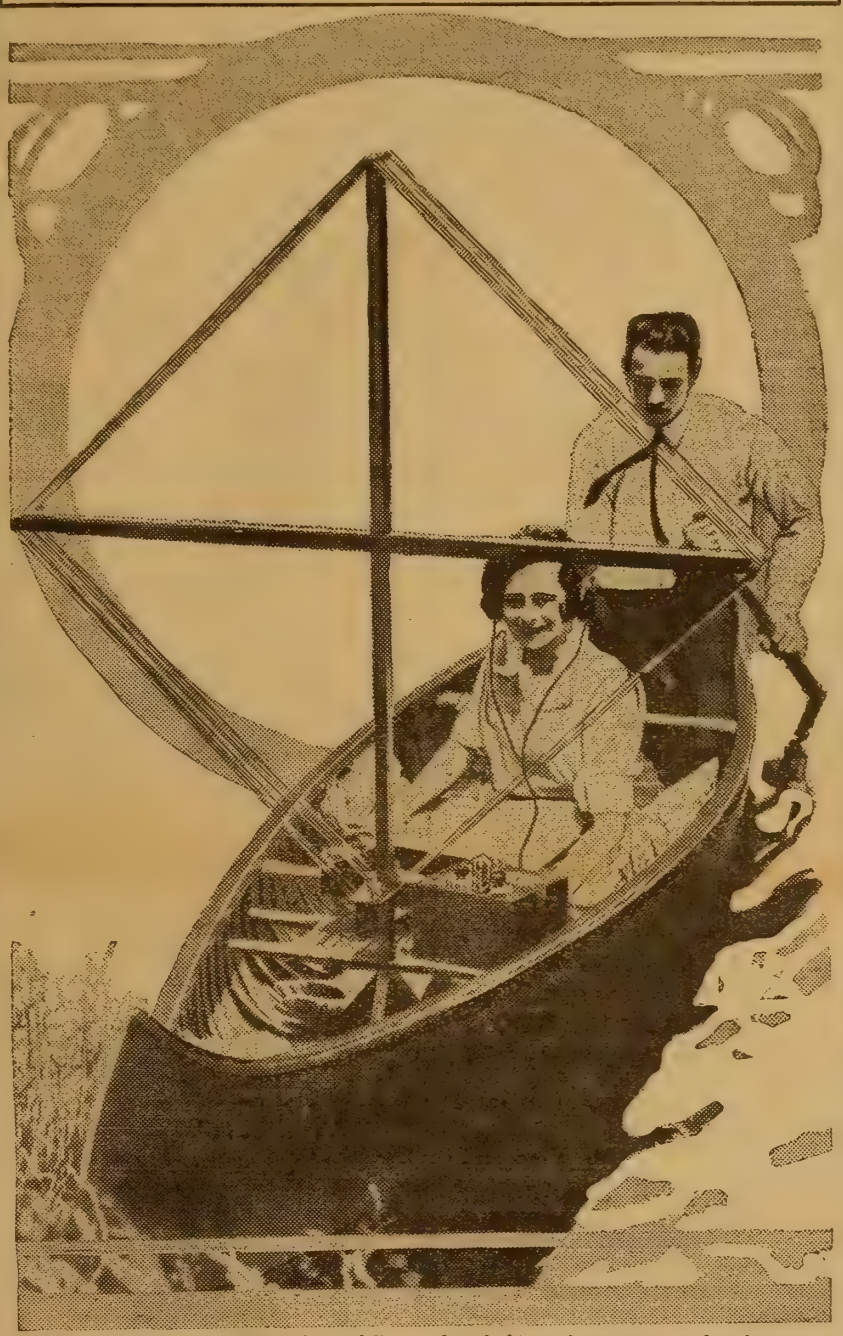
BOSTON IS FIRST CITY WITH RADIO FIRETUGS

BOSTON, MASS.—This city will be the first municipality in the world to have its firetug equipped with Radio. Fire Commissioner Glynn is planning to have the three boats of the harbor fire service thus equipped at a total cost of $7,000 to $8,000, and has asked the city council for a special appropriation.

"SPARKS" JOB FILLED IN 3 MINUTES BY AIR

NEWARK, N. J.—Three minutes after an announcement was made from WOR to the effect that a first-grade Radio operator was needed on a sea-going tug to go to a ship up the coast, which the Shipowners' Radio Service requested WOR to make, word was received by WOR that the job was filled.

RADIO REPLACES THE MANDOLIN



Venice, a gondola, the tinkling of mandolins, soft splashing of tiny waves—that is romance. California, a canoe, the Radio set and the same splashing of tiny waves is just as romantic and quite a bit more up-to-date. These two happy fans are listening in to the twilight broadcast of KFI while drifting in the moonlight waters of a California lagoon. Can you think of a nicer way to spend a summer evening?

DIRECTIONAL WAVE PROVES SUCCESSFUL

CHBC UNHEARD 100 MILES OFF STRAIGHT PATH

Giant Aerial, 120 Feet Square Erected at Albertan Station to Carry Out Feat

CALGARY, ALTA.—Directional transmission of voice on the Radiophone has been achieved.

For the first time in the history of the Radiophone, the human voice has been transmitted in a definite direction. W. W. Grant, chief engineer of CHBC, The Morning Albertan Radio broadcasting station, and president of the W. W. Grant Radio, Ltd., spoke to KEDB, the Mercantile Trust Co., at San Francisco, 1,000 miles from Calgary, and only those within a radius of 50 miles of the direct line between the two cities could hear.

Mr. Grant has perfected directional transmission of the voice by Radio by means of a giant loop aerial, the largest in use at the present time by any station on the American continent. The loop antenna, which is 120 feet square, is supported by two masts 115 feet in height. Another factor operating to Mr. Grant's advantage is the fact that The Albertan station is located on Crescent Heights in Calgary, which gives it an elevation of around 4,000 feet above sea level.

Only North and South

At the present time the masts of the aerial are so situated that Mr. Grant is able to transmit his voice directly north and south, but at the same time prevent it from traveling east and west. The loop which is being employed consists of five wires 120 feet in length. There are five lead-in wires from each mast, each of which are 150 feet long, one lead-in being attached to each of the five cross wires. This special type of circuit, which was devised and discovered by Mr. Grant, is the dominant factor in the directional transmission.

Thus Mr. Grant can control the direction of his voice on the waves of ether in a manner similar to the way in which the beam of a searchlight is directed, with the exception that the voice travels both ways. Mr. Grant, however, hopes he will be able to overcome this difficulty in the near future. Preliminary experiments in directional transmission have been conducted by other Radio engineers in the past, but no workable system such as Mr. Grant has devised was ever used, nor was the distance which he is able to cover ever attained.

Tests Are Carried Out

Saturday night and Sunday morning Mr. Grant, operating on a wave length of slightly above 440 meters, conducted tests on the new loop aerial which was installed last week. Tests had been arranged and it was found that his voice could be heard north and south, but not east and west and thus it was proven that directional transmission of the voice was attainable. Therefore Radiophans of San Francisco heard The Albertan when operating on this loop, but eastern Canada points could not hear. By switching the lead-in wires, which operation entails only a few moments' work, the giant loop aerial is transformed into a standard broadcasting antenna.

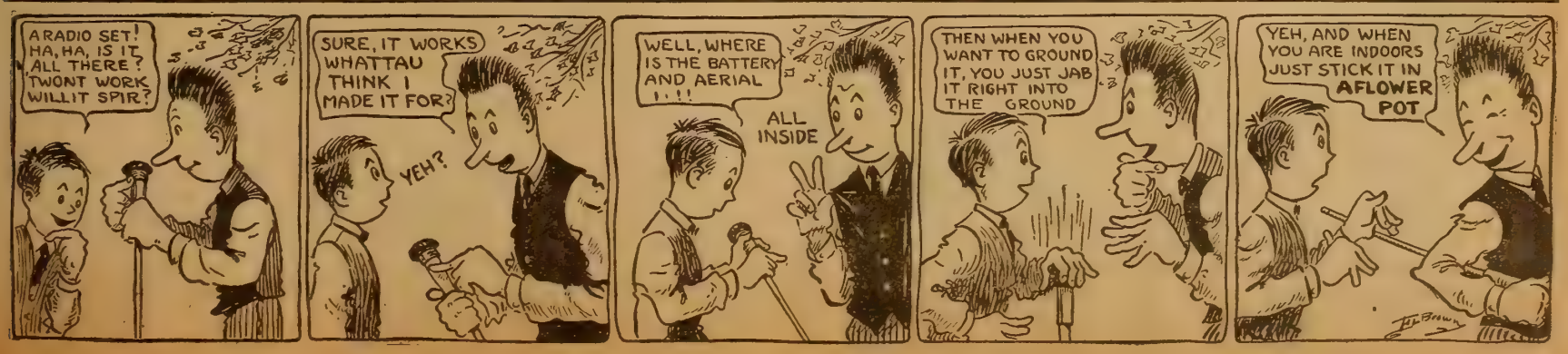
Commercial Value

"As yet the experiments have not gone far enough to tell whether this will have any great commercial value," said Mr. Grant. "However, if one wished to communicate with southern points only, and leave out eastern and western points, this would make it possible."

Norway to Broadcast

CHRISTIANA, NORWAY.—It is proposed to erect broadcasting stations at Christiana, Bergen and Trondhjem, and application for the necessary licenses has already been made for the Norwegian Marconi company and the Morse Telegram Bureau.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Not the Rubber Plant Pot!



TUBE SUPPLY QUIZ TO DISCLOSE FACTS

CHAMBER OF COMMERCE TO SURVEY CONDITIONS

Broadcasting Section Announces Careful Study of Copyright Controversy Caused by Music Publishers

NEW YORK.—A national survey of the vacuum tube supply in this country has been undertaken by the National Radio Chamber of Commerce, it was announced recently, at headquarters of the chamber, 165 Broadway.

This survey, the first to be made and said to be well under way, "vitally concerns every one in the Radio industry as well as the public," according to the announcement, issued after a meeting of the Board of Governors, at which numerous groups were represented. The Governors, it was stated, acted at the request of the chamber's membership and of other elements in the Radio industry.

Discloses Actual Situation

Tresham D. Gregg, one of the engineers and managers of the Chamber, said that the survey claims to disclose the actual situation nationally with regard to the tube supply. Specifically, the supply of the following tubes is concerned: 200, 300, 201, 301, 201-A, 301-A, DV-6, DV-6A, WD 11 and WD 12. Among the questions asked are these:

"Have you an adequate supply of these tubes?"

"Have you a supply in sight for the next two months?"

"If the supply of any of these tubes is short, when did such shortage first appear?"

"What number of each would you deem an adequate stock?"

"What number of each does your trade normally demand for the season?"

Aids Development of Radio

The survey, it was explained, is a part of a program to aid in the orderly development of the Radio industry in the interest of both the industry and the general public. Co-operation with the Department of Commerce and other Government departments, as well as with universities and public and private institutions is embraced in the plans.

The broadcasting section of the Chamber, it was also announced, is making a careful study of the copyright controversy between the American Society of Composers, Authors and Publishers and the broadcasters. A conference to consider this conflict was held by the Chamber recently. Middle West broadcasters were represented by John E. Jenkins, of Chicago.

Membership in the Chamber, which now takes in all interests from manufacturer to listener, has, it was stated, recently increased about thirty per cent. The educational section is pushing its work among the universities and churches.

WEAY Promises Real Amusement

HOUSTON, TEXAS.—Preparation of an elaborate midnight program featuring professional and proven local talent, is now at the point where Radiophans may expect witchy hours to bring real amusement from WEAY. This station has been sending one program each week from The Evening Post studio, Friday nights; from McMillian's dancing academy Wednesday nights and from the First Baptist church Sunday nights.

NAVY TO ABANDON PLANTS ON LAKES

Eight Stations "For Sale" by Government—Radio-Compass Service Remains

GREAT LAKES, ILL.—The navy department has decided to abandon virtually all of its Radio service on the Great Lakes with the exception of the Radio-compass stations, and will shortly advertise eight Radio stations for sale. Lack of men and money to operate them led to the decision to abandon the plants.

An inventory of the material and supplies to be sold is being prepared by the district communications superintendent, Lieut. A. G. Berry, preparatory to advertising for bids.

The stations to be abandoned are located at Alpena, Mich., Buffalo, Cleveland, Detroit, Duluth, Mackinac Island, Milwaukee and Manistique, Mich. Stations at Chicago, Great Lakes and Eagle Harbor will be retained, in addition to the Radio compass stations at Detour, Grand Marais and Whitefish Point, Mich.

The three Radio-compass stations safeguard vessels passing through the fog enshrouded lower end of Lake Superior, Whitefish Bay and St. Mary's river.

Besides handling the Radio business of the lakes the stations to be closed have taken care of most of the commercial messages passing between Great Lakes ships and the shore. The strictly commercial Radio companies have never invaded the Great Lakes field, and with the exception of a few stations privately owned by the steamship companies, virtually all business has been handled by the navy Radio.

Commissioner Gets Mules by Radio

ATLANTA, GA.—While in Atlanta recently on a Radio inspection trip, Commissioner Carson of the Department of Commerce, was advised that his best team of mules had disappeared from his farm in a nearby state, and being later in the broadcasting station of a local paper he let their loss be broadcasted with a description. A few days afterwards when in Nashville, he was advised that his mules had been found.

SEND FOR BOOKLET
TRUTH
ABOUT VARIABLE LEAKS
AIREX
REVELATION LEAKS
0-5 MEGOHMS VARIABLE LEAK ONLY
25c
DITTO WITH .00025 or .0005 MICA CONDENSER
35c
PAY NO MORE
ATTRACTIVE DEALER & JOBBER PROPOSITION
SOLE NATIONAL DISTRIBUTOR
ALBERT J. SLAP
132 NASSAU ST., NEW YORK CITY

Atlantic City's Crowds Stroll to Ether Music

City Officials Plan to Entertain Visitors Daily

ATLANTIC CITY, N. J.—Crowds on Atlantic City's famous boardwalk were surprised one Saturday afternoon recently to hear voices of invisible speakers and singers above the boom of the surf and the myriads of sounds peculiar to the "Great Wood Way."

The sounds came from a set of amplifying apparatus, known as a public address system, installed by the Western Electric company and being tested for a group of city and hotel officials. A motor truck carrying the vacuum tubes, control apparatus and batteries was parked alongside the Brighton hotel. Wires connected it with a microphone in the concert hall of the National Exhibitors and to sound-projectors mounted at intervals on the Brighton and the Traymore. Speeches and music were distributed clearly along 2,000 feet of the boardwalk.

City officials are considering a permanent installation of loud speakers along the entire boardwalk, so that everyone on it could hear addresses by prominent visitors, play-by-play stories of important games, dance music from local hotels, and all the rich variety available through tapping the programs of nearby broadcasting stations.

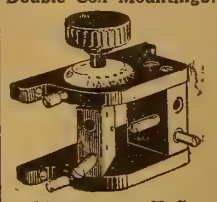
A movement is under way to provide Toledo, Ohio, with a Radio broadcasting and receiving station for its police department.

MEXICO HAS FIRST BROADCAST PLANT

Transmitting on 400 Meters from Regional Exposition of Nuevo Leon

MONTEREY, MEXICO.—The first Radiophone broadcasting station ever successfully operated in Mexico now is sending out programs from the Regional Exposition of Nuevo Leon, according to Radiophans, who heard the announcer's name given as Senor Reyes. The station uses a wave length of 400 meters. Musicians and public speakers have volunteered to work every night if necessary to supply entertainment to mining camps.

ADJUSTABLE COIL MOUNTINGS FOR FLEWELLING CIRCUIT
Triple Coil Mounting.....$5.00 List
Double Coil Mountings..... 3.50 List



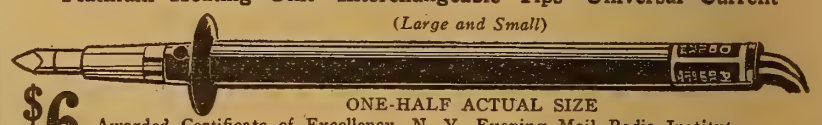
A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in.

Licensed under U. S. De Forest Pat. 1365170

Dealers write for special discounts

ASTORLOID MFG. CO., 416 Marcy Ave. Brooklyn, N. Y.

Delicate Soldering
Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.
THE POST SOLDERING IRON
Platinum Heating Unit—Interchangeable Tips—Universal Current
(*Large and Small*)



$6
ONE-HALF ACTUAL SIZE
Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute
From your Dealer, or write
POST ELECTRIC COMPANY (Dept. 509), 30 E. 42nd St., New York

Cotogrip
"Built First to Last"
This little beauty was approved by our engineers only when convinced that they had produced the one socket that combines all the essential features of a good socket.

1. *Positive Cotogrip Contacts.*
2. *Hard Rubber Insulation.*
3. *Rugged Construction.*
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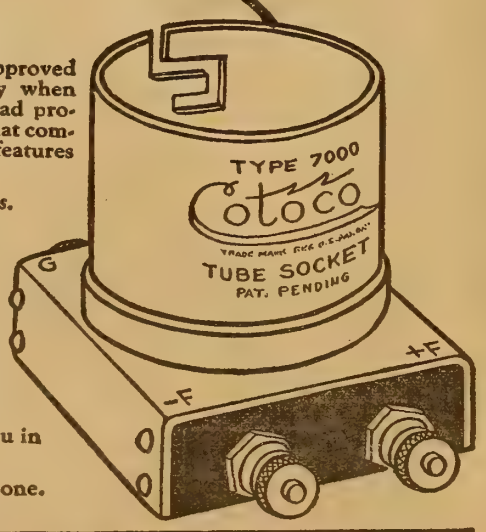
5. *Concealed Mounting.*

It is impossible to show the unique mechanical action of Cotogrip contacts in a photograph. It is different from any other socket you have ever seen. This socket will interest you in every way.

You ought to have one.
Ask Your Dealer



COTO-COIL CO PROVIDENCE

GREBE RADIO

"Fame is the follower of reality."
Yu Tse

The unrivalled reputation of the Grebe Receiver is built upon its years of thoroughly dependable service.

Write for "Musings of Dr. Mu"

Doctor Mu.

Licensed under Armstrong U. S. Pat. No. 1113149

A. H. GREBE & CO., Inc.
Richmond Hill, N. Y.
Western Branch—451 East 3rd St., Los Angeles, Cal.

HAWAIIANS IN U. S. HEARD AT HOME

Had the setting been transferred to the moonlit beach of Wakiki or the mystic, palm-decked hills of Hilo, the Radiophans who listened in to tinkling ukeleles and wailing steel guitars could not have felt the Hawaiian atmosphere more than they did when the Hawaiian group of the Ford Motor Company of Highland Park, was on the air. In the circle is shown two natives of the land of the hula girls actually listening in to a broadcast from the United States. Can you imagine their surprise when they tune in their own national songs and music?

CRIB KEEPER SAVED BY AMATEUR RADIO

SICK FAN PICKS UP CALL OF STORM BOUND MEN

Thrilling Tale of Battle with Death by Life Guards Told Newspapers by Ether Waves

CLEVELAND.—One of the most thrilling adventures ever recorded in the annals of stormy Lake Erie was the rescue by amateur Radio of Harry Holzworth, keeper of the crib in the waters a few miles off this city. While Holzworth lay ill with pneumonia, a storm raging outside the steel enclosure, two of his companions frantically sent out a call for help which was picked up by a Cleveland amateur.

Radio for Help

Inside the walls were dripping with dampness while the waves dashed on the rocks below and the spray swept over the sides. For a man with such an illness the crib was not a safe place and he was in dire need of medical aid. It was impossible to launch a boat and valuable minutes slipped away as his fellow workers waited for an answer. Patiently one of them tapped the key until word came back through the air that the coast guard would be notified to send immediate relief.

After an hour of maneuvering, Captain William E. Crapo got the craft alongside, and three coast guards, numbed by the icy spray, lay flat on the canvas top of the launch waiting for their chance to grasp the crib keeper as he dangled from a rope in midair. Time and time again the launch slid up under the skillful guidance of the captain and slipped back when it appeared likely to be tossed up against the wall.

Difficult Transfer Made

As the boat poised for a moment on the crest of a wave, one of the guardsmen reached up and Holzworth fell safely inside.

Behind the simple story of the rescue, there was still another scene in a comfortable room at 1372 West Eighty-fifth street, Harold J. Hill, an amateur member of the American Radio Relay league, was tinkering with his Radio set.

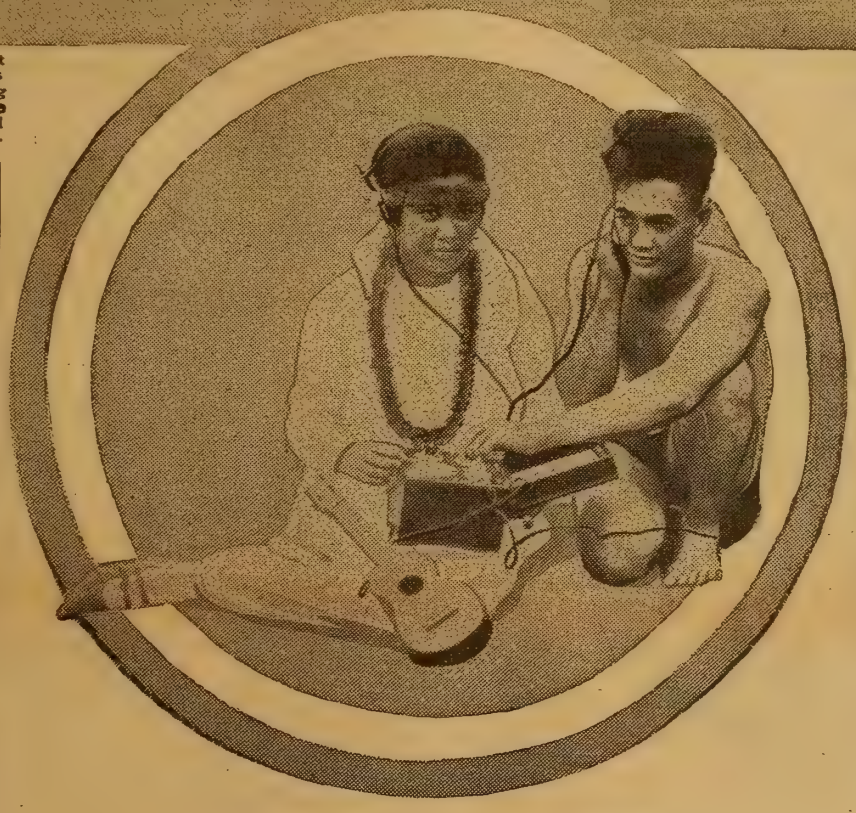
He, too, had been ill and was then recovering from an attack of scarlet fever which had confined him at home for more than three weeks. For several days he had been passing the time by talking with other amateurs. In the afternoon, Thomas B. Keller, Radio man at the crib, told him about the heavy sea and the high wind which was howling about the rock pile. He said that Captain Holzworth had a sore throat.

Picks Up Call for Help

It was not until later in the evening that Hill once more "tuned in" and listened to the frantic message from the crib that the captain was much worse.

After notifying the coast guard, Hill was not satisfied and waited to hear the result of the rescue. The launch had hardly left the side of the crib before Keller, worn and weary from his long vigil at the captain's side, sat down before his key and told the whole story.

And sitting there in his bedroom, Hill copied the facts by Radio for reporters waiting to make the first morning edition.



St. Louis Post-Dispatch Gives Direct Service to Stores, Banks and Schools

Market Reports from Station KSD Received by Community Receiving Set in Small Towns and Relayed to Individual Homes and Businesses by Telephone

By Vera Brady Shipman

The original newspaper of the famous Pulitzer chain of publications, The St. Louis Post-Dispatch, has pioneered in Radio broadcasting in the central west as the newspaper has furthered each enterprise for local advancement. The Radio field is broader than any local readers of a newspaper, for Radio distance is limitless, bounded only by the power of receiving sets placed in the listeners' hands.

A Radio newspaper which gives its direct service to hundreds of thousands of farmers, stores, banks and schools, bulletined hourly, broadcasting markets and stock reports, the St. Louis Post-Dispatch KSD, as it is known on the air, is located in the core of that prosperous section of farming, business and mining country—the great Mississippi valley. Beginning with the opening of the St. Louis stock exchange at 9:40, Central time, each morning, reports are broadcasted hourly to the listeners-in on distant farms or in large or small communities.

Have Community Radio

Situated atop a building grounded on sixty pillars of steel which run through a layer of quicksand down to bed rock, with a perfected aerial and with little steel interference from other buildings, KSD is adequately equipped with its powerful broadcasting outfit, to send its message to the people. KSD operates on 485 meters daylight schedule and 400 for evening.

Do the farmers appreciate the service they are getting? Do we as American people continue to ride a free horse or are we noticeably appreciative? KSD broadcasts reports of every market which interest the farmer or the business man.

Take a day in a small town within Radio distance of the KSD daylight market service. In many towns the Radio receiving set is installed in the local garage. This is in turn relayed by telephone to any home or business firm wishing to connect with them. Another favorite place of receiving in a small community is the local bank. And this service is all free. The great newspaper furnishes reports direct from the city exchanges, and the small community has instant access as well as her larger sister.

Has Woman Announcer

"And is the St. Louis announcer really a woman?" How many times I met that question on my recent trip south. The voice, which a Radio magazine editor once called "that effeminate voice of KSD" would be unfortunately handicapped if it were not so, for the announcer and director of Radio programs at KSD since its Radio conception last July, is Miss V. L. Jones, graduate of Leland Stanford College of California, a former newspaper woman and at present owner of a publicity firm in St. Louis, a musician and critic, and above all a woman of great personal charm.

Miss Jones begins her announcing at eight each evening. During the day market and stock reports are announced by the chief operator, Willis Corwin, or either of his two licensed assistants, W. F. Ludgate or S. C. Mahaney. KSD maintains Sunday and Thursday silent nights with the exception of a midnight Thursday concert.

STATION WSY HAS FIRST ANNIVERSARY

WINDOW DISPLAY SHOWS WSY'S AUDIENCE

Feminine Announcer Says, "WSY Is Dedicated to Alabama and Not to Service of Owners"

BIRMINGHAM, ALA.—In two show windows of a down-town department store is a novel display of the WSY, Birmingham's broadcasting station. And the display is attracting the attention of thousands of people who pass by this busy corner every day.

The display consists of a map of the United States, Canada and Mexico, showing the various points where thousands of people listened in on WSY programs. The map forms the background, and running to the map are many ribbons showing the points where people have listened in on this program. On the floor of the windows are hundreds of letters from all sections of the three nations named from admiring auditors.

Celebrates First Anniversary

WSY has only recently celebrated its first anniversary with an extended and varied program.

Among other things the program included an address by Miss Georgia Bryant, the WSY's feminine announcer. She spoke in part as follows: "WSY feels certain that its millions of listeners have noticed with a degree of satisfaction that at no time during the one year of its existence has it in any way permitted its operatives to exploit through the ether so-called propaganda, concerning the Alabama Power company. We have always endeavored to make our broadcasting station an agency for pleasure and education and our programs have been arranged with every possible care and precaution, with the hope that they would afford our listeners evenings of real enjoyment and enlightenment.

Promise Highest Efficiency

"WSY has been dedicated to the service of Alabama, and not to the service of the Alabama Power Company. As it has been in the past, our policy in the future will be to keep this service on the highest plane of efficiency, permitting no one to use it in the furtherance of any individual's, firm's or corporation's interest. Its greatest ambition is to serve well its state and its multitude of friends with clean, wholesome entertainment, and spiritual and educational broadcasting, and it is indeed gratifying to know that this ambition has, in a degree, been cherished during our first year of existence. For this we are greatly indebted to the artists, who have so generously contributed their talent free of charge, and to our listeners who have not been sparing in their indulgence."

Fish Prices Via Radio

WASHINGTON, D. C.—The Fisheries Bureau of the Government issued a broadcast recently, giving wholesale market prices on fish, together with the quantity of varieties available at New York, Boston, Norfolk, Jacksonville and Chicago. Each week on Tuesday evening NAA will carry similar broadcasts between 7:45 and 8 p. m.

The Week's Advance Broadcast Programs

HERE is the sixth appearance of this new service for Digest Readers There are only fifty eligible stations for the listening, but already twenty-two of these will be found in the "Advance Programs." Only features are listed below. Such parts of station programs as are regular week in and week out, are, as they have been from the start, found in the Digest Radiophone Station Directory. Much other data on the stations for which advance programs are given, will be found there.

Tuesday, May 15

CFCA (Eastern, 400, Daylight Saving), 8:00-9:00 P. M., Concert, Selection from "Sometime," Star Orchestra; "Break o' Day," J. Winnifred Smith, soprano; Violin solo, Harry Adaskin; "A Song of India," Orchestra; "Still as the Night," J. Winnifred Smith; "The Broken Melody," H. Saunders, cellist; "La Czarine," Orchestra; "The Brownies," J. Winnifred Smith; Czardas, from "Coppella," Orchestra; "Sempre Fidelis," Orchestra.

KDKA (Eastern, 360), 9:00 A. M., Music; 11:00-3:30 A. M., Music; 5:05 P. M., Organ recital, Howard R. Webb, organist, Cameo Theater, Pittsburgh, Pa.. "The Arcadia," "Slumbers-Nightfall," "Sunset Sketches," "Vaudeville Overture," "Sunrise on the Mountains," "A Deserted Farm," "Lady Billy Selection;" **7:30 P. M.,** "The Coming of Peter Pan," Genevieve Marshall, soprano; Anne Hagameir Woestehoff, contralto; George Kirk, baritone; Warren Kinder, tenor; "My Little House," soprano; "The Crafty Crocodile," contralto and bass duet; "Good Advice," tenor; "Bedtime Stories," quartet; "A Pirate Bold," bass; "Spring Cleaning," soprano and tenor duet; "There and Back," contralto; "The Land of Make Believe," Quartet; "Dance of the Goblins," "Caprice Viennoise," "Concerto in E Minor," Leo Kruczek, violinist.

KHJ (Pacific, 400), 1:15 P. M., Concert; **6:45-7:30 P. M.,** Children's Hour; Concert, "Uncle John:" **8:00-10:00 P. M.,** DeLuxe program, Shrine Band, Al Malhakah Temple; Pilar Gonzales, soloist, City of Mexico.

KPO (Pacific, 400), 8:00-10:00 P. M., Music; Miss Gladys Salisbury, organist.

KSD (Central, 546), 8:00 P. M., Concert, Sarry Curry, soprano; Alice Mace, accompanist; Martha Prewitt, reader; Address, Dr. W. P. Cutler.

KYW (Central, 447, Daylight Saving), 2:35 P. M., Concert, courtesy of Lyon & Healy Co.; **8:00-8:58 P. M.,** Musical program, Elizabeth Lindquist, soprano; Margaret Martin, accompanist; Cathal O'Byrne, Irish tenor; Sallie Menkes, accompanist; Madeline Pendelton, reader; Margaret Vernier, pianist.

WBAP (Central, 476), 7:15-8:00 P. M., Concert, Sam S. Losh and pupils; **9:30-10:30 P. M.,** Concert, Mount Gilead Negro Baptist Church Orchestra and Choral Club.

WBZ (Eastern, 442), 7:45 P. M., "Institution by Congress of Government by the People, 1778," Senator George D. Chamberlain; **8:00 P. M.,** Concert, Clef Quartet, Olga Thyberg, soprano; Gladys Noble, soprano; Mrs. Ruth Ekberg, contralto; Florence Pierce, contralto.

WDAP (Central, 390, Daylight Saving), 10:00 P. M., Musical program, Mrs. R. H. Prichard, soprano; H. Jane Symons, contralto; Grace Symons, accompanist; Eva Ray, soprano; Edward W. Shriner, tenor; Leonard J. Huber, baritone; Evelyn Morrow, violinist; Dance music, Jack Chapman's Orchestra.

WDAR (Eastern, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; **2:00-3:00 P. M.,** Vocal and piano solos; **4:30-6:00 P. M.,** Talk on "Affairs of the Heart," by Betsy Logan; Dream Daddy with little tots; **7:30-8:00 P. M.,** Dream Daddy with boys and girls.

WFAA (Central, 476), 9:00-9:20 P. M., Program, Orchestra Bryan St. High School; **12:30-1:00,** Address, DeWitt McMurray, editor Semi-Weekly Farm News; McDowell Sisters, Hawaiian musical program.

WFI (Eastern, 395), 10:00-11:00 P. M., Short talks; **1:00-2:00 P. M.,** Dinner music, Meyer Davis Bellevue-Stratford Orchestra; **3:00-4:30 P. M.,** Vocal and piano selections; **6:00-7:30 P. M.,** Music, Meyer Davis Bellevue-Stratford Orchestra; Cousin Sue's stories for little children; **8:00-9:55 P. M.,** Vocal and musical selections; **10:10-12:00 P. M.,** Dance music, Meyer Davis Bellevue-Stratford Orchestra.

WGR (Eastern, 360, Daylight Saving), 2:00 P. M., Music; **3:00 P. M.,** Music.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Dream of Love," Donald Chartier, violinist; Max Cote, cellist; Beatrice Wakeley, pianist; "Berceuse," soprano, Mrs. Wm. J. Bray; "Three for Jack," John H. Vail, baritone; High School Trio, "Cavatina," trio; "Sorter Miss You," "Mah Curly-Headed Baby," Ruth Ellsworth, contralto; "Good-Night, Beloved," Quartet; "Juba Dance," Beatrice Wakeley, pianist; "Dreaming Alone in the Twilight," Wm. J. Bray, tenor solo; "King of the Winds," Rollin B. Fisher, bass; "A Spring Song," quartet; "Love Has Wings," "Down the Trail o' Dreams to You," Mrs. L. J. Southard; "To Spring," Beatrice Wakely, pianist.

WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theater; Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Concert, Ella Sharrard Violin Quartet, assisted by Mary Smith, soprano; Mrs. John E. Harman, Jr., contralto; Miss Dettlinger, pianist; Reading, "An Interesting Historical Episode."

WHK (Eastern, 390), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, 509), 10:00-11:00 A. M., Talk; **1:00-2:00 P. M.,** Recital; **3:00-4:30 P. M.,** Musical program; **6:00-7:30 P. M.,** Dinner dance music; Uncle Wip's bedtime stories; **8:00-12:00 P. M.,** Program of popular music.

WJAX (Eastern, 390), 7:30 P. M., Cleveland News Concert, Hermit Club, of Cleveland, O.

WLW (Eastern, 360), 10:00 P. M., Concert, "Sonato in D," Margaret Prall, violinist; "The Swan," "The Way of the World," Blanche Neel; "Liebeslied," "Serenade Espagnole," "Nocturne," "Schone Rosemarin," Margaret Prall; "Wayfarers' Night Song," "Dedication," "Summertime," Blanche Neel; "Rondina," Margaret Prall; "Deep River," "I Want to Be Ready," "Heaven, Heaven," "Oh, Didn't It Rain!" Blanche Neel; Concert, Sinclair Dance Orchestra.

WMAQ (Central, 448, Daylight Saving), 4:35 P. M., Estelle Winwood and Ernest Glendenning, from the play, "Why Not?"; **7:00 P. M.,** Talk on Astrology, John Wheeler; Sophine Lobel, pianist; **9:15 P. M.,** Musical program, Vivian Rankin, soprano; Margaret Dirks, pianist.

WMC (Central, 500), 8:00 P. M., Concert, Washington Syncopators, H. H. Guinett, director; **11:00 P. M.,** Midnight Frolic.

WOC (Central, 484), 12:00 M., Chimes concert; **3:30 P. M.,** Educational talk, A. G. Hinrichs; **5:45 P. M.,** Chimes concert.

WOO (Eastern, 509), 11:00 A. M.-1:00 P. M., Organ recital and musical program; **2:00-3:00 P. M.,** Piano and song recital; **4:30-6:00 P. M.,** Organ recital; **7:30-8:00 P. M.,** Short talks and musical selections.

WWJ (Eastern, 517), 3:00 P. M., Talk, Simon Nye, president of American Booksellers' Ass'n; **7:00 P. M.,** The Town Crier; News Orchestra; Musical program, Detroit Chamber Music Society.

Wednesday, May 16

CFCA (Eastern, 400, Daylight Saving), 8:00-9:00 P. M., Concert, Selection from "Gypsy Love," Star Orchestra; "Despris le Jour," Lina Craine, soprano; "Ballet Egyptian," Orchestra; "Old Refrain," Harry Adaskin, violinist; "Down in the Forest," Lina Craine; "Spanish Serenade," Star Orchestra; Violin solo, Manny Roth; "Beautiful Spring," Orchestra; "Macushla," Lina Craine; March from "Aida," Orchestra.

KDKA (Eastern, 360), 9:00 A. M., Music; 5:15 P. M., Concert, KDKA Little Symphony Orchestra, Victor Saudek; **6:15 P. M.,** "Pung Chow," L. L. Harr, of Kaufman's Dept. Stores, Chinese game; **7:30 P. M.,** KDKA Orchestra; Alice Christine King, soprano; O. E. Newman, tenor; Karl Snyder, pianist; Orchestra, "The Bat," "The Rosary," "Down South," "Within the Walls of China," trumpet; "Forever Mine," "Heart o' Mine," Mildred Frye Cook, soprano; "Mammy You," "Bye Lo," "Honey Chile," "My Last Dollar," "You're on the Right Road, Sister, But You're Gwine the Wrong Way," tenor.

KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Banking," Officer San Francisco Mercantile Co.; **8:00-10:00 P. M.,** Classical music.

KHJ (Pacific, 400), 1:15 P. M., Music; 6:45-7:30 P. M., Children's Hour; Musical program; Bedtime story, "Uncle John"; **8:00-10:00 P. M.,** Program, Edison Club, Redondo Beach, Calif.

KSD (Central, 546), 8:00-9:45 P. M., Concert, Missouri Theater Orchestra.

KYW (Central, 447, Daylight Saving), 8:00-8:58 P. M., Musical program, courtesy of William Lester.

WBAP (Central, 476), 7:15-8:00 P. M., Concert, Ida Epps, pianist; Mary Byron, violinist; **9:30-10:30 P. M.,** Concert, Euterpean Club.

WBZ (Eastern, 442), 6:00 P. M., Concert, WBZ Concert Orchestra, C. J. Fairfield; **7:45 P. M.,** Dr. Bertram E. Roberts, "Pasteur Versus Napoleon"; **8:00 P. M.,** Concert, Orin Taylor, soprano; Mrs. Woodin, pianist; concert, WBZ Orchestra, C. J. Fairfield.

WDAR (Eastern, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; **2:00-3:00 P. M.,** Short talks; **4:30-6:00 P. M.,** Short talks, Dream Daddy with little tots; **7:30-8:00 P. M.,** Dream Daddy with boys and girls; **8:00 P. M.-12:00 P. M.,** Musical program, Arcadia Cafe Dance Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Entertainment; talent Melba Theater.

WFI (Eastern, 395), 10:00-11:00 P. M., Short talks; **1:00-2:00 P. M.,** Dinner music, Meyer Davis Bellevue-Stratford Orchestra; **3:00-4:30 P. M.,** Vocal quartette; **6:00-7:30 P. M.,** Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; Stories for little children by Cousin Sue.

WGR (Eastern, 360, Daylight Saving), 2:00 P. M., Music; **3:00 P. M.,** Music; **8:00 P. M.,** Musical program, Billy McKay, Buffalo's Harry Lauder and others.

WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theater; Ruth Sharp, pianist; Richard Wymond, violinist; Concert, Mary Anderson Theater Orchestra; **7:30-9:00 P. M.,** Concert, Kentucky School for the Blind, C. B. Martin, director; Guitar trio, Georgia Pope, Ruth Elder, J. Henry Brady; Guitar solo, J. Henry Brady; Soprano solo, Myrtle Stinger; Reading, Mrs. Mary B. Bennett.

WIP (Eastern, 509), 10:00-11:00 P. M., Musical selections; **1:00-2:00 P. M.,** Dinner dance music; **3:00-4:30 P. M.,** Orchestra selections; **6:00-7:30 P. M.,** Dinner dance music, Uncle Wip's bedtime stories.

WLW (Eastern, 360), 8:00 P. M., Program, The General Protestant Orphans' Home Band; "Star Spangled Banner," Military Escort Band; "Meditation" from "Thais," "Easter Dawn," Thomas Gay, violinist; Overture, Band; Address, R. A. Longman, Supt.; "Spring Folly," "The Mocking Bird," Ruth Wilhelm, whistler; Banjo solos, Bruce Pollard; Medley selection, "Massa's Birthday," Band; "Dance of the Robins," Ruth Wilhelm, whistler; "Grandpa Maypole," a play presented by Junior Students of the Reulman School of Expression; "The Troubadour," "America Exultant," Band.

WMAQ (Central, 448, Daylight Saving), 4:35 P. M., Sketch from play, "Light Wines and Beers"; **7:00 P. M.,** Stories, Georgene Faulkner; **9:15 P. M.,** George D. Hess, baritone; R. E. Williams, pianist.

WOC (Central, 484), 12:00 M., Chimes concert; Educational talk, D. K. Kirck; **7:00 P. M.,** Recital, Erwin Swindell, organist; Mrs. F. E. Fuller, soprano; Lillian Dewold Murphy, reader; **8:00 P. M.,** Lecture, "Americanism," Frank S. Moses; **10:00 P. M.,** Musical program, Opera Study Club, Moline, Ill.

WOO (Eastern, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt, organist; **2:00-3:00 P. M.,** Short talks and musical selections; **4:30-6:00 P. M.,** Organ recital; **7:30-8:00 P. M.,** Short talks; **8:00-12:00 P. M.,** Orchestra selections and songs.

WWJ (Eastern, 517), 7:00 P. M., The Town Crier; News Orchestra; Vocal selections, Rens Holden, baritone; Talk, Rep. David O'Connell, of New York; Vocal selections, George A. Voltz, tenor.

Thursday, May 17

CFCA (Eastern, 400, Daylight Saving), 8:00-9:00 P. M., Concert, Selection from "Carmen," Star Orchestra; Character sketch, "Mia Rosa," Fred Whitlow; Selection from "The Firefly," Orchestra; "A Perfect Day," W. Woods, cornetist; Musical monologue, "O Memory," Fred Whitlow; Cornet solo, W. Woods; "Vivienne," Orchestra; "Jim," Fred Whitlow; "Chant Sans Paroles," H. Saunders, cellist; "Serenade," Orchestra; **10:00-11:00 P. M.,** Dance program, Star Orchestra.

KDKA (Eastern, 360), 5:05 P. M., Organ recital, H. R. Webb, Cameo Theater; **7:15 P. M.,** Lecture, "Macbeth," Walter E. Kealy; **7:30 P. M.,** Concert.

KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Art," Member San Francisco Palace of Fine Arts.

KHJ (Pacific, 400), 1:15 P. M., Musical program; **6:45-7:30 P. M.,** Children's Hour; Bedtime story; Concert; **8:00-10:00 P. M.,** DeLuxe program, Chamber of Commerce, Huntington Park, Calif.

KSD (Central, 546), 8:00 P. M., Concert, Seth Arbergh's Orchestra; Raymund Koch, baritone; Arthur Lieber, pianist; Addresses, U. S. Senator James A. Reed, W. Frank Carter; **10:30-11:30 P. M.,** Concert, Municipal Theater, St. Louis Symphony Orchestra; **12:00 M.-1:00 A. M.,** Dance program, Seth Abergh's Orchestra.

KYW (Central, 447, Daylight Saving), 2:35-3:00 P. M., Concert, courtesy of Lyon & Healy; **8:00-8:58 P. M.,** Musical program, Marjorie P. Shotwell, soprano; Eugene Wallenius, baritone; Edward Dufresne, baritone; The Paramount Orchestra; **9:05-9:25 P. M.,** "Twenty Minutes of Good Reading," Rev. C. J. Fernin, S. J., head of Department of English, Loyola University.

WBAP (Central, 476), 7:15-8:00 P. M., Concert, Cornelius Qaurtet; **9:30-10:30 P. M.,** Concert, Texas Hotel Orchestra.

WBZ (Eastern, 442), 8:00 P. M., Concert, Hortense W. Philbrick, contralto; Gertrude Philbrick, pianist; Mrs. Hazel Card Whalen, violinist, soprano.

WDAP (Central, 390, Daylight Saving), 10:00 P. M., Musical program, Gladys Cable, soprano; Mme. Stevenhagen, accompanist; Frank Polesny, violinist; Frank Pfau, pianist; J. Benson, tenor; Mrs. E. Michels, contralto; Mrs. Daisy Diessing, soprano; H. H. Haugs, baritone; Helen Cepal, violinist; Dance musit, Jack Chapman's Orchestra.

(Continued on page 9)

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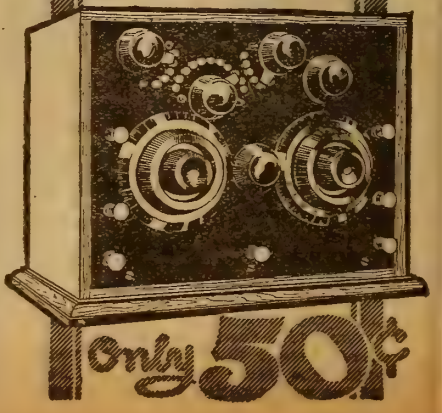

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How to Make One Condenser Flivver Super Set

Part III—Circuit Diagram and List of Parts

By E. T. Flewelling

OUR last talk on the one condenser Flewelling circuit discussed the tuning and tickler coils for this set. These were of the variocoupler type in contrast to honeycomb coils, and the question has arisen as to why the change was made. It really is a matter of personal choice. All Radio sets may be constructed in various ways according to the needs or fancies of the builders, and the set which we are now describing is merely another method of arriving at the successful operation of the Flewelling circuit.

The circuits and sets that have been previously described have worked out very well indeed, but one never stands still and the present set, we believe, will be accepted as another step ahead. The advantage is in the circuit used and it will be seen at once that it might just as well be constructed with honeycomb coils as not, according to the builder's desires.

The next step for us to consider after the inductances is what parts are to be used, and it is perhaps best to give here the complete list of parts that will be necessary to use to construct the set.

The list is as follows:

The inductance unit described last issue.

One bakelite panel about 9 by 9 inches and one sheet of copper foil of same size to be used to shield the instruments.

One tube socket.

One 11-plate variable condenser .00025 mfd. vernier type recommended.

One tube rheostat, vernier type if possible.

Two dials, one for the variable condenser and one for the tickler.

Eight binding posts.

One switch lever with 7 points.

One switch lever with 2 points.

One suitable wooden board to mount panel, etc., on. This board should be ½ inch shorter than panel to allow for mounting set in cabinet if it is desired and about 8½ by 5 by ½ inch thick will be right for the panel size given.

One variable grid leak, panel mounting type preferable.

One grid condenser .00025 mfd. capacity, with mica dielectric.

One mica dielectric fixed condenser of .006 mfd. capacity.

Suitable screws for mounting parts, wire and clips for connections, A battery, B battery, phones and a tube.

Many fans will ask just what particular parts to use, and to this question we must answer, just the best. No fear need be entertained as to whether the receiver will operate and one will be far better satisfied in the end if only good reliable apparatus is used.

Critical Apparatus

The only critical pieces to consider are the following, and we might offer a few suggestions regarding them: The variable grid leak is very important and should be one that has a large range of adjustment. Try to get one that is guaranteed and that may be exchanged if it does not operate properly. The best that you can buy will be the surest way to success that we know of.

The grid condenser should be of a well constructed type, that uses mica for its dielectric and one that will be easy to mount with the grid leak. In this connection let me advise the use of a combination grid leak and grid condenser that may be mounted directly upon the panel so that all adjustments of the leak may easily be made.

The large fixed condenser of .006 mfd. capacity should also follow the scheme of things. This should be of good solid construction and it is important that this condenser also uses mica for its dielectric.

Tube for Best Results

Regarding the tube to be used with the set, the following is suggested: A hard tube such as the UV201, UV201A, WD11 or WD12 is recommended and note also that if you wish to, you may use a soft tube such as the UV200. In other words, use the tube that you have on hand or is easiest to obtain.

A great many will ask at once which tube is the best? There is no direct answer to this question because no two tubes are alike in their operating characteristics even though they may bear the same labels. The advantage lies with the hard tube of the UV201 and UV201A type because of the greater volume that these tubes give.

If a soft tube is used, it will be found very critical when used in the set, especially if it is operating as a Flewelling set. The volume is not as great as may be wished for. This tube however is perhaps our best tube for use as a plain detector tube, it is at all times best at a critical plate voltage. Summing the tube question up gives us the answer that any good vacuum tube will work in the circuit and that the difference in various tubes lies in the volume that they deliver and in how critical they are to handle.

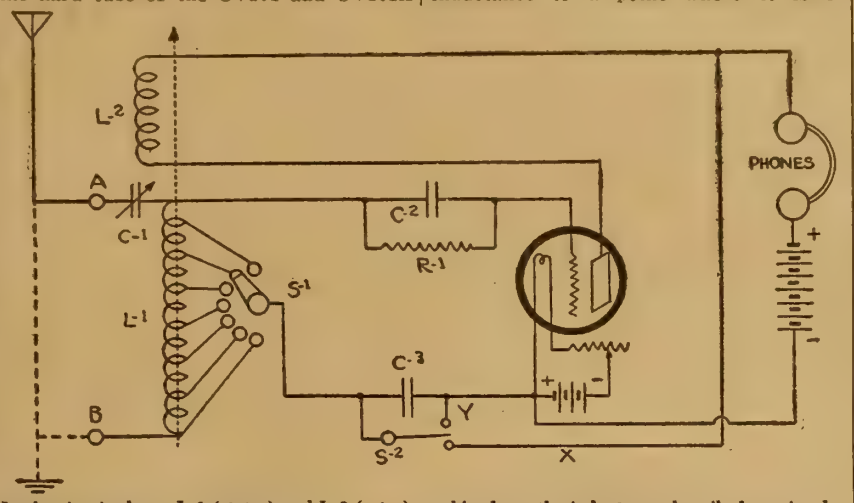
Departure from Original Layout

It will be seen by now that this receiver is going to depart a bit from the usual Flewelling layout. The reason for this is that it will enable the greatest number of fans to join the circle and also because we are finding it possible to further simplify the circuit. We all are anxious to reduce our sets to the simplest possible form and the writer believes that the set that we are describing is a real step in the right direction. For instance you are asked to study very carefully this wiring diagram of the set.

Connections for the Set

It will be seen at once that the variable condenser has been changed from a parallel or shunt connection with the inductance to a point where it is in series with the antenna, or ground, whichever is being used. That is, one side of the variable tuning condenser is connected to the side of the inductance that is connected to the grid condenser and leak and whatever type of energy collector that is used, is connected to the other side of the variable condenser.

The incoming signal goes from the energy collector, through the variable tuning condenser, touches on one side of the tuning inductance, goes through the grid leak and its condenser directly to the grid of the tube. If this variable tuning condenser were to be connected to the side of the inductance that is connected to the filament of the tube it would be useless and this is why the above emphasis is made.



In the circuit above, L-1 (stator) and L-2 (rotor) combined are the inductance described previously; S-1, tap switch on stator of inductance; C-1, 11-plate variable condenser, vernier preferred; C-2, .00025 mfd. mica fixed condenser; R-1, variable grid leak; C-3, .006 mfd. mica fixed condenser; S-2, single pole double throw switch when thrown to X makes set a Flewelling Super, when thrown to Y, converts set to straight regenerative; A and B, terminals for either aerial or ground, or one of these alone, interchangeable

Used as a Super

When the circuit is used as a super there will be no connection whatever to the point B on the diagram. This point is only to be used when the set is operating as a plain regenerative circuit. As a super any connection of the set to ground or antenna should be made to the point marked A. Here is a point to remember, although we will speak of it when referring to the operation of the set in order to secure any effect from the tuning condenser when using no antenna or ground it will be necessary to arbitrate and use a short antenna consisting of from 3 to 6 feet of wire or a convenient coal hod or bed spring or auto frame connected as stated to the point A.

This completes the list of parts and materials needed and we will pass on to the panel layout, because we are going to try to show that there is a best position for the various pieces.

Panel layout will be the next article.

(TO BE CONTINUED.)

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Western District Office: 417 South Dearborn Street, CHICAGO, ILL.

Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

WAAK, Milwaukee, Wis. 360 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 11 am-2 pm, 8-10:30, music. Eastern.

WAAN, Columbia, Mo. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 360 meters. 600 mi. New England Motor Sales Co. Daily ex Sun, 9:30 am-5:30 pm, every half hr. Eastern.

WAAS, Decatur, Ga. Georgia Radio Co.

WAAW, Omaha, Neb. 360 meters. 500 Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 8, market reports; 8:15-9 pm, music. Central.

WAAY, Youngstown, O. 360 meters. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABA, Lake Forest, Ill. 266 meters. Lake Forest College.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABD, Dayton, O. 283 meters. Parker High School.

WAJT, Marshall, Mo. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. Sterling Elec. Co.

WBAF, Moorestown, N. J. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 360 meters. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9:15-9:45 am, 10:30-11, 1-1:15 pm, 2:15-2:30, 4:30-5:30, music. Sat. morn. only. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram. Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 3:45-4, markets; 5:30-5:45, 6:30-6:45, 8, sports. Daily ex Sat, Sun, 7:15-8 pm, 9:30-10:30, concerts. Sat, 7-7:20 pm, bible lesson. Sun, 11 am-12:15 pm, church; 3:30-4:30, concert. Central.

WBAU, Hamilton, O. 360 meters. Republican Pub. Co.

WBAV, Columbus, O. 360 meters. 500 mi. The Ernor Hopkins Co. Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. Marietta College.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBL, Anthony, Kans. 360 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 360 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. Temporarily discontinued.

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 326 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone Chem. Co.

WCAG, New Orleans, La. 360 meters. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thurs, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 360 meters. 500 mi. Entrekin Elec. Co. Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAR, San Antonio, Tex. 360 meters. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 360 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 9:30-11 pm, music, lectures. Mon, Wed, Thurs, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 360 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 360 meters. 500 mi. Durham & Co., Inc. Daily ex Sun, 11:15 am-12:15 pm, 1-1:30, 2:15-3, 5-6, reports, music. Mon, Thurs, 6:30-8 pm, music. Tues, Fri, 8-10 pm, concert. Thurs, 9-11:30 pm, music. Sun, 10:55 am, church services. Eastern.

WCAV, Little Rock, Ark. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 360 meters. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. Univ. of Vt.

WCAY, Milwaukee, Wis. 360 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Sun, 7:30-8:30 pm, church services. Central.

WCAZ, Carthage, Ill. Carthage College.

WCE, Minneapolis, Minn. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. Univ. of Tex.

WCN, Worcester, Mass. 360 meters. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program, irregular. Eastern.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. 360 meters. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. J. Laurance Martin.

WDAH, El Paso, Tex. Trinity Methodist Church South.

WDAI, Syracuse, N. Y. 360 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert. Eastern.

WDAJ, College Park, Ga. 360 meters. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 360 meters. 150 mi. Hartford Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex. Automotive Elec. Co.

WDAP, Chicago, Ill. 390 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros.

WDAS, Worcester, Mass. Samuel A. Waite.

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern.

WDAX, Centerville, Iowa. 360 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 244 meters. 300 mi. Fargo Radio Electric Co. Daily ex Sun, 9:30 am, weather. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church service; 4-5 pm, music. Central.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, Stapleton, N. Y. 405 meters. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 360 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. Fallain & Lathrop.

WEAB, Fort Dodge, Ia. 360 meters. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8 music; 8:35 markets; 9:45, weather. Fri, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAD, Atwood, Kan. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Daily ex Sun, 4:30-5:30 pm, Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Eastern.

WEAG, Edgewood, R. I. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 360 meters. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. Cornell Univ.

WEAJ, Vermilion, S. D. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Thur, 8-9:45 pm, concert. Central.

WEAM, North Plainfield, N. J. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 360 meters. 50 mi. The Shepard Co. Daily ex Sun, 12-1 pm, 4-5, 6-8, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern. Daylight Saving.

WEAO, Columbus, O. 375, 360 meters. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. John J. Fogarty.

WEAU, Sioux City, Ia. 360 meters. 200 mi. Davidson Bros. Co. Daily ex Sun, 10 am, 11, 2, 5 pm, reports, markets, news. Mon, Wed, Fri, 8 pm, concert. Sun, 7 pm, church service. Central.

WEAV, Rushville, Nebr. 360 meters. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAX, Little Rock, Ark. T. J. M. Daly.

WEAY, Houston, Tex. 360 meters. 1,500 mi. Will Horwitz (Iris Theater). Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm. Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 360 meters. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WEY, Wichita, Kan. 360 meters. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:15-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 360 meters. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAF, Poughkeepsie, N. Y. H. C. Spratley Radio Co. Temporarily discontinued.

WFAG, Waterford, N. Y. 360 meters. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. Hutchinson Elec. Service Co.

WFAQ, Cameron, Mo. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri 11 pm, concert. Central.

WFAU, Boston, Mass. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Daily ex Sun, 10:00 am, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAZ, Charleston, S. C. 360 meters. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evening, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital; 7:30 church services. Eastern.

WGAB, Houston, Tex. 360 meters. 250 mi. QRV Radio Elec. Co. Daily ex Sun, 8:45-9:15 am, news. Sat, 7 pm, news; 8-9:15 pm, concert. Central.

WGAD, Ensenada, Porto Rico, 360 meters. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAF, Tulsa, Okla. Goller Radio Service.

WGAH, New Haven, Conn. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 360 meters. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAL, Lancaster, Pa. 360 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Mon, Wed, Fri, 7-8 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 360 meters. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. Southwest American.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. Ernest C. Albright.

WGAX, Washington C. H., O. 360 meters. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 300 meters. Register and Tribune. Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Daily, 5-6:45 pm, Children's Hour, reports codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm. Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 830, church services; 9, concert. Eastern.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 360 meters. 1,000 mi. Federal Tel. & Telg. Co. Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern. Daylight Saving.

WGV, New Orleans, La. 400 mi. Interstate Elec. Co. Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 12 m, 12:30 pm, 6, 10, reports, time, sports. Mon, Tues, Thur, Fri, 2-2:30 pm, 7:45, concert. Sat, 9 pm, special. Fri, 10:30 pm, special. Sun, 10:30 am, 4 pm, 7:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Daily ex Sat, Sun, 7 pm, lectures, news. Mon, Thurs, 7:30 pm, agriograms, concerts, sports. Sat, 12:15-1 pm, music, codes. Sun, 1:30-2:30 am, concert. Central.

WHAA, Iowa City, Ia. 200 mi. Univ. of Iowa. Mon, Tues, Wed, Fri, 8:30 pm, lecture, concert, news. Sat, 9 pm, sports. Central.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 360 meters. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 360 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. Univ. of Rochester.

WHAO, Savannah, Ga. 360 meters. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 100 mi. Otta & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 360 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 730-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Daily ex Sun, 12-1 pm, music. Mon, Wed, Fri, 6-8 pm, concert. Tues, Thur, 6-7 pm, music. Eastern.

WHAW, Tampa, Fla. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 380 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Mon, 8:15-9:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 360 meters. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 360 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm. music. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 485 also. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 360 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 360 meters. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 360 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Mon, 7:30-8 pm. Sun, 10:45-12 m, church services. Central.

WIAI, Sprignfield, Mo. 360 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 360 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 200 mi. School of Engineering. Mon, Tues, Thur, Fri, 11:30-11:45 am, news; 11:45-12:10 pm, lecture; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. Chronicle Pub. Co.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. Leon T. Noel.

WIAU, Le Mars, Ia. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 224 meters. 200 mi. Woodward & Lothrop. Daily ex Sun, 10-11 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Mon, Sat, 8-10 pm, concert.

WIK, McKeesport, Pa. 360 meters. 500 mi. K. & L. Elec. Co. Daily ex Sun, 630-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 360 meters. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. and Public Ledger. Daily ex Sun, 6-6:30 pm. Daily, 2-3 pm, 7-7:30 pm. Tues, 7-12 pm. Sat, 10:10-12 m. Sun, am, pm, church service. Eastern.

WIZ, Cincinnati, O. 360 meters. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engrng. Lab. Daily ex Sun, 3:30-4 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

WJAJ, Dayton, O. Y. M. C. A.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30 music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 360 meters. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAP, Duluth, Minn. 360 meters. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 360 meters. 200 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern. Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:30-6 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 1,000 mi. Union Trust Co. Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment. Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 360 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. R. C. A. and Westinghouse Co.

WJZ, Newark, N. J. 455 meters. 1,500 mi. Radio Corp. and Westinghouse Elec. Co. Mon, Thurs, Fri, 8:30-10:30 pm. Tues, 7-10:30 pm. Wed, 9-10:30 pm. Sat, 8:30-11 pm. Sun, 8:30-10 pm. Eastern.

WKAA, Cedar Rapids, Ia. 200, 360 meters. 200 mi. H. F. Paar, Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 360 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. Charles Looff.

WKAF, Wichita Falls, Tex. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. Planet Radio Co.

WKAK, Okemah, Okla. Okfuskee County News.

WKAL, Orange, Tex. Gray & Gray.

WKAN, Montgomery, Ala. 360 meters. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Granston, R. I. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 7:30-9 pm, entertainment. Eastern.

WKAR, East Lansing, Mich. Mich. Agrl. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. Laconia Radio Club.

WKAW, Beloit, Wis. 242 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 9:45-10 am, 10:15, 11:15, 11:45, 12:15 pm, 1:15, markets, weather; 2:30 pm, concert; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Thurs, Fri, pm, concerts. Central.

WL2, Fairfield, O. U. S. Army.

WLAC, Raleigh, N. C. N. C. State College.

WLAG, Minneapolis, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Tues, Wed, Fri, music. Mon, 10:10 pm, concert. Thurs, 9:15 pm, concert. Sat, 8:30, 10:30 pm, concert. Central.

WLAH, Syracuse, N. Y. Samuel Woodworth.

WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. Tulsa, Okla.

WLAN, Houlton, Me. Putnam Hdwe. Co.

WLAP, Louisville, Ky. W. V. Jordan.

WLAQ, Kalamazoo, Mich. 360 meters. 100 mi. A. E. Schilling. No regular program. Central.

WLAS, Hutchinson, Kan. 360 meters. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm; 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

ADVANCE PROGRAMS

(Continued from page 6)

WDAR (Eastern, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks and musical program; 4:30-6:00 P. M., "Affairs of the Heart," Betsy Logan; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Public Utilities and the Public," W. M. Holland; 8:30-9:30 P. M., Recital, Mrs. Albert L. Seales, singer; 11:00-12:00, Music, D. L. Whittle Music Company.

WFI (Eastern, 395), 10:00-11:00 P. M., Musical selections and short talks; 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Recital; 6:00-7:30 P. M., Musical program; 8:00-9:50 P. M., Vocal and musical selections; 10:10-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra.

WGR (Eastern, 360, Daylight Saving), 2:00-3:00 P. M., Music; 8:00 P. M., Boy Scout Radiogram.

WGY (Eastern, 380), 1:00 P. M., Music and address, "Causes of Malnutrition—What Conditions in Your Child's Life May Interfere with Normal Growth," Mary G. McCormick; 7:45 P. M., Musical program, Cambrian chorus; "Scherzo," Ruth Mabey, pianist; "Heaven at the End of the Road," "Sweet, Sweet Lady," "The Lamp in the West," Chorus; "Mrs. Murphy's First Auto Ride," "Myself and Me," Esther F. Welsberg, reader; "Bolero," Harold Wright, violinist; "I Heard a Cry," "Dawn in the Desert," Viola Primmer, contralto; "Rustle of Spring," Ruth Mabey, pianist; "The Soul of the Violin," Esther Weisberg, reader; "Give a Man a Horse He Can Ride," "Cradle Song," "Glorious Forever," Chorus; "In the Time of Roses," "Japanese Lullaby," "Laddie," Viola Primmer, contralto; "Slumber Song," Harold Wright, violinist; "Rosa," "In the Old Town Hall," Esther Weisberg, reader; "Sally in Our Alley," "The Land o' the Leal," Chorus; "Sweet and Low," Chorus.

WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theater; Margaret Munro, pianist; Ruby Freeman, soprano; Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Child Night, direction of Florence Montz; Reading, "An Interesting Historical."

WIP (Eastern, 509), 10:00-11:00 P. M., Short talks and musical selections; 1:00-2:00 P. M., Dinner dance music; 3:00-4:30 P. M., Song recital; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories; 8:00-9:50 P. M., Musical program; 10:10-12:00 P. M., Dance music.

WJAX (Eastern, 390), 7:30 P. M., Dance program, Everette Tryon's Dance Orchestra.

WLW (Eastern, 360), 10:00 P. M., Entertainment, Quartet from "Rigoletto," "Copper Moon," Opera Quartet; "The Great Awakening," Herbert C. Schatz, baritone; Soprano and tenor duet, Helen Kessing, Richard Pavey; Soprano solo, Helen Kessing; Reading, Blance W. Thompson; "When Will the Sun Shine for Me?" Quartet; "Nocturne," "Prelude," Margaret Ballentin, pianist; "Griggsley Station," "A Sad Mistake," Blance W. Thompson, reader; Aichele Novelty Orchestra.

WMAQ (Central, 448, Daylight Saving), 7:00 P. M., Readings, Mary Agnes Doyle; Talk on "Auto Trails," Rockwell Stephens, automobile editor of Chicago Daily News; 9:15 P. M., Musical program, Nesta Smith, violinist; Margaret Wilson, pianist.

WMC (Central, 500), 8:00 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 484), 5:45 P. M., Chimes concert; 7:00 P. M., Musical program, Erwin Swindell, Clara Swanson, Maude Miller Wheeler, Rosetta Wagner, S. B. Moats; 8:00 P. M., Lecture, "The A-1 American Boy," Berquist, Rock Island, Ill.

WOO (Eastern, 509) 11:00 A. M.-1:00 P. M., Organ recital; Mary E. Vogt organist; 2:00-3:00 P. M., Short talk and musical selections; 4:30-6:00 P. M., Organ recital, Mary E. Vogt, organist; 7:30-8:00 P. M., Musical selections.

WWJ (Eastern, 517), 7:00 P. M., The Town Crier; News Orchestra; Vocal selections, Edward S. Piggins, baritone; Talk, John W. Laird, president of Albion College; Hawaiian duet, John Kaihui, Henry Carter.

Friday, May 18

CFCA (Eastern, 400, Daylight Saving), 8:00-9:00 P. M., Concert, Selection from "Cavalleria Rusticana," Star Orchestra; Tenor solo, W. J. Colebrook; "Ballet La Source," Orchestra; "Hungarian Dance No. III," Mannie Roth, violinist; Tenor solo, W. J. Colebrook; "Gold and Silver," Orchestra; "Souvenir," Mannie Roth, violinist; "Sheperds' Hey," Orchestra; Tenor solo, W. J. Colebrook; "Soldiers' Joy," Orchestra.

KDKA (Eastern, 360), 5:15 P. M., Concert, KDKA Orchestra; 6:15 P. M., Address, "Guernsey Cattle," Chas. L. Hill; 7:30 P. M., Concert, Pitt Musical Clubs, Carnegie Music Hall, Pittsburgh.

KFDB (Pacific, 400), 2:00-2:30 P. M., Health program, San Francisco Tuberculosis Ass'n; 8:00-10:00 P. M., "Dads' and Lads' Night," "Grandfather's Boy," Dr. Warren J. Slurman, pastor Central M. E. Church; Harry Kolb, whistling solo; "Our Dads," Bob Koll; "Sons Thru a Dad's Specs," Arthur More; Ray Antsin, vocalist.

KHJ (Pacific, 400), 1:15 P. M., Concert; 6:45-7:30 P. M., Children's Hour; Musical program; Bedtime story, "Uncle John"; 8:00-10:00 P. M., Program, "Death Valley," Dr. Frederick Munson.

KSD (Central 546), 8:00-9:45 P. M., Vocal selections; Organ recital; Concert, Grand Central Theater Orchestra.

KYW (Central, 447, Daylight Saving), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy; 9:05-9:25 P. M., Book reviews, Llewellyn Jones; 10:00-1:00 P. M., Midnight Revue.

WBAP (Central, 476), 7:15-8:00 P. M., Concert, vocal and instrumental selections; 9:30-10:30 P. M., Concert, Orchestra of North Texas State Normal School, Denton, Tex.; R. S. Riggs, director.

WBZ (Eastern, 442), 6:00 P. M., Concert, WBZ Concert Orchestra, C. J. Fairfield; 7:30 P. M., Talk, "Between You and Me and the Motor Car," A. B. Vincent; 7:45 P. M., "The Necessity of Keeping Good Records," Thomas McCarry, Tax Consultant; 8:00 P. M., Concert, Octave Club of Agawam, Harold L. Hudson; WBZ Orchestra.

WDAR (Eastern, 305), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Vocal and piano selections; 4:30-6:00 P. M., Talk, "Affairs of the Heart," Betsy Logan; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00 P. M.-12:00 P. M., Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Dr. Stewart Hyer, of Southern Methodist University, Sunday-school lessons; 8:30-9:30 P. M., Orchestra and Chorus, A. Harris & Co., music.

WFI (Eastern, 395), 10:00-11:00 P. M., Musical selections and short talks; 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00-4:30 P. M., Song recital, Strawbridge and Clothier Male Quartet; 6:00-7:30 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra; Children's Own Half-Hour Stories by Cousin Sue.

WGR (Eastern, 360, Daylight Saving), 2:00-3:00 P. M., Music; 8:00 P. M., Musical program, Shea's Court St. Theater Orchestra, Herman E. Schultz.

WGY (Eastern, 380), 1:00 P. M., Music and talk, "Rules to Follow in Cake-Making," Modern Priscilla; 7:35 P. M., Health Talk, "Eradicating Tuberculosis in Cattle," State Dept. of Health; 7:45 P. M., Radio drama, "The Lion and the Mouse"; "Gavotte," WGY Instrumental Quartet; "A Dance of Olden Days," Quartet; "Memories of Childhood," "A La Polacca," "Valse Brilliante," Quartet; 10:30 P. M., Concert; "The American," WGY Instrumental Quartet; "A Bowl of Roses," "Evening Love Song," Harriet Ensign, contralto; "Farewell," Quartet; "Valse," Frank MacKenna, pianist; "Melodie," Quartet; "Shadows," Harriet Ensign; "Songs Without Words," "Consolation," "Boat Song," Frank MacKenna, pianist; "Intermezzo," Quartet; "Deep River," Harriet Ensign; "Tarantelle," Frank MacKenna; "Tango," Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theater; Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Delta Omicron Sorority of Louisville Conservatory of Music, Ruth Huffer, director; Reading, "An Interesting Historical Episode."

WIP (Eastern, 509), 10:00-11:00 A. M., Short business talks; 1:00-2:00 P. M., Dinner dance music; 3:00-4:30 P. M., Song recital and short talks; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.

WMAQ (Central, 448, Daylight Saving), 4:35 P. M., Travelogue, Homer Barton; 7:00 P. M., Talk of New England Music, Marx E. Oberndorfer; Louise Steele, soprano; 9:15 P. M., Musical program, Mrs. H. J. Brewer, violinist; Miss Bowman, pianist.

WMC (Central, 500), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gasper Pappalardo, director; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Talk, C. E. Wlient; 5:45 P. M., Chimes concert; 7:00 P. M., Musical program, P. S. C. Orchestra; 8:00 P. M., lecture, "Citizens' Military Training Camps," Major R. E. Carmody, Cavalry, U. S. A.

WOO (Eastern, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt, organist; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Organ recital, Mary E. Vogt, organist; 7:30-8:00 P. M., Musical program; 8:00-12:00 P. M., Band selections by J. W. C. I. Band.

WWJ (Eastern, 517), 7:00 P. M., The Town Crier; News poet; News Orchestra; Vocal selections, pupils of Marcus Kellermann.

Saturday, May 19

CFCA (Eastern, 400, Daylight Saving), 8:00-9:00 P. M., Concert, Selection from "Tom Jones," Star Orchestra; "Danny Boy," Kato Jackson, contralto; Second Movement from Tschaikowsky Concerta, Harry Adaskin, violinist; "Sizellieta," Orchestra; "Lullaby," Kato Jackson; "Espana," Orchestra; "Entrance of the Boyers," Orchestra; Contralto solo, Kato Jackson; "Serenade D'Amour," Orchestra; Soldiers' Chorus from "Faust," Orchestra.

KDKA (Eastern, 360), 2:00 P. M., Concert; 5:05 P. M., Organ recital; Howard R. Webb, organist; 7:30 P. M., Concert, Moarle W. Forney; Choral Club, Butler St. Methodist Church, Pittsburgh; "Inflammatus," "Rigoletto," "The Lass With the Delicate Air," "Do Not Go, My Love," "The Year's at the Spring," "Largo," "My Faith Looks Up to Thee," "I Heard You Pass By," "I Dreamt I Heard You Singing," "Lucia di Lammermoor," "Fairy Bark," "Daybreak," "Minor and Major," "The Lost Chord," "By Babylon's Wave."

KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Radio"; **2:30-3:00 P. M.,** Music.

KHJ (Pacific, 400), 1:15 P. M., Music; 6:45-7:30 P. M., Children's Hour; Music; Bedtime story, "Uncle John"; 8:00-10:00 P. M., Program, Negro talent.

KPO (Pacific, 400), 8:00-10:00 P. M., Dance program.

KSD (Central, 546), 8:00-9:45 P. M., Concert, Missouri Theater Orchestra; Organ recital, Vocal numbers.

KYW (Central, 447, Daylight Saving), 8:00-8:58 P. M., Musical program, courtesy of W. W. Kimball Co.; 9:05-9:25 P. M., "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 475), 7:00-7:20 P. M., Review of Sunday School lesson, Mrs. W. F. Barnum, leader of Barnum Bible Class, First Methodist Church.

WBZ (Eastern, 442), 7:45 P. M., Literary Evening, "Under the Evening Lamp," Youth's Companion; **8:00 P. M.,** Concert, John L. Thompson, baritone; Grace Thompson, pianist.

WDAP (Central, 390, Daylight Saving), 10:00 P. M., Musical program, Ariston trio; Dance music; Jack Chapman's Orchestra.

WDAR (Eastern, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Vocal selections; 4:30-6:00 P. M., Short talks; Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, "Current History Comment"; 8:30-9:30 P. M., Terrill School Orchestra, Harold Hart Todd; 11:00-12:00 P. M., Walter Paul Romberg, violinist; Miss Romberg, violinist; Mrs. Romberg, pianist.

WFI (Eastern, 395), 10:00-11:00 P. M., Short talks; 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Concert; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; Children's own half-hour stories by Cousin Gertrude; 8:00-9:50 P. M., Musical program; 10:10-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Hotel Orchestra.

WGR (Eastern, 360, Daylight Saving), 8:00 P. M., Concert, Vincent Lopaz' Orchestra, Hotel Statler.

WGY (Eastern, 380), 8:00 P. M., Dance music, Cain's Castle Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, H. C. Conrad, Alamo Theater; Concert, Mary Anderson Theater Orchestra; Mrs. Mary Louise Dohn, soprano; Laela R. Cain, reader; 7:30-9:00 P. M., Concert, Mary Hook Bettinger, soprano; Mrs. Robert K. Van Pelt, contralto; Robert Stein, tenor; Frances Sellors, whistler; Prof. Henry Dryer, Henry Dryer, Jr., saxophonists; Helen I. Mitchell, pianist; Reading, "An Interesting Historical Episode"; Grace Deppe, soprano; Margaret Munro, pianist.

WIP (Eastern, 509), 10:00-11:00 P. M., Musical program; 1:00-2:00 P. M., Dinner dance music; 3:00-4:30 P. M., Song recital and piano selections; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories; 8:00-9:50 P. M., Song and musical program; 10:10-12:00 P. M., Dance music.

WMAQ (Central, 448, Daylight Saving), 7:00 P. M., Vocal selections, Chas. W. Green, tenor; Talk, L. C. Grundeland, Live Stock Editor of Chicago Daily News; 9:15 P. M., Concert, Pennsylvania Railroad Band.

WMC (Central, 500), 8:00 P. M., Program by talent from Wynne, Ark., arranged by H. K. Barwick.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Talk, C. C. Hall; 5:45 P. M., Chimes concert; 7:00 P. M., Musical program, Erwin Swindell, "Girls' Glee Club, Monmouth College"; 9:30 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt, organist; 2:00-3:00 P. M., Short talks; 4:30-6:00 P. M., Organ recital, Mary E. Vogt, organist.

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CHICAGO

Sunday, May 20

KFDB (Pacific, 400), 7:00-7:30 P. M., Bedtime stories, Hermione Henze.

KPO (Pacific, 400), 11:00-12:15 P. M., Sacred music; Organ recital; readings.

KYW (Central, 447, Daylight Saving), 11:00 A. M., Church services, Orchestra Hall, Dr. F. F. Shannon, pastor; Musical program under direction of Daniel Protheros; **3:30 P. M.,** Chapel services, Ernest Bourner Allen, minister, Pilgrims' Church, Oak Park, Ill.; **7:30 P. M., Sunday Evening Club services;** Musical program, Choir of One Hundred, direction of Edgar Nelson; Speaker, Cornelius Woelfkin, New York City.

WBAP (Central, 476), 11:00 A. M.-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor; Will Foster, organist.

WBZ (Eastern, 442), 8:15 P. M., Church services, Rev. R. B. Lisle, pastor Highland Methodist Church, of Holyoke; Church quartet.

WDAP (Central, 390, Daylight Saving), 9:15 P. M., Henry Selinger and Drake Concert Ensemble.

WFAA (Central, 476), 2:30-3:30 P. M., Bible Class, Dr. Wm. H. Anderson, Jr., pastor First Presbyterian Church, Dallas; Music; **9:30-10:00 P. M.,** Footwarmers' Orchestra.

WFI (Eastern, 395), 4:00 P. M., Chapel services; 7:30 P. M., Church service, Arch Street Presbyterian Church, Sermon, Rev. Clarence Edward Macartney, D. D.; Organ recital, Alton K. Dougherty; **10:30 P. M.,** Organ recital.

WHK (Eastern, 390), 8:00 P. M., Concert, WHK Orchestra.

WGR (Eastern, 360, Daylight Saving), 3:00 P. M., Vesper Service, Rev. Ernest H. Ray, Richmond Ave. Church of Christ.

WHAS (Central 400), 9:57 A. M., Organ music; **10:00 A. M.,** Church services, Rev. Dr. Austin R. Middleton; Mildred Schierberban, organist; Margaret Bickel, soprano; Ethel M. Tuell, contralto; **4:00-5:00 P. M.,** Sacred Concert, The Beachmont Trio; Mrs. J. Harry Trent, soprano; Mrs. Blance Throp, soprano; Hedwig Pormann, contralto; Mrs. Hazel Willingter, accompanist.

WIP (Eastern, 509), 11:00 A. M., Church services, Holy Trinity Memorial Chapel, B. Janney Rudderow, minister; Ernest Felix Potter, organist and choir leader, male choir; **2:00-3:30 P. M.,** Musical program.

WLW (Eastern, 360), 11:00 A. M., Church services, Church of the Covenant.

WWJ (Eastern, 517), 7:30 P. M., Church services, St. Paul's Cathedral; **2:00 P. M.,** News Orchestra.

Monday, May 21

KFDB (Pacific, 400), 2:00-2:30 P. M., Book chat, Paul Elder's book store; **2:30-3:00 P. M.,** Talk; **8:00-10:00 P. M.,** "A Trip Thru Russia," San Francisco Chamber of Commerce, Russian Music.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Fred Cahoon's Orchestra.

WDAR (Eastern, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Vocal selections; 4:30-6:00 P. M., Talk, "Affairs of the Heart," Betsy Logan; Dream Daddy with little tots; 7:30 P. M., Dream Daddy with boys and girls; 8:00-12:00 P. M., Musical program, Arcadia Cafe Dance Orchestra.

WFI (Eastern, 395), 10:00-11:00 P. M., Musical program; 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Hotel Orchestra; 3:00-4:30 P. M., Recital; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Hotel Orchestra; Children's own half-hour stories by Cousin Sue.

WGR (Eastern, 360, Daylight Saving), 2:00-3:00 P. M., Music; 8:00 P. M., Event, Selling Buffalo by Auction, New Hotel Statler; speeches, "Buffalo's Main Assets," talks; 1:00-2:00 P. M., Dinner dance music; 3:00-4:30 P. M., Piano and song recital; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.

WLW (Eastern, 360), 8:00 P. M., Concert, The Bellevue Choral Society; "Nightfall in Granada," Chorus; "Variations—Old Black Joe," Esther Wall, pianist; "Slumber Song," Mrs. John Slpie, contralto; "Venus Valse," Oscar E. Bacon, cornetist; "Daybreak," "Evening," Chorus; "Ave Maria," Mrs. Frank Shattuck, violinist; "The Rosary," Edward F. Myers, tenor; "Night in June," Ladies' Chorus; "Melody in F," Merrill Abbot, violinist; John Bierly, cellist; Selma Chaliff, pianist; "By the Waters of Minnetonka," Besso W. Hall, soprano; "Serenade," Male Chorus; "Romance," "Rondino," Mrs. Frank Shattuck, violinist; "Sweet and Low," "How Can I Leave Thee," "Swing Low, Sweet Chariot," Edward F. Myers; Piano solo, Mrs. Edward Halloran; "Mighty Lak' a Rose," Ladies' Quartet; "Intermezzo," Trio; "The Silent Sea," Chorus.

WMC (Central, 500), 8:00 P. M., Concert, Washington Syncopators, H. H. Guinett, director.

WOO (Eastern, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt, organist; **2:00-3:00 P. M.,** Short talks and musical selections; **4:30-6:00 P. M.,** Song recital, Organ recital, Mary E. Vogt, organist; **7:30-8:00 P. M.,** Baseball scores and results of sporting events; **8:00-12:00 P. M.,** Orchestra.

Reviews of Books

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement Price, $2.00.

Lefax Radio Handbook. A loose-leaf handbook. This book never grows old or out of date. All of the latest apparatus and hook-ups are added as time goes on. Anything that grows old is taken out and new leaves substituted. Price, $3.50.

Home Radio. How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur that desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Radio for the Amateur. By A. H. Packer and R. R. H. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Elements of Radio Telephony. By William C. Ballard, Jr., M. E. A reliable, authoritative discussion, in simple form, of the essential principles of Radio telephony and their application. The use of mathematics has been almost entirely avoided. Price, $1.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, May 19, 1923 No. 6

Out-of-Studio vs. Studio Broadcasting

Atmosphere and Echoes Gained; Quality Lost

THE chief value of out-of-the-studio broadcasting lies in the possibility of securing events that could not be staged in the studio. But there is another factor that is important; namely, the atmosphere of life that is transmitted. The artist or speaker in the studio is addressing a silent audience. When he indulges in humor, there is no laughter; when he scores a point, there is no sign of approval; and when he finishes, there is no applause. But when the affair is broadcast in the presence of a real audience, both the speaker or artist and the Radio audience feel the difference.

The great difficulty with outside broadcasting is the poor acoustic conditions that are often encountered. Proper location of the microphone will sometimes remedy the worst defects, but there is usually a great deal of echoing and extraneous noises. The best artistic results will therefore always be obtained in the well designed studio until theaters, churches, auditoriums and other public places are specially designed with thought toward broadcasting.

Wonders of Radioland

Its Boundaries Have No Limits

WE have had dreamland, no-man's land and many other lands surrounded with mystery and romance. Few of us have failed to delight in the descriptions of what Alice found in Wonderland. But compared to Radioland, they are all places restricted in their delights.

Fairyland has always been associated with the relief of the troubled, the reward of the virtuous and the triumph of the lovely personality. Who does not remember the transformation of Cinderella; the glorious transformation of the handsome prince who for so many years was destined to live in the form of a frog?

But the story of Radioland furnishes more surprising accomplishments than Fairyland. It has all of the romance and all of the beanty of Dreamland. Its boundaries are far beyond the limits of no-man's land.

Greater than all of the wonders of Wonderland, is the fact that Radioland is a reality. It is the land that furnishes each day some astonishing accomplishment for the pleasure and benefit of the people. Romance, education, wealth and health are dealt out in it as if by magic. To the islands in the middle of the ocean and to the poles of the earth it sends and benefits. No imagination can fathom what it may do in the future.

Sets, Unlike Styles, Do Not Change

Once a Radiophan, Always a Radiophan

RADIO does not change overnight. The set that you purchase today will be good a year from today, and probably for many more years. The long distance receiving sets in thousands of homes at present are practically identical, with a few minor refinements, to the sets that were used by Radiotelegraph enthusiasts five years ago. If you have postponed getting a good set because you are waiting for a big change in Radio, you are missing more enjoyment per square inch than the individual who puts off buying an automobile for the same reason. Radio is not new—it is not a fad. Popular interest has merely become more widespread in the past year. Radiophone broadcasting has been conducted on a small scale for years; and Radiotelegraph broadcasting for more than a decade.

Don't expect your Radio sets to act like phonographs. You can't push the button for grand opera or jazz and get it necessarily. You will hear many stations better than over a phonograph, but some of them cannot be heard over a loud speaker for the reason that they are out of your range. When you analyze it, you will realize that in this fact lies the root of the lure of Radio. The fascination is in the uncertainty of the thing; always something new, greater distance to cover, and the ever increasing mystery of the science. If you just had to push the button to bring in anything you wanted to hear you would discard the set within a month. As it is, the experience of those who have followed Radio since its inception, decidedly indicates "once a Radiophan, always a Radiophan."

RADIO INDI-GEST

$000,000,000,000.19 COPPER IN CASH PRIZES—SOOPER CONTEST

Since the Stebbin's Sooper Degenerative circuit appeared in Indigest last week, seven mail carriers have dropped in a faint due to overwork bringing in letters of praise from Radioknuts.

As this circuit has caused this great wave of interest from so many, we have decided to offer **$000,000,000,000.19** in copper to the Radioknuts who send in the best drawings and letters of explanation on adaptations and operation of the Stebbin's Sooper Degenerative circuit.

The rules of the contest are but few and simple, so it is merely a matter of expended energy for you to be placed in the idle rich class by winning one of the cash prizes offered.

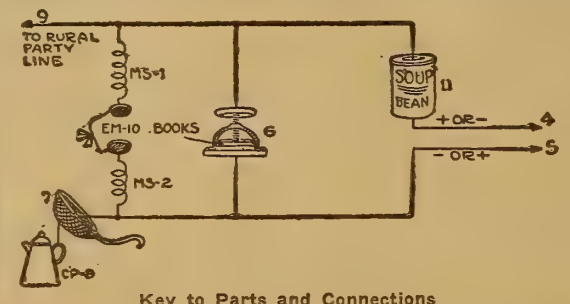
Rules of the Contest

1—Contestants should write on both sides of the paper only.
2—All answers should be mailed in and not delivered in person. (However, those Radioknuts living outside of Chicago may do so if they care to.)
3—In case of a tie for any one of the prizes the money will be donated to the Ice Fund for Esquimoux.
4—No person of sound mind is allowed to enter the contest if such is known to be the case by us.
5—All papers should be in our office at the earliest date possible as the contest will be considered closed at MIDNIGHT OF THAT DAY.
6—All contestants should give age and full name and present address; members of fair sex should send their latest photos. (Your right name will not be printed if you so specify.)
7—Judges of the contest will be Spire and Lew Antenna, The Radio and Music Trusts and Al Brown. (If we can locate H. J. Marx he will be added to open the mail.)
8—Cash prizes in copper will be paid as follows:

First Prize	$000,000,000,000.07
Second Prize	000,000,000,000.05
Third Prize	000,000,000,000.03
Four Equal Prizes	000,000,000,000.01

The Stebbin's Sooper Degenerative Circuit

For the convenience of those Radioknuts who intend to enter our big $000,000,000,0000.19 cash copper contest we are again showing the hook-up of the Stebbins Sooper Degenerative Circuit.



Key to Parts and Connections

MS-1, Marcelled coil; MS-2, Waterwave coil; 3, Nothing; 4 and 5, Connections to 110 or 1½ volt D. C. generator that has A. C. output; 6, Letter-press type condenser; 7, Strainer to keep out static and coffee; 8, Coffee pot for grounds; 9, Connection to rural party line; 10, Pair of D. C. C. ear muffs; 11, Campbell or Van Camp Sooper Detector.

Send in your papers or drawings AT ONCE and see which prize you cop off.

QUESTIONS AND ANSWERS

Q. & A. Dept. Indigest—Please give me a good test for ascertaining if tubes have the proper vacuum.
—Hill.

A—Grasp tube firmly in the right hand. Tap tip of tube with brick or sledge hammer, held in left hand. If there is a "plop" sound you can be reasonably sure that the tube had a good vacuum.

Dear Indigest: I see on quite a few Radio parts and pieces of apparatus the name Pat Pending. Can you tell me who this fellow is? Polly W.

A—Patrick is the inventor.

Dear Indi: In reply to Jimsie you say you are the leading paper in the Radio field and that you are running 000,000,000,007 more copies than your nearest competitor, the Radio Digest. I would like to get the address of the latter publication and also where can I buy it?—Lillian G.

A—We have never seen an issue of it yet, sorry can not give more information but it is unknown to us.

You Wrecked Our Week's Salary Sending It Collect

WESTERN UNION TELEGRAM

INDIGEST
123 W MADISON ST
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COLLECT

NOTE ALAGONQUIN TONSILS III LETTER STOP CAN YOU ADVISE WAVE LENGTH OF BROADCAST OF LIQUOR BY A R R L STOP LOCAL GIN MILL ADVERTISES THREE FINGER LISTEN IN FOR HALF BUCK
SPIDER WEBB

Then You Have a Record?

Dear Indigestures: As soon as I got my last week's copy of Indi-Gest I started in frantically to build a Stebbin's Sooper Degenerative set. I had hardly got the connections tied when I heard the Victrola in the next room very plainly. —Spark Coil.

(1) We Do Too, (2) We Shall, (3) So Do We

Dear Indi: I appreciated the poems of Walt Drummond and J. Foster More very much. Please ask them to broadcast some more of this stuff on the same wave length. I like the column fine since you moved over.
—J. Walker.

Looking Ahead

Who Will Win the Great $000,000,000,000.19 Cash Copper Contest? We have sat up all night long for the past week trying to figure it out. It will be with great anxiety and impatience that we shall sit outside of the locked and barred doors of the judge's room to await the decision. As for you—WATCH INDIGEST!—Get your copy of INDIGEST from your most polite newsdealers—10c.

Spencer, in The Omaha World Herald

Condensed

By DIELECTRIC

A very interesting number of Copley Plaza Topics describes what took place in their broadcasting rooms when they offered prizes of Easter eggs to listeners in. Few hotels in the country have availed themselves of transmitting sets, but this one in Boston is having a great success.

Radio expositions are as popular centers of attraction now as they were when the initiated were fewer in number. The National Radio and Electrical Exposition held at the Civic Auditorium in San Francisco had an average daily attendance of five thousand persons. To make it distinctly a Radio affair the music was supplied by Station KPO and received in the auditorium each evening. Mayor Rolph's speech was heard not only by those present but by a host of listeners in, as it was transmitted by this same station.

Considerable fuss has been stirred up over the broadcasting of copyright music. That many of the larger broadcasting stations are determined to replace such music with unrestricted selections would indicate a very small profit to the American Society of Composers, etc., from this source. It's the same old tale: the broadcasters are providing free advertising, but the beneficiary thinks he should be paid to allow them to do it. Radio cut the sales of phonograph records, sheet music, opera tickets and so on down the list! What a curse it is!!

That Detroit news item about "bootlegging peanut tubes" is easily explained—I mean the matter, not the appearance of the item. You see, the Canadian Radio dealers are a far-sighted lot of men who purchased an enormous quantity of these little tubes soon as they appeared on the market. That naturally created a scarcity, since the maximum output is so limited (?), and we in this country have had to wait for the factories to catch up. Plausible, isn't it? Quite as much so as some of the excuses offered to fretting consumers.

For those who enjoy dance music, and can pick up WNAC the Shepard Stores station in Boston, a great treat is in store since the music supplied by the orchestra of the Copley-Plaza Hotel in that city is now sent out through the ether. There are quite a number of stations supplying regularly to their Radio audiences dance music that is well played and no one need be without music in his home for the purpose of entertaining guests by dancing. The new wave length, 286 meters, which WNAC is now using, should be an aid in picking up their station.

There have been instances of those out of employment attempting to have broadcasting stations announce their predicament to the world of listeners in. Had they applied to the New York State Employment Bureau the result might have been different, as that bureau is locating men for vacant positions through its weekly announcements from Station WGR. The applications coming in response to the broadcasting are said to be from all over the world. This is a feature that other employment bureaus might consider with a view of relieving the present shortage of labor in some sections of the country.

There have been several instances of Radio reception by societies in one state from an allied body in another, so while the recent Radio concert given the members of the New Orleans Chapter of American Association of Engineers by the San Francisco chapter was not unique, it serves to emphasize the practical way in which two fraternal groups may feel as one. Also it becomes possible to have a very diversified program without the necessity of transporting a large number of entertainers. It would be an interesting experiment to have an evening devoted to addresses by officials in some national order representative of each section of the country. The speakers would follow one another in some preconceived order from their respective broadcasting stations, thus holding a national public meeting.

First Steps for Beginners in Radio

Chapter III—Part I; Pointers About Aerials and Grounds

By Thomas W. Benson, A. M. I. R. E.

STRICTLY speaking, the aerial is that part of a receiving set which collects or rather has currents induced in it by the passage of Radio waves. Therefore it often happens that the wiring in the Radio set proper acts as an aerial to receive over fairly long distances. However, we usually connect the term with some particular device arranged for the purpose of receiving the wave impulses. Aerials can be classified into two general classes, namely, capacitive and inductive, although the action of most aerials combines both properties in their operation.

Outdoor Aerial

The usual outdoor aerial structure comprising one or more insulated wires suspended between elevated supports is of the capacitive type, that is, the elevated conductors form one plate of a condenser, the ground being the other. As regards types they are either of the inverted L or T type as shown in Figure 6. We shall first consider how these aerials function and then decide which method of construction is preferable.

For an example let us take an inverted L as shown in Figure 7, with the free end pointing in the direction from which the waves are coming. When the wave strikes its free end. In the T aerial, where the lead-in is brought down from the center, the directional effect is not so noticeable.

Resistance of the Aerial

Since the induced currents are at best very weak, it is advisable to keep the resistance of the aerial circuit as low as possible. We cannot always do this by using simply a heavier wire because another phenomena comes into effect; namely, skin resistance. When the current in a wire is of very high frequency, say 750,000 cycles at 400 meters wave length, as we learned previously, the alternations in direction of flow take place so rapidly that the current does not penetrate to the center of the wire.

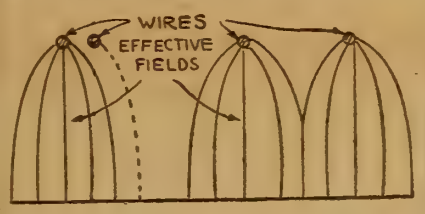

Figure 8—Showing Resulting Fields When Wires Are Spaced Close and Far Apart

At such frequencies it flows only on the surface of the wire. Therefore we reduce the resistance by using a stranded wire, usually 7 strands of No. 22. For the same reason it is advisable to use a wire that is noncorrosive or is protected in some way from the action of the elements. The tinned wire is then to be preferred, while a wire made up from enameled wires stranded together makes an excellent aerial.

Number of Wires Used

Another point often in question is how many wires to use in the flat top. The usual practice is four, separated about 3 feet apart. As a matter of fact it is the writer's belief that there is no advantage in using more than one wire unless they are separated 10 or 12 feet. The reason for this will be apparent from Figure 8. Consider one wire used as an aerial and its effective field will take the form shown by the lines. If this wire is 30 feet high and we put another wire within 3 feet of it as shown the added field is but slightly larger, whereas, when the wires are spaced 10, 12 or 15 feet apart, then an appreciable advantage is obtained. The effect of placing the wires close together is then only that of one wire, but with a lower resistance due to the increase of conducting surface.

Length of the Aerial

Another factor that is important is the length. For efficient operation the length of an aerial should be considered from the point of view of the wave lengths to be received. The length should be such that the fundamental or natural wave length of the aerial is less than the wave length to be received.

A simple method of calculating the wave length of an aerial is as follows: Add the length in feet of the flat top, lead-in and ground wire, and multiply their sum by 1.5. When more than one wire is used in the flat top the result is increased by one third, due to the inductance of the additional wires. Where a T aerial is used only one half of the length of the flat top is used in the formula.

Natural Wave Length

The natural wave length of the aerial should be enough shorter than the wave length to be received that sufficient inductance can be used in the tuner that a high voltage drop will be obtained across same if of the straight tuned type, or enough turns can be employed to transfer

(Continued on page 14)

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:

Chapter IV—About Condensers and Inductances.
Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

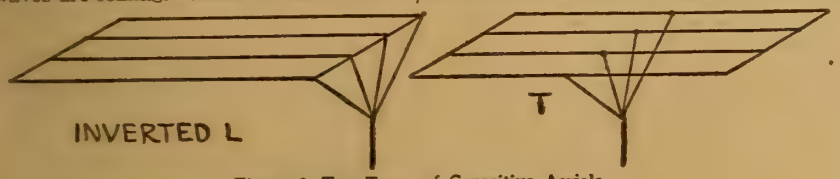

Figure 6—Two Types of Capacitive Aerials

the aerial the electrostatic component of the wave place an electric field between the two plates of the condenser formed by the aerial and the ground. We know that when an electric charge is put on two plates separated by a dielectric, an electric stress is present between the plates.

Conversely, when we put an electric stress between two plates as in this case an electric charge will be induced on the plates, hence a difference of potential exists between the elevated wire and the ground which causes a current to flow between the two plates. In addition, when the wave passes the vertical wire or lead in the magnetic component induces a current in the vertical wire that either assists or opposes that induced by the electrostatic field.

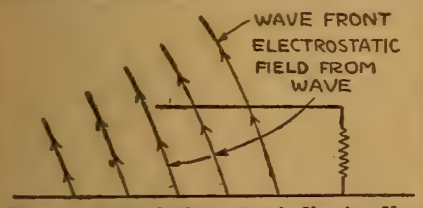

Figure 7—Wave Striking Aerial, Showing How Stress Between Aerial and Ground Results in Current Being Induced in Aerial Circuit

We see then that this so-called capacitive aerial has currents induced in it by virtue of its capacity and also by electromagnetic induction. The relative values of these currents from the two sources will vary as the length of the plate portion and the height of the aerial are altered.

The most noticeable effect of these two currents is in the fact that an inverted L aerial is directive in its effect. An aerial of this type will receive best away from

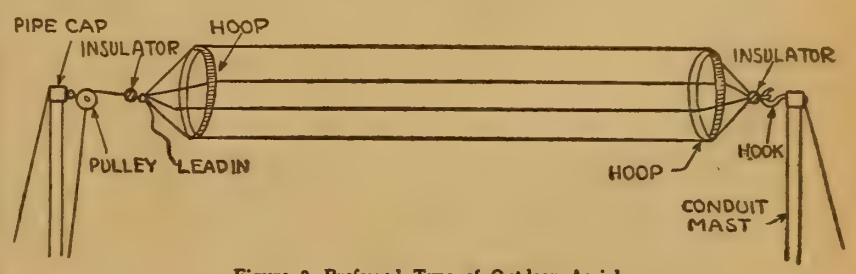

Figure 9—Preferred Type of Outdoor Aerial

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
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Spirola TRADE MARK **BETTER LOUD SPEAKERS $3.85**

TRUE CABINET TYPE, like the finest modern phonographs, with all their beauty and perfect tone. Makes your two-step set a real ENTERTAINER for family and friends. SPIROLA DUPLEX uses any headset. SPIROLA SIMPLEX uses Baldwin or other unit. Either type, black with nickeled fittings, $3.85; mahogany finish with bronzed throat, $4.85.
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1000 Miles Guaranteed on One Tube

A real radio set at a low price

Consisting of the following parts: 180° Variocoupler, Variable Condenser, 7x15 Panel already drilled, 2 Dials, Switch Lever Points Stops, Rheostat Socket, Binding Posts, Bus Bar, Sphagetti, Lugs and complete blue print to assemble in one-half hour.

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Two Stage Amplifier for above.....$15.00

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$1.25 7x10 Panels ..... .80
$1.00 Phonograph attach single..... .50
$6.50 1½ Volt Tubes Guar..... 3.95
.50 W.D.11 Bakelite Socket..... .35
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.75 Freshman Var. Leak only..... .60
$5.00 Elect. soldering Iron..... 3.75
$5.00 Detector Tube Guaran..... 3.50
$6.50 Amplifier tube, Guaran..... 3.95

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"SENIOR" SET

WONDERFUL!

That one word appears in nearly every one of the hundreds of letters written to us by happy owners of

MICHIGAN "SENIOR" and "JUNIOR" Regenerative Receivers

They tell us how stations two or three thousand miles away come in so clear that they can scarcely believe their ears when the announcer tells his location. How our patented Split Hair Vernier Dial Control enables them to tune in to almost any station, on which they had made previous record of dial-positions. How the tone-quality and volume they get through their Loudspeaker (with the Michigan Senior Receiver) approaches that of headphone reception on ordinary sets.

"JUNIOR" SET

Regeneration — or feeding the output of the detector tube back into the same tube instead of into a second tube; gives an enormous increase in the sensitiveness of the detector. This invention by Armstrong made modern radio telephony what it is.

"Michigan" Receivers are licensed under Armstrong's U. S. Patent No. 1,113,149 and pending letters patent No. 807,388.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

How to Make a Two Electrode Tube

Range of Crystal Set Increased with Tube

Those who are thinking of replacing their crystal detector with one of the new two element tubes may be interested to know that a very efficient one may be made cheaply, as follows: Secure an ordinary 3 volt miniature lamp bulb and stick tinfoil all around the outside of the glass tightly with liquid glue, taking care to exclude all air pockets in the tinfoil between it and the glass.

A wire is carefully soldered to the tinfoil with an iron which is no warmer than is absolutely necessary for the solder to run. The tinfoil covering is used as the plate in the ordinary two element tube.

Even better results can be obtained by immersing the globe in a metal dish of mercury. The mercury is used for the plate.

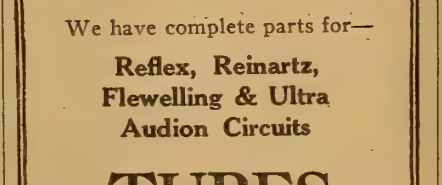
If such an arranged tube is used in place of the ordinary crystal detector, much louder signals and also an increase in range will be the result. Two ordinary dry cells should be used to light the tube filament and the flow of the current should be regulated with a 25-ohm rheostat. A hook-up using this tube is given. Range, 50 miles.—J. K. Smith, Chicago, Ill.

Pilot Lamp for Loud Speaker

Different attempts have already been made to attach pilot lights to loud talkers, utilizing the magnetic current so as to indicate the on and off condition. Generally a small 6-volt lamp is used, but it will be found that such lamps only help to drain the storage batteries.

I have developed a way to use alternating current to light a lamp. Any type relay can be used for this purpose, but it should be kept in mind that most relays have a high resistance, and it will be necessary to rewind the magnet. The magnet used in this case was a single type core and was rewound with No. 12 dcc magnet wire, with two layers, twenty turns to each layer.

Suitable lamps can be obtained for this purpose. A very neat and small lamp will be found in the red bullseye lamps which are used in flush receptacles for heating units or a switchboard pilot bullseye (red, green or white). Any kind of a good switch may be used, such as the automobile dash switch or push button kind used in lighting fixtures.—Peter S. Schott, Perth Amboy, N. J.



Faulty Audio Amplifiers

Faulty audio frequency amplifiers on weak signals, particularly on the first stage, is a common complaint. To begin with the same degree of amplification, should not be expected on weak and strong signals. That is, if with a nearby station the first stage gives an audibility amplification of twenty times, it will give less amplification possibly only doubling the signals of a distant transmitter. This is due to the fact that the output of a tube does not vary directly with the applied E. M. F., but more approximately with its square. Also throwing in amplifying apparatus appreciably alters the receiving conditions of the entire set which in the case of the very weak signals may render them inaudible. Therefore, when tuning is done the set should be slightly retuned when the amplifier is plugged in, especially on the adjustment determining regeneration.

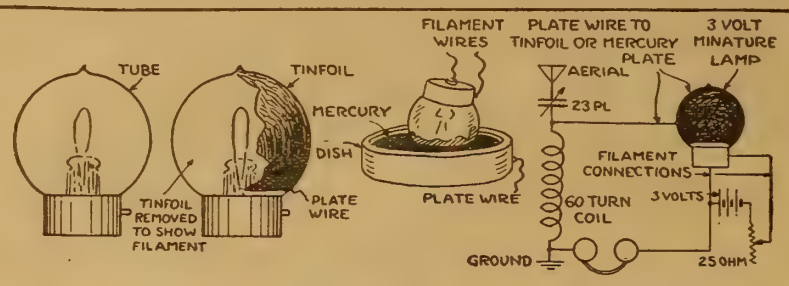
Probably the most common cause of such amplification lies in the failure to include a small .001 mfd. telephone shunt condenser across the primary of the first step. It is once more the problem of reducing the positive reactance in a Radio circuit. The inductance of an audio frequency transformer is made very high in order to secure a transfer of audio-frequency energy. The reactance is, therefore, much greater than that of the resistance, which combined with resistance obstructs the passage of the plate current.

Many instances of faulty amplification are due to transformer and tube troubles and the experimenter should always make tests to determine just where the trouble lies.

Directional Effect

An outdoor aerial does not necessarily have to run in any particular direction to pick up a certain station. The directional effect is very slight in most cases. Run the line the way that gives the most "open view," unobstructed by houses, etc.

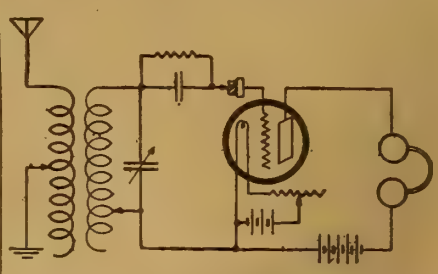
MINIATURE GLOBE USED AS TUBE



Crystal in Grid Lead Aids Signal Strength

Some time ago I inserted a crystal detector in series with the grid of my vacuum tube and found that it increased the range of my set about 350 miles. I use a loose coupler and a 23-plate condenser for tuning.

I am passing this hook-up along so that



it can be experimented with by some other Radio bug to increase their range.—R. Hoffman, Cincinnati, Ohio.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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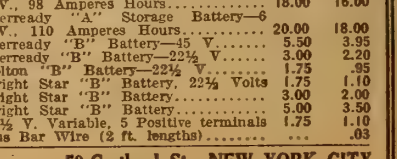
AERIOLA, SR. STYLE TUNER UNIT $5.65



3 5 c

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Edison BB-4 cells, any voltage, any capacity.
PEANUT TUBES, TINY AEROPLANE STYLE
REFLEX—REINARTZ—FLEWELLING
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11 Plate Condenser, moulded ends, .00025	2.50	1.35
43 Plate Condenser, moulded ends, .001	4.00	2.00
Franco 23 Plate Variable Condenser with Vernier	6.60	3.75
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Crown Triple Mountings with leads—screw adjustment	$ 5.00	$ 3.95
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	Hard Rubber	Bakelite		Hard Rubber	Bakelite
7x18	$1.65	$2.45	7x10	$0.95	$1.35
7x21	1.85	2.75	7x12	1.25	1.60
7x24	2.15	3.25	7x14	1.40	1.95

CABINETS
Extra fine quality—Hinged top—Mahogany finish.

7x10	$3.25	7x18	$3.95
7x12	3.40	7x24	4.25
7x14	3.75	12x14	3.95

PHONE CONDENSERS

		Our Price
All Capacities Fixed Condensers, Grid Leaks, etc.	$0.30	$0.09
Freshman Variable Grid Leak	.75	.60
Freshman Variable Grid Leak and Condenser combined	1.00	.75

All capacities of Dubilier Micadons and Freshman Micons in stock.

SOCKETS

	List	Our Price
WD-11 Socket	$1.00	$0.25
Red Bakelite Standard Base	1.00	.60
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VOLTMETERS
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0 to 30	Special	$1.75
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EXIDE "A" Storage Battery, 6 V. 40 Amperes Hours, Type 3 LXL5	17.85	14.00
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Everready "A" Variable Storage Battery—6 V., 90 Amperes Hours	18.00	15.50
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Everready "A" Storage Battery—6 V., 110 Amperes Hours	20.00	18.00
Everready "B" Battery—45 V.	5.50	3.95
Everready "B" Battery—22½ V.	3.00	2.20
Volton "B" Battery—22½ V.	1.75	.95
Bright Star "B" Battery, 22½ Volts	1.75	1.10
Bright Star "B" Battery	3.00	2.00
Bright Star "B" Battery	5.00	3.50
22½ V. Variable, 5 Positive terminals	1.75	1.10
Bus Bar Wire (2 ft. lengths)	...	.03

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WHOLESALE AND RETAIL

Making a Three Tube Reflex De Luxe Receiver

Part III—Details of Wiring

By H. J. Marx

THE COMPACTNESS of the Reflex De Luxe makes it ideal for automobile or motor boat installation, and will help make your summer recreation trips a real pleasure. A good loop or an aerial stretched between two trees with a natural ground, is all that is necessary for good reception. The storage battery in the car or boat will light the tubes and the plate battery takes but little room.

Importance of Proper Wiring

Just to emphasize the importance of careful wiring, it might be wise to relate the writer's experience with the first Reflex De Luxe Cabinet Set. The experimental circuit was first developed by means of apparatus mounted on a flat board. The wiring appeared to be a bewildering entanglement but strange to relate no inductive interference was encountered. When the cabinet set was assembled, it had to be done in very limited time. For this reason the wiring was hurriedly done, but **not carelessly soldered.** Insufficient attention however was paid to the alignment of the various leads. Fortunately no "bugs" were present at the first test. After all the battery connections, plus loud speaker and loop, were made the filament rheostats were turned. The ungodly collection of shrieks, groans, howls, squeals, grunts, whistles, etc., that issued from the horn, reminded one of Armistice Day, New Years, Fourth of July and St. Patrick's Day celebrations all confined in one room! Fearing ejection from the apartment, considering the hour, further testing was postponed.

The next night, after three vain hours of attempts at straightening out matters, it was decided to entirely rewire the set and take a whole lot more care in aligning the leads and making the connections.

Transformer Interference

Both of the R.F. transformers are over A.F. transformers. In order to avoid the possibility of magnetic influence from the audio transformers, the Radio transformers were raised ⅝-inch above the sub-panel. This was accomplished by taking some fiber tubing ⅞-inch inside diameter ⅛-inch wall and cutting off four pieces ⅝-inch long. These spacers were then inserted on the four transformer mounting screws between the base and the sub-panel. The space between was found sufficient to avoid interference.

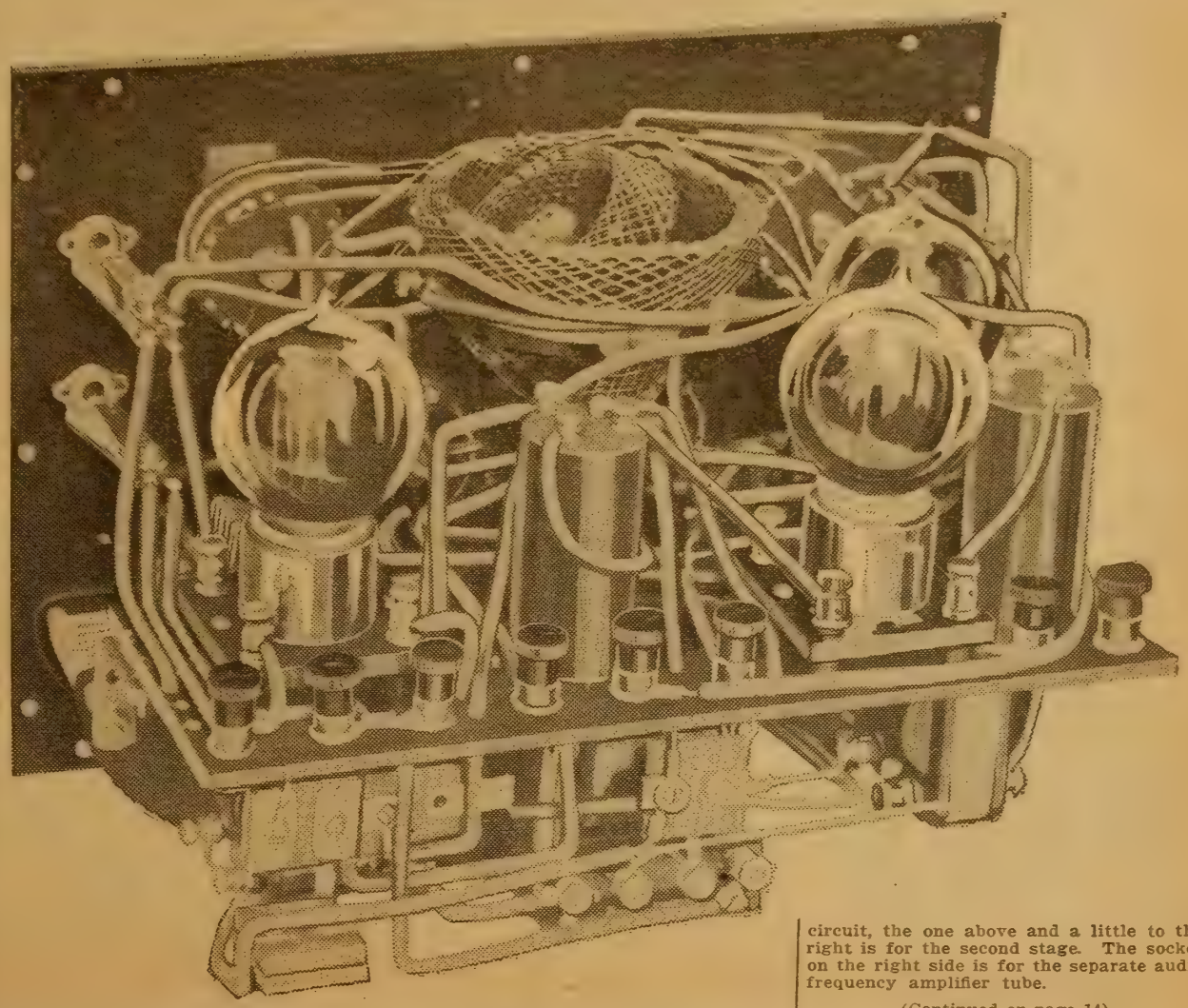
Classification of Leads

In order to keep track of interference possibilities, the leads for connecting apparatus can be classified as follows in the order of their importance:

1. Grid Leads.
2. Plate Leads.
3. Secondary By-pass Leads.
4. Primary By-pass Leads.
5. Negative "A" Battery Leads.
6. Remaining Leads.

The grid and plate leads should be added first keeping them absolutely as short as possible, and well separated from each other unless crossing at right angles.

The secondary and primary by-pass leads will have to be added in conjunction with the A battery leads, since the secondary by-pass runs to the negative A and the primary by-pass to the positive A. The remaining leads can then be added avoiding proximity and parallel runs to the grid and plate leads as much as possible.



Identification of Apparatus

In Part II, Figure 2, the sub-panel lay-out, the tube socket in the lower left hand corner is for the first tube in the circuit, the one above and a little to the right is for the second stage. The socket on the right side is for the separate audio frequency amplifier tube.

(Continued on page 14)

WD 11 Hook-Up positively free of body capacity

also giving selectivity, sensitivity and record distance, postpaid for 25 cents, or complete set of parts for $13.50.

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WD-11	$3.50	UV-201-A	$3.50
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ADVANTAGES

1st. Vernier All the Way. Three turns required from maximum to minimum capacity, instead of the customary half turn.
2nd. No Hand Capacity, if the plate nearest the hand is connected to the grounded, or dead side as we direct.
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4th. No Sliding Contacts to cause noise or trouble.
5th. Saves Space. Lies flat and requires but a fraction of an inch back of the panel.
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7th. Reasonable Price. About one-third the cost of a vernier rotary plate.

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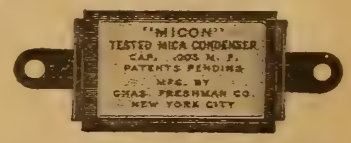

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.006 Micon	$1.00
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Radio Condenser Products

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Home of Freshman Variable Resistance Leaks

Ask for FREE Diagram of FLEWELLING CIRCUIT

FIRST STEPS IN RADIO

(Continued from page 11)

the energy if a coupled circuit. For this reason it is advisable to allow about 200 meters to be made up by the tuner and the balance in the aerial.

Thus an aerial with a natural wave length of 200 meters would measure over all, 200 divided by 1.5, or 150 feet, including lead-in and ground. From the above anyone can readily determine the length of an aerial best suited to his particular conditions.

Lower Aerial More Selective

It should be borne in mind that the lower the aerial, within limits, the more selective, while the higher aerial gives a higher voltage reception factor and louder signals. The disadvantage of the higher aerial lies in that it picks up more static and strays and is more subject to interference from local high power stations.

The use of a high aerial necessitates the use of a coupled tuner to obtain selectivity, whereas a lower aerial, say 10 feet above the house top, will give selective tuning with the straight tuner using no coupling.

Height of the Aerial

With all the foregoing facts in mind, the best aerial for those preferring an outdoor structure is one elevated 10 feet or so above the roof or other elevation, so it is 35 or 40 feet above ground. It should consist of four wires spaced equidistant around an 8-inch wood or metal hoop and of such a length that with a lead-in and ground wire it will not be over 150 feet.

The use of hoops is advised because this arrangement gives the effect of a large conductor with low skin resistance and eliminates the swaying of spreaders. One large insulator should be employed at each end, the wires being brought to the insulator from the hoops as shown in Figure 9. The lead-in can be attached to the wires where they are bunched and run over suitable insulators down the side of the building.

The details of the masts are not important, but a length of enameled or galvanized conduit properly guyed makes an excellent and lasting job. The lead-in should be made of stranded wire, using preferably four strands of the same wire used in the aerial. All joints should be well soldered. We are well aware that many aerials work satisfactorily without all these precautions being taken, but the aerial is put up to gather energy from the ether and the range of a set is often hampered by a poor aerial structure that is as easy to put up right as wrong.

Capacity of Aerials

While on the subject of capacity of aerials it would be well to make mention of the small capacity aerials recently experimented with by the Bureau of Standards, that give much promise. Considering the outdoor aerial as a condenser, one realizes that included in the field between the elevated conductor and the ground are many substances that well could be dispensed with from the viewpoint of efficiency.

There are usually masses of building material, pipework, masonry or vegetation that form poor dielectric for a condenser. With this thought in mind, experiments were started on aerials wherein the two plates are supported in the air without any intervening matter. Using metallic netting as plates a few feet square and supported 2 feet apart, results were obtained that were very promising and should offer a good suggestion to those anxious to try out new arrangements.

It might seem that reducing the distance between the plates so much would reduce the voltage reception factor to an extent that would make reception impossible because we know the higher the aerial the greater the induced voltage. This is offset to a great extent by the fact that the resistance is much lower and that for a given size the capacity is much greater.

(TO BE CONTINUED.)

THREE TUBE REFLEX

(Continued from page 13)

The first R.F. transformer is in the upper left hand corner and the second is a little to the right of the center line.

The A.F. transformer under the panel at the right side (sub-panel layout) is the first of the audio frequency amplifier stages after the detector. This transformer is the one on the left in the rear view shown on the preceding page. The second A. F. stage transformer is on the opposite side, while the separate amplifying stage transformer is in the center.

In the rear view, the primary binding posts of both reflexed audio frequency transformers face to the right.

The tube sockets are set, so that the filament binding posts all face towards the front panel. If these arrangements of the apparatus are carefully followed, it will be found that the grid and plate leads are kept as short as possible and thus helps to avoid interference.

Holes were drilled through the sub-panel alongside of the sockets and transformers wherever it was found necessary to connect from the upper instruments to the lower.

Precautions

A few precautions that it will pay every amateur to heed are as follows:

Don't solder leads to binding posts on transformers. Very often the connections are soldered on the inside and when heat is applied the inside connection is loosened.

Don't solder connections to by-pass condensers. When heat is applied the mica dielectric is apt to fuse and the condenser becomes shorted or possibly seriously weakened.

Don't let the leads come in contact with the metallic framework of any of the apparatus. This, although possibly not a short circuit, often creates an undesirable capacity reaction.

Don't let hot solder splash over your apparatus.

Don't solder in your leads until you are sure they clear all moving parts of apparatus, and also are not in the way when inserting and removing the tubes. This may sound humorous and unnecessary, but it's been done time and time again.

Take your time and don't try to rush the job—you'll save time in the end.

A very little solder applied properly makes a better job than a whole lot held in place by scarcely heated flux.

Where apparatus is equipped with binding posts there is usually little to be gained by a soldered connection.

If a poor connection is made repair it immediately; postponed operations are usually forgotten.

(TO BE CONTINUED.)

A Radio set will not work satisfactorily when the storage battery or B batteries are nearly run down. Have the storage battery charged and get new B batteries. B batteries should last six months, and often last several years.

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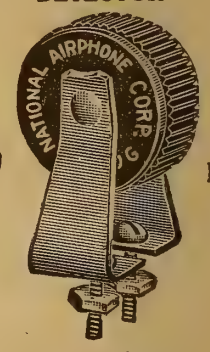

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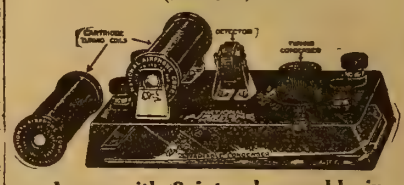

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Questions and Answers

Crystal Set

(3523) AFK, Chicago, Ill.

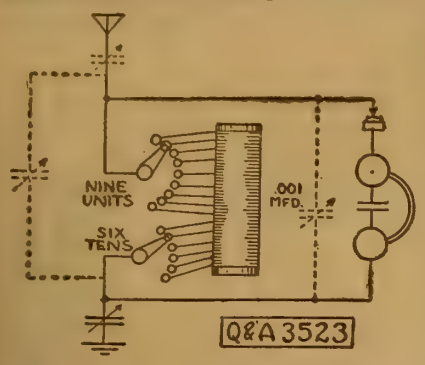
Is enclosed hookup all right? What is the range?

Which condensers shall I eliminate? Forty-three plates ?

Can an electric light socket be used as an aerial for this set?

How far is Argo, Ill., from the loop of Chicago?

A.—Noting sketch of hookup shown in illustration we are advising that it is correct in detail and would have a range of about fifty miles. Would advise elimination of all condensers shown with dotted lines. Use only the one in the ground lead.



An electric light socket can be used for an antenna, as suggested. A regular antenna is preferable, however. We are not at this writing familiar with the exact location of Argo, Illinois. However, its distance from Chicago can be ascertained easily through RR time table. The Q. and A. department service is intended for assistance in Radio information, not for geographical measurements which can be answered through the efforts of the interrogator.

RD 66

(2413) REE, Baltimore, Md.

Please refer to your issue of December 23, 1922, describing receiving outfit RD 66. Several of us have hooked up this set and we find that it does have selective qualities and appears to have fair signal strength. However, the drawing as published does not appear to us to be correct because in the tickler coil circuit there appears to be no tuning adjustment with either the secondary condensers or the movement of the two honeycomb coils. In fact you can remove the honeycomb coil from this set, where it is in the tickler coil circuit and the set will work just the same. No doubt these coils were inserted to have some effect on the operation of the set and if so, your published diagram does not place them properly.

Will you please refer this matter to the author of the drawing or to your Radio editor, who may be in position to advise? Would also like to have advice as to the size and capacity of condensers that should go in this circuit.

A.—Answering your inquiries with reference to RD 66 would advise that this circuit as it appears is correct. While the set will function, as cited, without the use of tickler coil, its purpose when employed is to offer impedance to signals of wave lengths other than those desired. It merely provides a lockout and does not require to be separately tuned.

The condensers are both variable of .0005 capacity.

Flewelling Development

(3563) BMB, Montgomery, Ala

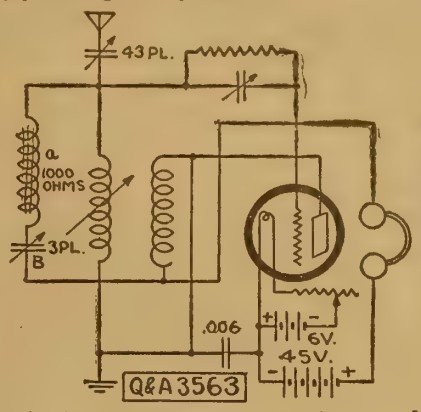
Enclosed you will find a Radio circuit diagram. I have been experimenting with the Flewelling principle on a single tuner and the circuit I enclose is the result of my experiment.

I have received KDKA, WHAS, WOAW, WGM, WSY, WOC, WHB, PWX, WFAA, WEAY, WOAI, WBAP, and several others without any aerial or ground with one bulb of the hard type as loud as the usual single circuit with one step of audio frequency amplification.

You will notice a resistance marked ten thousand ohms. I am guessing at the ohms as I am using the secondary winding of an old automobile. The condenser B is a three plate vernier and it is very sharp tuning in stations, also cutting down a disagreeable hum so noticeable in the Flewelling Circuit. The variable condenser of the forty-three plate variety is not very sensitive. The inductance is a standard variocoupler.

Please examine this circuit and explain actions to me. The part I cannot understand is that it brings in station louder and clearer without aerial or ground.

I receive your paper every week and enjoy reading it very much.



A.—Noting your specifications and sketch of Flewelling circuit evolved through experimentation shown in illustration we are advising that the action cited is quite similar to that of the original Flewelling circuit. The resistance choke and three plate condenser act as verniers. We cannot account, without personal observation, for the fact that circuit receives best without antenna and ground. However, it should receive without one or the other.

If of an experimental turn of mind, try out some of the freak hook-ups and see what results are obtainable with critical adjustments.

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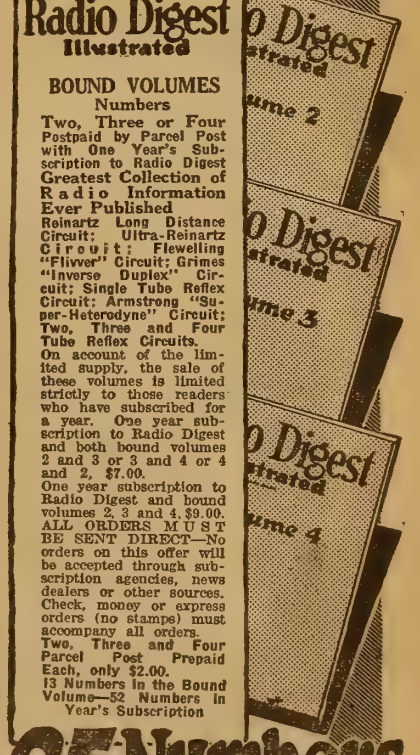

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Radio Illustrated

Baby Yvonne Day, who has just reached the age of twenty-one months, is no doubt the youngest Radiophan. Her father, Major Bernard Day, presented Yvonne with a set on her first birthday and she has been a confirmed listener in ever since. The Radio set has even proved a greater attraction for the kiddie than her dolls and other toys © K. & H.

"Midget," a young elephant with the Sells-Floto circus, is very hard to handle except when he hears music, and as the band does not play all the time, the trainers had to devise some scheme to keep him in a good humor while training for tricks. The Radio idea was used and now the tiny pachyderm prefers ether music to that of the band © U. & U.

"Are you an automobile?" That is the question Miss Fredericka Brew is asking this car. A Washington, D. C., distributor of automobiles has inaugurated a system which helps to eliminate a large sales force on the floor. The prospective buyer simply asks questions into the radiator and a voice from somewhere answers © Photograms

The first prize in the amateur contest for the smallest portable tube receiving set, which was held at the Permanent Radio Fair at the Hotel Imperial, New York City, was won by Frederick W. Procter, of New York City. The receiver is of the regenerative type © Photonews

Dc1B578863 MAY 26 '23

De Luxe Reflex—Beginner's Aids—Flivver Super

Radio Digest

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HYPNOTIZE BY AIRPHONE

Above is a movie strip taken of Blanche Sweet, movie star, when she was in the midst of a program broadcast from Station KHJ. At the top Miss Sweet is listening to where "the big bear leaped at Peter Rabbit." In the center she is saying, "Everyone keep quiet." At the bottom she has just tuned in some static. © Int.

MENTAL SUGGESTION TRANSMITTED ON AIR

Vishnu, Hypnotist, Predicts Even More Startling Discoveries for Coming Years

By May Teressa Holder

BIRMINGHAM, ALA.—Hypnotized by Radio! To do the "old stuff" in a new way is the quickest road to success, and one of the latest and most unique flings in that direction—Hypnotism by Radio—was given a most thrilling and successful test recently in Birmingham, Alabama. Then it was the second attempt in the history of hypnotism and the second time in the history of Radio. Miss Beatrice Kyle was not only put into hypnotic sleep but was also awakened by Radio when Vishnu, the Famous Hypnotist, dozens of blocks away from his subject, transmitted mental suggestion through Radio instruments.

A receiving station was installed on a raised platform in front of the store of a local electric supply company by a former Radio expert of the United States Army, and Miss Kyle was seated in a chair on top of tables which had been placed on the sidewalk, while in another part of the city Vishnu was located in the studio of WSY, the Alabama Power Company's station.

Timidly looking out upon the vast audience which had gathered to witness the wonderful feat, Miss Kyle placed the headset over her ears. Soon the voice of

(Continued on page 2)

STATION KPO GIVES FIRST COAST OPERA

"EL RANCHO DEL REY" HAS CAST OF SIXTY

Broadcast Regarded as Success Despite Effect Lost in Lack of Colorful Settings

SAN FRANCISCO.—A new chapter in the history of Pacific Coast Radio was written recently when station KPO broadcast a complete opera from the studio on the sixth floor of the Hale Bros. department store. This was the first opera to be heard in its entirety from a coast city, and judging by the response from Radiophans all over the country, it was one of the most successful performances ever given to the air by a local station.

Has Cast of Sixty

The work was "El Rancho del Rey," libretto by Evelyn Nells of the San Francisco Call, music by George Bigler of Burlingame, Cal., and was conducted by Pearl Hossack Whitcomb, of San Francisco. The story treats of the early Spanish history of California, and was especially favored by the melodious music and excellent cast. Sixty men and women appeared in the production, and much favorable comment was elicited for the splendid way in which they were handled by Mme. Whitcomb.

Production Considered a Success

It is to be regretted that science has not yet found a means of broadcasting the colorful stage settings, the gorgeous costumes and beautiful dances that called forth such thunders of applause when the opera appeared locally several weeks ago. However, the production was considered a success as given.

NAME BABY BUFFALO ANTENNA AND AERIAL

PHILADELPHIA, PA. — The center of attraction of the hundreds of school children visiting the Philadelphia Zoological Gardens these days, are "Aerial" and "Antenna," new born baby bison. According to C. Emerson Brown, the animals were named with the first two names alphabetically of the Radio catalogue, and the Radio wave will include many more arrivals expected soon.

Monitor Control to Be Used Throughout Navy

New System Enables Navy to Handle 800,000 Words Monthly

SAN FRANCISCO.—After a nation-wide tour of inspection of Navy communications, Commander S. E. Hooper, U. S. N., announced recently that he had recommended that the Radio monitor control system, a new method of receiving and transmitting which was originated on the west coast, be installed throughout the Navy service.

In this district all messages under this plan are received at the South San Francisco Naval Radio station and are transmitted by it to the Naval Radio office, which will be operated from the U. S. Appraiser's Building. All outgoing messages will be transmitted to the Mare Island station for sending.

The Naval office will handle between 650,000 and 800,000 words monthly.

Landlord Can't Destroy Tenant's Radio, Ruling

CHICAGO.—Judge Peter Schwaba ruled recently that a Radio aerial in an appurtenance to the home of the owner and therefore inviolable, so far as the landlord is concerned. The ruling arose out of a case between Fred B. Snell, 2836 Taylor street, and his landlord, John Vekias, 2838 Taylor street. Snell charged that Vekias chopped his aerial down with an ax when he told him he must wait until next day for his rent. Vekias was placed under a $1,000 peace bond.

The upper picture here shows Miss Sweet as she has just heard a good joke. In the center she is laughing at that whimsical bit of humorous song "Gallagher and Shean." Of course you can tell what has happened in the last picture,—"Jazz, the best yet," the little lady is saying here. Miss Sweet is quite a Radiophan. © Int.

HYPNOTIZE BY AIRPHONE

(Continued from page 1)

Vishnu rang out clearly over the crowd, although he was many blocks distant:

Gives Command to Sleep

"It gives me great pleasure to attempt this strange new feat of hynotizing a woman by Radio," he said.

At this point the big audience strained every nerve to hear, for being in the open air on the main business street, there were many disturbing noises, and his voice seemed to die away. Suddenly his deep tones rang out again, and a serious expression overspread Miss Kyle's smiling face as he said:

"Fix your eyes, Miss Kyle, upon a definite object! Let your mind become concentrated upon the one thought—that of sleep. Put your knees together!"

Miss Kyle became deathly still. She seemed to be getting dazed.

"You will drift off peacefully to sleep—SLEEP!" was heard as the Radio buzzed on.

A little quiver ran through Miss Kyle's body. Her head drooped and her eyes closed slowly as she lurched forward, reminding one of a sleepy little child whom the "Sand Man" was about to get. One of Vishnu's attendants hurriedly took the receivers off her ears, which left her entirely dependent upon the Radio horn for a continuance of the experiment, and gently lifted her up.

From over the long distance Vishnu seemed to mysteriously sense the situation and feel her exigency for him. Quickly from out the Radio horn came his clear commanding tones:

"Let your body become rigid!"

Rushes to Subject

As if by magic, Miss Kyle's body straightened stiffly, every muscle taut. She seemed dead. In this state she was carried by ambulance to be placed on a little white bed which had been arranged in the show window of a large department store several blocks away.

Meanwhile the hypnotist got into a waiting automobile and was hurriedly driven to Miss Kyle's side in order to quickly relax her body before placing her on the bed. Upon his arrival at the show window, bending over Miss Kyle, he examined her condition and only smiled as she relaxed naturally. Then when she was lifted from the stretcher to the bed, where she was to remain in her comatose state until the next afternoon, he called on her again for rigidity, after which he again relaxed her for her twenty-four hours' sleep. After seeing that her breathing and heart were right, he gently drew a mosquito netting over the top of the bed, through which could be seen her flushed face upon the pillow.

"I find being hypnotized by Radio queer," said Miss Kyle the next day after she had been awakened from her long sleep. "However, I was not a bit afraid or nervous. Have you ever waked up from a real sound sleep and felt so drowsy that you would turn over and go right back to sleep? Well, it's just that twixt-and-between feeling I got at first. It seemed like I just must go to sleep. I never knew when I quit hearing Mr. Vishnu talking to me. I just went right off into dreamland. Then, when I was awakened, at first I seemed all confused, as though someone was making a big fuss over me, and then, 'Wake up!' was the first thing I got."

Other Feats More Astonishing Will Come

The hynotism of Miss Kyle was a striking demonstration of the progress science is making and how hynotism is keeping pace with it; yet withal, Vishnu declares that the coming years have in store for the ambitious youth discoveries even more numerous and much more astonishing.

"Hypnotism through the air is possible," says Vishnu. "When a subject is once controlled, only the sound of the human voice is needed. If the sound of the human voice can be transmitted by Radio, there is no reason in the world why a subject can not be controlled by Radio, and while hypnotizing a person by Radio is in itself a difficult feat, yet that of waking a subject by the same means is by far the more arduous task."

California Town Plans Loud-Speaker Curfew

Fans Show Fight, Say, "Curfew Shall Not Ring"

SIERRA MADRE, CALIF.—A Radio curfew ordinance is under consideration by the city board of trustees here. Citizens who are uninterested in the ether science have complained to city officials that the noise of neighborhood loud speakers is unbearable and become a nuisance when operated late at night.

The Radiophans of the city are planning to wage a hot fight to prevent any action being taken against their interests.

The law as suggested reads that it shall be an offence to operate any form of loud speaking apparatus after nine o'clock at night.

Radio telephones are to be placed on every fishing vessel of the Norwegian fleet, numbering more than 14,000 ships.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	7:00- 8:00	7:00-8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	6:45- 7:45
CFCN, Calgary, Alta.	440	.....	.....	11:30-12:30	.....	.....	11:30-12:30	.....
CKAC, Montreal, Que.	430	.....	6:00-10:30	.....	6:00-10:30	.....	6:00-10:30	3:00- 5:00
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	1:45- 3:45
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	469	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	7:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00	.....	10:00-11:00	.....	9:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	8:45-11:30	12:00- 1:00
KPO, San Francisco, Calif.	423	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00 10:00	.....	8:00-11:30	8:00-10:00	.....
KYW, Chicago, Ill.	448	8:00- 9:30	8:00- 9:30	8:00- 9:30	8:00- 9:30	11:30- 1:00	8:00- 9:30	7:00- 8:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00- 10:30	.....
WBAP, Fort Worth, Texas	476	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	.....	6:30- 6:45
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WEAF, New York, N. Y.	492	6:30- 9:00	6:30- 7:00	6:30- 9:00	6:30- 9:00	6:30- 7:00	6:30- 9:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:30- 6:00	5:30- 6:00	7:00- 9:30	5:30- 6:00	7:30- 9:30	8:00-11:00	.....
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	7:00- 9:00	.....	7:00- 9:00	.....	7:00- 9:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	7:15- 8:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	390	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	6:00- 6:30	6:00-11:00	6:00- 6:30	6:00- 6:30	6:00- 8:55	9:10-11:00	.....
WJAX, Cleveland, O.	390	.....	6:00- 7:30	.....	7:15- 9:30	.....	.....	.....
WJZ, New York, N. Y.	455	7:30- 9:30	6:00- 9:30	8:00- 9:30	7:30- 9:30	7:30- 9:30	7:30-10:00	7:30- 9:00
WKAQ, San Juan, P. R.	360	.....	7:30- 9:30	.....	.....	.....	7:30- 9:30	.....
WLAG, Minneapolis, Minn.	417	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	.....
WLW, Cincinnati, O.	360	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:50-11:00	.....	.....	6:50- 9:10	.....	.....	.....
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	.....	6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

Do You Want to Know All About Condensers and Inductances? Next week Thomas W. Benson is going to tell about them. It makes no difference how well one may be versed in Radio, there is always some little point that may be hazy. Perhaps "Condensers and Inductances" is your weak point.

A Diagram of the New Four-Circuit Tuner will appear in next week's Digest. Want to do DX work this summer?—Then try this out on your antenna.

Characteristic Curves of Recent Designs of Vacuum Tubes will be shown in an article written by H. J. Marx in the June 2 issue of the Digest. This article is prepared particularly for those Radiophans who are critics of good apparatus.

Mr. Flewelling Will Complete His Present Series of Articles next week. If you have followed the series thus far you cannot afford to miss next week's article to complete your files. He will give operating kinks for the One Condenser Super Flivver.

Are You Getting Your Share of Broadcasts under the new wave length allocations? An article on "Loading Coils and How to Raise Your Set's Inductance Values" will be in an early issue.

Your Vacation. You died-in-the-wool Radiophans are going to take a set along, of course! What kind?—Let Radio Digest tell you in a coming issue.

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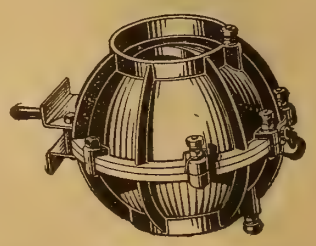

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CHICAGO

"RAILROAD NIGHT" IS BROADCAST BY KHJ

FANS LISTEN IN ON REALISTIC DEPOT NOISES

Traveler's Gossip, Cab Driver's Shouts, Newsboys' Cries, Children's Chatter —All Come In on Ether

LOS ANGELES, CALIF.—Presenting one of the most vivid, realistic and descriptive Radio broadcast programs so far heard on the Pacific Coast, the Radio concert from station KHJ, the Los Angeles Times, broadcast recently, proved to be one of stellar attraction.

"Railroad Night" was the subject and the atmosphere was alive with the associations of railroad life. The setting was the waiting room of the Arcade Station, of the Southern Pacific, in this city, but there was no waiting, everybody rushed headlong into the fun. Mayor Geo. E. Cryer was greeted by the South Pacific Shop Band as he stepped from a figurative train upon his return from vacation and as he passed into the waiting room was cheered by the crowd. The Mayor was there in person and was called upon for a short address.

Have Railroad Band

The Southern Pacific Band, under the baton of conductor L. B. Verweire, composed of accomplished musicians, presented a brilliant concert, including the following: March, from "Tannhauser," by Wagner, the overture "William Tell," by Rossini; "Fackeltaz" (Torch Dance), by Meyerbeer, and the "Star Spangled Banner," arranged by Lieut. John P. Sousa, U. S. N. R. F. Conductor Verweire and members of the band were congratulated for their brilliant performance.

A waiting room to be true to life should have the yowls of an infant, which was there in real life and it exercised its lungs in regular style. A police officer on the scene, to keep order and handle the crowd was enacted by Harry Anderson, who was recommended by Police Chief Louis D. Oaks, and Officer Anderson proved himself in the waiting room.

Youngsters Play Parts Well

Prattling youngsters are required in a waiting room, herein enter, Maxine and Virginia Loomis, the most charming twins in seventeen states; and yet, it is amazing what sensible questions the lassies of 5 years of age may ask. They presented an adorable part in the sketch. Richard Headrick, silver-sheet luminary, age 5 years, was the third party in the juvenile trio.

Others who completed the waiting room scene were: Newsboys who shouted the latest news, taxi drivers who announced their cars ready and peanut venders who cried out their wares, and as the program was deserving of a ringing tribute the Southern Pacific Company furnished a 200 pound locomotive bell for that purpose.

STATION TO HELP SAVE LIVES ON GREAT LAKES

WGR to Broadcast Weather Information to Seamen Daily

BUFFALO, N. Y.—For the first time an independent Radio broadcasting station will be a factor in saving the lives of those imperiled by violent storms on the Great Lakes and amateur Radiophans can now picture to themselves the scenes on shipboard described in their favorite sea stories when they receive the thrilling news of an approaching storm. This weather information will be broadcast partly in a code of letters and figures by the powerful Federal Telephone & Telegraph company's station WGR at Buffalo, N. Y., at 10:45 a. m. and 10:45 p. m., Eastern time, every day. Interested fans may obtain the key to this code by writing to the weather bureau, Telephone building, Buffalo, N. Y.

GERMANS FIND WAVE TO DOWN AIRPLANES

PARIS.—French aviation investigators in Germany reported today that the Germans have discovered a Radio process which forces airships, however powerful, to land. Serious alarm is felt in French airplane circles at this news, which vitiates every effort in the development of France's chief weapon, aviation. Radio waves of extraordinary potency and of special quality are used to stop the airplane motors.

NEW CUBAN STATION TUNES IN CLEVELAND

HAVANA, CUBA.—The new Cuban Station 6KW, operated by Frank Jones, is now working on a wave length of 315 meters. Mr. Jones recently entertained the whole town of Tuinicu with a Cleveland News Radio concert broadcast from the Union Trust Company's station. A loud speaker was placed in the window of the studio and connected to the receiving set. The entire populace listened to the "wave from Lake Erie" roll in.

HOW ABOUT THIS CRYSTAL?

How would you like a crystal for your set as large as the one the young lady is holding? With the proper equipment one would stand a chance of bringing in some real DX records with it. The crystal is the same as used in Radio work but in the crude form. It is yet to be finished and chipped into smaller bits. ©K. &H.

Loud Speaker Directs Mob Scene of "The Hunchback"

UNIVERSAL CITY, CALIF.—Whispers are directing the huge mobs used in some of the scenes for "The Hunchback of Notre Dame," being filmed here. Wallace Worsley, the director, has not needed to raise his voice above a monotone, yet it is carried to the farthermost portions of the seven-acre set.

This feat was made possible only through the great Radio amplifier, just installed by a Radio specialist of the Western Electric company. The installation cost $7,000, but it saves hundreds of dollars every day and affords complete mob control.

If reception is not as good as usual in damp weather, it is due to faulty aerial insulation.

DO YOU KNOW HOW WGY BROADCASTS?

SERMON PASSES THROUGH FIVE EXCHANGES

Four Microphones Used—Two in Service; Two for Emergency—Use Twenty Mile Line

By W. T. Meenam

SCHENECTADY, N. Y.—Have you ever wondered how a Radio broadcasting station with its fixed equipment manages to send out religious services weekly from churches many miles away from the sending station?

The operating staff of WGY, the Schenectady, N. Y., station of the General Electric Company has so developed church service broadcasting that thousands of letters of appreciation are sent in from far and near. Furthermore, clergymen who were frankly skeptical at first of the value of broadcast religious services and who doubted that the dignity and beauty of these services could be conveyed through the air, now pronounce Radio an invaluable aid.

Amsterdam Service Typical

The installation necessary for broadcasting the service of the Second Presbyterian Church of Amsterdam, N. Y., recently is typical and will give the Radiophan an idea of how it is accomplished.

In the church were four microphones, two of them spares for emergency use. Two were placed at the reading desk to get the words of the clergyman in scripture reading, prayer, sermon and announcements. Two more were hung above and in front of the choir and organ. These microphones or pick-ups were the only evidence to the congregation that the service they were hearing was going out to countless thousands many miles away. There is nothing in the church installation to distract the attention of the congregation from the services.

Operator Stationed in Church

At one side of the church, hidden from view but in a position where he could follow the service was stationed one of the WGY staff who switched the microphones on and off as the service progressed. If the minister was speaking, his microphone was brought into the circuit and the choir microphone was switched off.

Two other operators were situated in an adjoining room where a portable control equipment had been installed. In this room one of the operators controlled the amplification of speech and music. The amplifying outfit consisted of two 5-watt tubes, one 50-watt tube and other necessary apparatus. Sufficient amplification was used to overcome line noise on the twenty miles of telephone wire necessary to carry the electrical oscillations set up in the microphones to the control room of WGY in Schenectady, N. Y. The second operator in the side room was in constant communication by special land wire with the control room at WGY.

Passes Through Five Exchanges

In the control room in Schenectady the church services were again amplified, this time on equipment which consisted of one 5-watt tube and two 50-watt tubes. From this point the electrical oscillations passed to the power apparatus and were impressed on modulator and oscillator tubes going to the antenna and the air.

Between the church in Amsterdam and control apparatus in Schenectady the service passed through three exchanges of the New York Telephone Company, the Amsterdam exchange, the Schenectady exchange and finally the exchange of the General Electric Company.

Aurora Borealis Causes QRM

HARTFORD, CONN.—Presence of Northern lights, or the aurora borealis is believed to have been the cause of the failure of Canadian amateurs to relay a message across the continent during a recent three-day test of the American Amateur Radio Relay League. The aurora has been known before to interfere with transmission.

THE ANTENNA BROTHERS Spir L. and Lew P. Ha-wa-ii, Then She Raised "Cane"

RECEIVING RECORD CONTEST

By Contest Editor

THREE hundred and thirty-five records now appear in the complete list. Five new records were added this week. A number of the contestants have been able to hold their own since the last time the entire list was given. N. H. Hall, of Boston, Mass., is still in the lead with his 5,100 mile record from KYQ, Hawaii, while C. F. Rose, Jr., of Springfield, Mass., is running a close second. Four in the race hold records over 4,000 miles and 23 over 2,500 miles! Can you beat these? If you can, don't forget to enclose the mileages for the stations whose records you submit.

The complete list of records, revised to date, are printed below:

Station—Miles Away—Who Heard It

AS6—1250, John Kiener, Cleveland, O.
CFAC—1750, Ted Lehman, Ashland, Ky.
CFCA—1850, C. C. Beery, Spokane, Wash.
CFCR—2200, A. J. Barron, Johnson City, Tenn.
CFCF—2325, B. H. Seydel, Tacoma, Wash.
CFCN—2100, E. J. Cuddy, Dedham, Mass.
CHBC—2450, S. S. Florence B. Phillips.
CHCA—1625, T. S. Wildman, Nicholas, Iowa.
CHCB—2125, Arthur Chapelle, Woodburn, Ore.
CHCF—1250, B. U. Livingston, Morristown, N. J.
CHCQ—2100, G. F. Aiken, Providence, R. I.
CHXC—1500, M. B. Gilbert, Douglas, Wyo.
CHYC—2300, S. S. Atwood, Esperance, Wash.
CJCA—1650, Kenneth Meyer, Greensburg, Ind.
CJCB—1300, V. Dennis, Oskaloosa, Kans.
CJCE—2100, F. C. Woodford, Canton, O.
CJCN—1900, Nestor Barrett, Republic, Wash.
CKAC—2700, A. C. Carter, Juneau, Alaska.
CKCK—1650, L. C. Burwell, Jr., Charlotte, N. C.
CKCR—1225, Samuel Woodson, Jr., Liberty, Mo.
DD5—1550, C. V. Bell, Ottawa, Can.
DM4—1700, Arthur Chapelle, Woodburn, Ore.
DM7—1150, L. J. Martin, Minneapolis, Minn.
DN4—2100, W. E. Davison, Berwick, N. S., Can.
KDKA—2500, Robert Rowe, Santa Clara, Calif.
KDN—2175, F. C. Woodford, E. J. Poyser, Canton, O.
KDPT—2600, R. G. Williams, Springfield, Mass.
KDYL—2450, R. Doull, Halifax, N. S.
KDYM—2025, F. B. Steer, Cleveland, O.
KDYQ—2550, C. M. Rice, Jr., Worcester, Mass.
KDYS—1700, M. C. Ridenour, Kingwood, W. Va.
KDYX—5000, C. F. Rose, Jr., Springfield, Mass.
KDZA—2025, Breisch Motor Co., Ringtown, Pa.
KDZE—1725, Philip Delano, Bonne Terre, Mo.
KDZF—1850, C. H. Nolder, Cincinnati, O.
KDZK—2050, C. E. Carber, Pittsburgh, Pa.
KDZK—1300, Harold Canon, Storm Lake, Iowa.
KDZR—1050, W. C. Wolverton, Linton, N. D.
KDZT—1250, E. M. Perkins, Jr., Sioux Falls, S. D.
KDZZ—1050, W. C. Wolverton, Linton, N. D.
KFAD—2125, Mrs. A. S. Mawhinney, New York, N. Y.
KFAE—1650, G. E. Wharton, Houston, Tex.
KFAF—1775, F. W. Foss, Boston, Mass.
KFAN—1250, Chas. N. Schwab, Grinnell, Iowa.
KFAP—1950, A. M. Tobias, East Orange, N. J.
KFAU—1325, Ross Hansch, Baraboo, Wis.
KFAW—1325, M. L. Johnson, Atchison, Kans.
KFAY—2200, L. A. Graf, Dunkirk, N. Y.
KFBB—1050, R. Henry, Butler, Mo.
KFBC—2125, J. D. Crosby, Stauffer, Pa.
KFBD—1375, W. M. K. Young, Kansas City, Mo.
KFBH—1450, R. B. Reed, Eureka, Kans.
KFBJ—1775, Richard Reeder, Alliance, O.
KFBK—1950, H. S. Juday, Eldorado, O.
KFCB—1425, O. P. Klein, Leduc, Alta., Can.
KFCF—1775, R. A. Deger, Dayton, Ohio.
KFCL—1300, M. L. Johnson, Atchison, Kans.
KFCV—1600, Robert N. King, Needham Heights, Mass.
KFDA—2250, L. Genack, Springfield, Mass.
KFDB—2400, W. H. Rhodes and Chas. Rhodes, Middleton, Pa.
KFDF—1150, H. R. Wunder, Cheviot, O.
KFDJ—2100, Ted Lehman, Ashland, Ky.
KFDL—1750, E. J. Cuddy, Dedham, Mass.
KFEB—1125, R. L. Hartman, Hoisington, Kans.
KFFY—1125, W. C. Wolverton, Linton, N. D.
KFHJ—1250, J. E. Bradley, Justin, Tex.
KFI—2900, W. E. Davison, Berwick, N. S. Can.
KFV—1750, A. L. Ober, North Manchester, Ind.
KFZ—2175, A. A. Acken, Jersey City, N. J.
KGB—1725, Louis Bruchiss, Chicago, Ill.
KGG—1650, Vernon Adams, Joplin, Mo.
KGN—1875, Fay Allarding, Lake Odessa, Mich.
KGU—1650, Eugene Evans, Tippecanoe City, Ohio.
KGW—2475, Dr. L. D. Bassett, Sidney, N. Y.
KGY—1925, Paul French, Oxford, Mich.
KHJ—3000, H. S. Olding, New Glasgow, N. S., Can.
KHQ—2500, C. M. Rice, Jr., Worcester, Mass.
KJJ—2175, M. P. Jacot, Copley, O.
KJR—2800, H. S. Olding, New Glasgow, N. S., Can.
KJS—1150, W. F. Galloway, Vancouver, B. C., Can.
KLB—1900, Billy Withington, Jackson, Mich.
KLS—1400, J. E. Bradley, Justin, Tex.
KLX—2600, C. C. Dunbar, Greenville, N. H.
KLZ—2100, W. E. Davison, Berwick, N. S., Can.
KMJ—1550, H. E. Clark, Monmouth, Ill.
KMO—1600, Ross Hansch, Baraboo, Wis.
KNI—2150, John Kiener, Cleveland, O.
KNJ—1425, J. Wallace, Bridgeville, Pa.
KNT—2425, J. H. Wall, Rensselaer, N. Y.
KNV—1725, A. C. Flint, Chicago, Ill.
KNX—1175, J. E. Bradley, Justin, Tex.
KOB—1975, C. M. Rice, Jr., Worcester, Mass.
KOG—2450, H. F. Andrews, Albany, N. Y.
KOP—2075, T. W. Smith, Watsonville, Calif.
KPO—2550, C. M. Bussey, Hudson, N. Y.
KQI—1650, H. E. Clark, Monmouth, Ill.
KQP—2100, G. A. Walter, McDonald, Pa.
KQV—1325, M. B. Gilbert, Douglas, Wyo.
KQW—1900, C. Conrad, Logansport, Ind.
KSD—4000, Walter Lee, Lost Harbor, Alaska.
KTW—1600, H. E. Clark, Monmouth, Ill.
KUO—2675, C. M. Rice, Jr., Worcester, Mass.
KUY—2100, Roland Smith, Hilo, Hawaii.
KWG—2500, Mrs. A. S. Mawkinney, New York, N. Y.
KWH—2350, C. R. Richtmeyer, Allentown, Pa.
KXD—2075, Richard Reeder, Alliance, O.
KYI—1750, W. Schultze, Chicago, Ill.
KYQ—5100, M. H. Hall, Boston, Mass.
KYW—1850, J. J. Beales, Jr., San Anselmo, Calif.
KZM—2700, Sarkis Kachajian, Worcester, Mass.
KZN—1650, E. K. Kitts, Bluefield, W. Va.
KZY—1175, C. Bennett, Aurora, S. D.
NAA—2250, R. J. Gall, Blythe, Calif.
PWX—2675, M. A. Jeffords, Wenatchee, Wash.
WAAB—1325, C. H. Vale, Providence, R. I.
WAAC—1775, W. F. Macleod, Prince Albert, Sask., Can.
WAAD—1100, R. Doull, Halifax, N. S.
WAAF—1850, L. W. Beretta, San Mateo, Calif.
WAAJ—1725, M. B. Gilbert, Douglas, Wyo.
WAAM—2125, R. J. Gall, Blythe, Calif.
WAAN—1400, H. Baird, River de Chute, N. B., Can.
WAAP—1400, Arthur Chapelle, Woodburn, Ore.
WAAQ—1325, W. Douglas, Guthrie, Okla.
WAAS—1025, E. B. Miller, Plainview, Tex.
WAAW—1300, A. B. Butlers, Los Angeles, Calif.
WAAZ—1700, W. E. Davidson, Berwick, N. S., Can.
WBAC—1575, C. Beery, Spokane, Wash.
WBAD—1125, N. Theobald, Attleboro, Mass.
WBAF—1250, M. Neuman, Guthrie, Okla.
WBAG—1125, M. L. Johnson, Atchison, Kans.
WBAH—1050, F. T. Wycoff, Springfield, Mass.
WBAJ—1150, E. B. Miller, Plainview, Tex.
WBAP—2550, C. Blanch, Amherst, N. S., Can.
WBAU—1200, H. S. Olding, New Glasgow, N. S.
WBAX—1350, G. E. Wharton, Houston, Tex.
WBAY—2175, C. C. Beery, Spokane, Wash.
WBL—1900, H. S. Olding, New Glasgow, N. S., Can.
WBT—2250, Kenneth Curtis, Seattle, Wash.
WBU—1400, Wilson Woodside, Calgary, Alta., Can.
WBZ—2500, Arthur Chapelle, Woodburn, Ore.
WCAE—2250, R. Taylor, Livermore, Calif.
WCAF—1025, F. J. McKenney, New Prague, Minn.
WCAG—1325, K. McNeil, Ottawa, Ont., Can.
WCAH—1950, A. B. Butlers, Los Angeles, Calif.
WCAI—1100, A. C. Flint, Chicago, Ill.
WCAL—1400, S. S. Atwood, Esperance, Wash.
WCAR—1775, H. Madrich, Verdun, P. Q., Can.
WCAS—1450, Arthur Chapelle, Woodburn, Ore.
WCAT—1975, H. S. Olding, New Glasgow, N. S., Can.
WCAX—1325, Doyle Getter, Arkansas City, Kan.
WCAY—1050, D. J. Morris, Weir, Tex.
WCAZ—1450, H. S. Olding, New Glasgow, N. S.
WCK—1225, W. F. Macleod, Prince Albert, Sask., Can.
WCN—2174, H. S. Olding, New Glasgow, N. S., Can.
WCN—1750, E. B. Miller, Plainview, Tex.
WCX—2075, L. W. Beretta, San Mateo, Calif.
WDAE—1700, Wm. Hurst, Jr., Winnipeg, Can.
WDAF—1675, W. E. Davison, Berwick, N. S., Can.
WDAH—1925, Paul Glaister, Napanoch, N. Y.
WDAJ—2175, G. L. Harms, Portland, Ore.
WDAK—1200, R. Hastings, Atchison, Kan.
WDAL—2450, J. Beckman, Seattle, Wash.
WDAO—1500, M. J. Solumbe, Plattsburg, N. Y.
WDAP—1875, M. J. Bevilockway, Lomita Park, Calif.
WDAR—1175, C. B. Martin, Springfield, S. D.
WDAS—1250, C. M. Bennett, Aurora, S. D.
WDAU—1700, E. B. Miller, Plainview, Tex.
WDAX—1500, H. S. Olding, New Glasgow, N. S.
WDAY—1200, G. E. Wharton, Houston, Tex.
WDT—1400, G. E. Wharton, Houston, Tex.
WEAB—1550, H. S. Olding, New Glasgow, N. S., Can.
WEAD—1000, John Kiener, Cleveland, O.
WEAE—2000, R. J. Gall, Blythe, Calif.
WEAF—2450, N. E. Parr, Albany, Ore.
WEAH—1375, E. A. Howard, Watch Hill, R. I.
WEAI—2075, R. J. Gall, Blythe, Calif.
WEAJ—1300, Richard Siegel, Lawrence, Mass.
WEAK—1100, J. H. Wall, Rensselaer, N. Y.
WEAO—2100, Dobson & Tuckie, Oakland, Calif.
WEAP—1700, R. J. Gall, Blythe, Calif.
WEAT—1525, R. Doull, Halifax, N. S.
WEAV—1200, H. S. Rahiser, Pittsburgh, P
WEAY—1950, H. Gow, Seattle, Wash.
WEV—1400, H. Dammann, Bronx, N. Y.
WEY—1250, Mrs. A. S. Mawhinney, New York, N. Y.
WFAA—2000, H. S. Olding, New Glasgow, N. S.
WFAC—1375, H. S. Olding, New Glasgow, N. S., Can.
WFAF—2200, R. J. Gall, Blythe, Calif.
WFAG—1375, R. L. Hartman, Hoisington, Kan.
WFAH—1025, John Kiener, Cleveland, O.
WFAJ—1150, W. E. Davison, Berwick, N. S., Can.
WFAM—1025, J. H. Wall, Rensselaer, N. Y.
WFAN—1300, S. S. Atwood, Esperance, Wash.
WFAT—1275, P. Benneyan, Fresno, Calif.
WFAV—1350, S. S. Atwood, Esperance, Wash.
WFAZ—1150, Edwin M. Perkins, Jr., Sioux Falls, S. D.
WFI—2350, A. B. Butler, Los Angeles, Calif.
WGAB—1750, J. A. Bernier, Quebec, Can.
WGAD—2575, L. Jang, Hanley Falls, Minn.
WGAF—1100, Kenneth Steele, Northumberland, Pa.
WGAK—1400, H. S. Olding, New Glasgow, N. S., Can.
WGAM—1275, H. B. Porter, Lynn, Mass.
WGAN—1700, H. S. Olding, New Glasgow, N. S., Can.
WGAQ—1025, W. J. Wolverton, Linton, N. D.
WGAR—1150, H. Dammann, Bronx, N. Y.
WGAT—1675, R. Doull, Halifax, N. S.
WGAY—1000, D. J. Morris, Weir, Tex.
WGF—1425, Perkins Benneyan, Fresno, Calif.
WGI—1750, E. L. Dye, Plainview, Tex.
WGM—2175, Allan Harvey, Snohomish, Wash.
WGR—2175, N. E. Parr, Albany, Ore.
WGV—1800, H. S. Olding, New Glasgow, N. S., Can.
WGY—2575, J. J. Beales, Jr., San Anselmo, Calif.
WHA—1650, Perkins Benneyan, Fresno, Calif.
WHAA—1450, H. S. Olding, New Glasgow, N. S., Can.
WHAB—1550, G. W. Perkins, Thompson, N. Y.
WHAE—1050, H. Rawls, Phoenix, Ariz.
WHAH—1100, Paul Glaister, Napanoch, N. Y.
WHAI—1600, Dick Lawrence, Sacramento, Calif.
WHAK—2175, Arthur Chapelle, Woodburn, Ore.
WHAL—1100, H. S. Olding, New Glasgow, N. S., Can.
WHAM—2225, Arthur Chapelle, Woodburn, Ore.
WHAR—1150, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAS—1950, Arthur Chapelle, Woodburn, Ore.
WHAW—1325, E. M. Perkins, Jr., Sioux Falls, S. D.
WHAY—1700, R. J. Gall, Blythe, Calif.
WHAZ—2550, H. Wilbert, San Francisco, Calif.
WHB—1675, W. E. Davison, Berwick, N. S., Can.
WHK—1550, L. W. Gushwa, Firth, Ida.
WHX—1025, Mrs. A. S. Mawhinney, New York, N. Y.
WIAC—1206, H. Mutze, Manassas, Va.
WIAF—1325, C. V. Bell, Ottawa, Can.
WIAG—1250, Wm. Hurst, Jr., Winnipeg, Can.
WIAO—1700, S. S. Atwood, Esperance, Wash.
WIAZ—1525, E. M. Perkins, Jr., Sioux Falls, S. D.
WIK—1150, G. E. Wharton, Houston, Tex.
WIP—1325, De Witt McKinley, Ft. Worth, Tex.
WIZ—1175, H. S. Olding, New Glasgow, N. S., Can.
WJAD—1625, G. F. Cory, New Bedford, Mass.
WJAJ—1000, D. J. Morris, Weir, Tex.
WJAN—1700, Arthur Chapelle, Woodburn, Ore.
WJAP—1200, D. J. Morris, Weir, Tex.
WJAQ—1200, Paul Glaister, Napanoch, N. Y.
WJAS—1900, Louis Raymond, Pullman, Wash.
WJAX—2000, Allan Harvey, Snohomish, Wash.
WJAZ—1400, Wilson Woodside, Calgary, Alta., Can.
WJX—2550, Robert Rowe, Santa Clara, Calif.
WJZ—2575, J. J. Beales, Jr., San Anselmo, Calif.
WKAC—1175, H. Dammann, Bronx, N. Y.
WKAF—1500, C. M. Bennett, Aurora, S. D.
WKAL—1850, Arthur Chapelle, Woodburn, Ore.
WKAN—1100, C. M. North, Malden, Mass.
WKAQ—3850, Arthur Chapelle, Woodburn, Ore.
WKAS—1075, Paul Glaister, Napanoch, N. Y.
WKC—1200, J. E. Latt, Fairfield, Tex.
WKY—2400, R. Bartholomew, Garrochales, Porto Rico.
WLAC—1175, D. J. Morris, Weir, Tex.
WLAG—4150, H. A. Crowe, S. S. Ethan Allan, South of Hawaii.
WLAH—1500, D. J. Morris, Weir, Tex.
WLAJ—1450, J. H. Wall, Rensselaer, N. Y.
WLAK—1575, Vinson Crowder, Houston, Tex.
WLAL—1525, Arthur Chapelle, Woodburn, Ore.
WLAP—1925, A. G. Hilton, Bicknell, Calif.
WLAV—2000, G. A. Gallagher, Berkeley, Calif.
WLAW—1450, C. C. Sawyer, Liberal, Kans.
WLAY—4200, M. P. Jacot, Copley, O.
WLAZ—2075, A. B. Butters, Los Angeles.
WLB—1150, Wilson Woodside, Calgary, Alta., Can.
WLK—1950, Wm. Schauer, Daly City, Calif.
WLW—2025, L. W. Beretta, San Mateo, Calif.
WMAB—1450, Arthur Chapelle, Woodburn, Ore.
WMAC—1300, R. T. Andrea, Cobalt, Ont., Can.
WMAD—1150, H. J. Latshaw, Clearfield, Pa.
WMAF—1250, R. Henry, Butler, Mo.
WMAG—1325, R. T. Andrae, Cobalt, Ont., Can.
WMAH—1350, S. S. Atwood, Esperance, Wash.
WMAK—1175, Wm. J. Wolverton, Linton, N. D.
WMAM—1350, H. Dammann, Bronx, N. Y.
WMAQ—1850, R. Rowe, Santa Clara, Calif.
WMAT—1600, Perkins Benneyan, Fresno, Calif.
WMAU—1400, W. W. Selden, Springfield, Mass.
WMAV—1500, H. S. Olding, New Glasgow, N. S.
WMAY—1400, R. J. Gall, Blythe, Calif.
WMC—1625, Perkins Benneyan, Fresno, Calif.
WNAB—1350, H. S. Olding, New Glasgow, N. S., Can.
WNAC—2300, S. S. Atwood, Esperance, Wash.
WNAD—1500, C. T. Mower, Malden, Mass.
WNAK—1200, J. H. Wall, Rensselaer, N. Y.
WNAM—1375, H. S. Olding, New Glasgow, N. S., Can.
WNAQ—1000, R. T. Andrea, Cobalt, Ont., Can.
WNAS—1200, B. S. Maynard, Detroit, Mich.
WNAT—1000, R. V. Hammer, Creston, Ia.
WNJ—2375, B. H. Seydel, Tacoma, Wash.
WOAA—1525, G. F. Cory, New Bedford, Mass.
WOAC—1600, O. P. Klein, Leduc, Alta.
WOAI—2250, H. S. Olding, New Glasgow, N. S., Can.
WOAJ—1550, S. S. Atwood, Esperance, Wash.
WOAN—1100, H. M. Clark, Auburn, Me.
WOAP—1950, L. W. Beretta, San Mateo, Calif.
WOAS—1275, L. Hull, Eureka, Kans.
WOAZ—1525, E. S. Macartney, Ottawa, Ont., Can.
WOC—1675, H. S. Trost, San Jose, Calif.
WOI—1550, L. W. Beretta, San Mateo, Calif.
WOK—1725, H. S. Olding, New Glasgow, N. S., Can.
WOO—1575, M. B. Gilbert, Douglas, Wyo.
WOQ—1475, Arthur Chappelle, Woodburn, Ore.
WOR—4800, Jack Costa, Haiku, Maui, T. H.
WOS—1625, G. L. Harms, Portland, Ore.
WOAW—100, Robert Rowe, Santa Clara, Calif.
WPA—1950, W. E. Davison, Berwick, N. S., Can.
WPAB—1250, J. Skinner, Corsicana, Tex.
WPAC—1325, L. C. Hopkins, Enfield, Conn.
WPAH—1650, Arthur Chapelle, Woodburn, Ore.
WPAK—1250, Arthur Chapelle, Woodburn, Ore.
WPAS—1900, W. D. Newcomb, Socorro, N. M.
WPAT—1375, L. C. Kemp, Seattle, Wash.
WQAM—1400, C. V. Bell, Ottawa, Can.
WRL—1100, W. M. K. Young, Kansas City, Mo.
WRP—1375, Guy V. Carrolo, Houston, Tex.
WRR—2000, H. S. Olding, New Glasgow, N. S., Can.
WRW—2550, L. W. Beretta, San Mateo, Calif.
WSAS—1225, F. T. Wycoff, Springfield, Mass.
WSAV—1125, Billy Withington, Jackson, Mich.
WSB—2275, L. K. Poyntz, Victoria, B. C., Can.
WSL—1175, L. Hull, Eureka, Kans.
WSY—2050, Arthur Chapelle, Woodburn, Ore.
WTAC—2025, R. J. Gall, Blythe, Calif.
WTAW—1525, L. W. Beretta, San Mateo, Calif.
WTG—1375, Arthur Chapelle, Woodburn, Ore.
WWAC—1550, Donald Wood, Waco, Tex.
WWAD—1050, M. L. Johnson, Atchison, Kans.
WWAX—1700, Sydney Warner, Springfield, N. J.
WWB—2150, R. Taylor, Livermore, Calif.
WWI—1800, R. J. Gall, Blythe, Calif.
WWJ—2200, F. W. Hill, Cristobal, C. Z.
WWL—1275, G. W. Perkins, Thompson, N. Y.
2LO—3175, S. F. Richards, Janesville, Wis.

Rival Hand Saw Musicians Entertain WEAY Listeners

HOUSTON, TEX.—Adam Carter, hand saw musician, recently appeared as entertainer for The Evening Post in a program from WEAY, the Iris theater station. The next day, John Weber, rival hand saw musician, offered to show that he also can play entertaining Radio music on the one-time carpenter tool.

Subsequent developments brought scores of requests for special selections and repeat numbers on the hand saw. Weber used a special-made phonograph record for accompaniment.

Vernier Var. Condensers
COMPLETE WITH KNOB AND 3 IN. RUBBER DIAL
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Plain— 3 Plate .....$0.75 11 Plate ..... .98
Plain— 23 Plate .....$1.25 43 Plate 1.50
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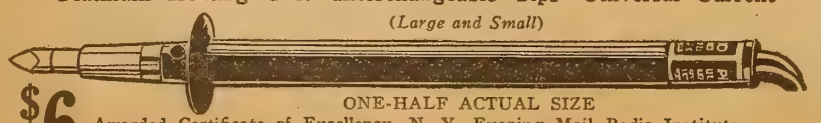
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Federal Standard
HEAD SET
For every member of the family
Add to the pleasure you get out of Radio by permitting all the members of your family to enjoy it at once.
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Scientific winding and the expert hand-workmanship of master craftsmen give exceptional range and power.
Get these guaranteed head sets from your dealer today and refuse to accept a substitute
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BUFFALO, N. Y.

MOVIES IN THE HOME BY RADIO

"SOON WILL BE PROVEN FACT," SAYS INVENTOR

Inventor of "Pictures by Radio" Machine Working Out Problem

Only One Kink Unsolved

Will Enable Persons in Far Away States to See Inaugural Ceremonies

By L. M. Lamm

"Movies by Radio in the home will soon be an accomplished fact, startling as this may seem, for the only unsolved problem is the speed factor," says C. Francis Jenkins of Washington, D. C., inventor of a machine by which photographs are sent by Radio. Actual demonstrations have been made between Washington and Philadelphia of the practicability of sending these pictures and Mr. Jenkins is now working on perfections of his new idea. Answering the writer's questions, Mr. Jenkins continued:

"When, then, this remaining problem of speed is solved, and it is now being worked out gratifyingly, persons in California or Nebraska or Maine or Florida will be able to see the inaugural ceremonies of their President in the National Capitol on the day of inauguration, or both see and hear grand opera broadcast from any point.

Will Allow Fast Picture Distribution

"Meantime, while this problem is being worked out photographs by Radio will be perfected for useful and speedy service in the distribution of picture news for the daily paper, the news bulletin, the theater and all other subscribers to such service."

The process of broadcasting photographs, Mr. Jenkins explained, consists chiefly in "slicing" the picture to be broadcast into hundreds of perpendicular sections, each about 100th of an inch thick, and in moving the projected image of each section across a so-called photo-electric cell, made of selenium or a similar mineral, whose ability to carry an electric current varies with the intensity of light falling upon it. As each section of the illuminated image is thus drawn across the cell, the dark portions, halftones and light spots formed along the "slice" by the shadows, lights and color variations by the photograph serve to correspondingly decrease, increase or maintain the flow of electric current through the cell.

Substitute for Microphone

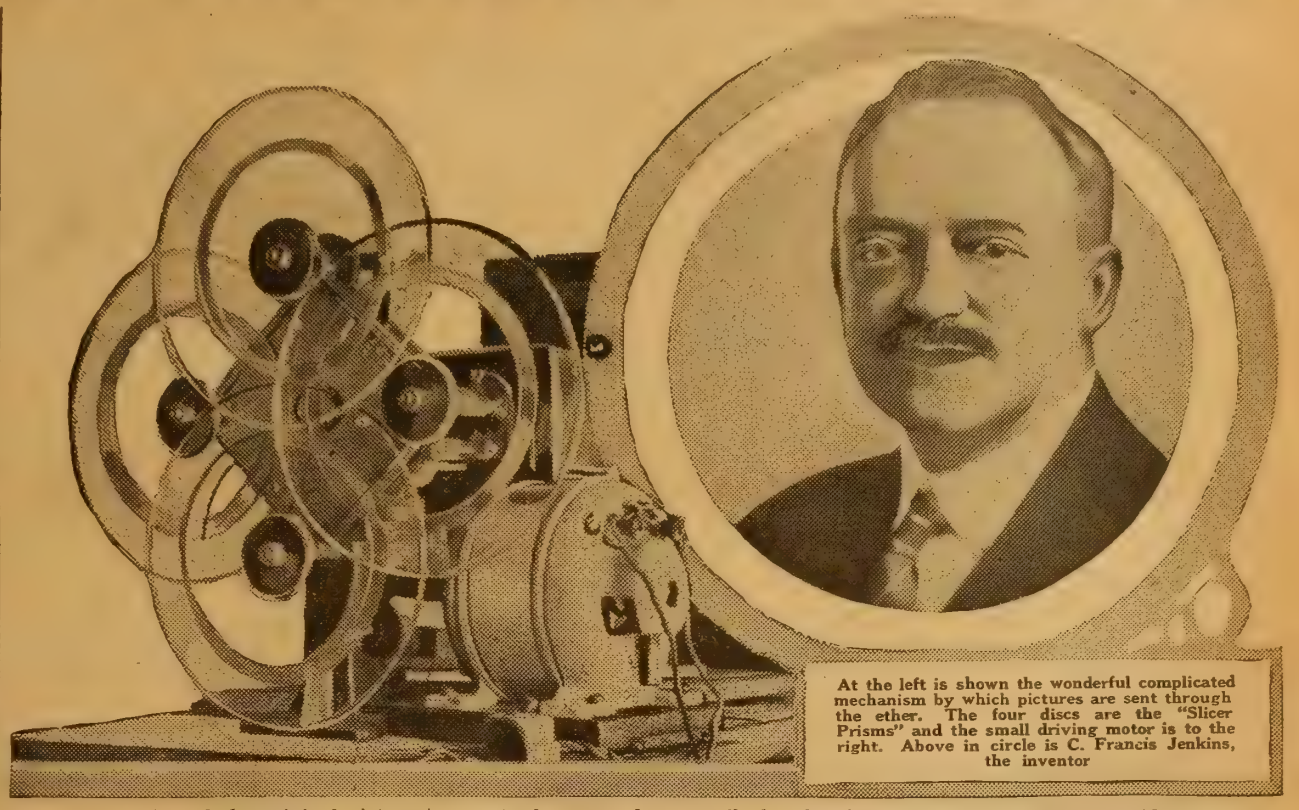
Having transformed light variations into electric current, Mr. Jenkins explained, it was a simple matter to substitute this instrument for the microphone mouthpiece of the Radiophone, for the function of the microphone is similar to transform sound variations into current variations.

To reproduce the picture at the receiving station a virtual reversal of the sending process occurs. Two methods have been successfully employed. By the first method, the Radio waves are received over a regular Radio receiving set, the receiver of which, however, is equipped as follows:

On the metal diaphragm of the receiver is mounted a tiny mirror which vibrates with the diaphragm as the Radio oscillations are registered. Focused on the mirror is a strong ray of light, which is reflected through a shutter when the mirror is stationary. As the impulses originating from the sending station start, the mirror oscillates with the diaphragm and the reflected ray also oscillates across the shutter hole. Thus, when the diaphragm is vibrating slowly more light from the ray filters through the aperture than when the vibrations are rapid. The current variations received by Radio are accordingly transformed back to light variations which are registered on a sensitized photographic plate.

Receiver Has "Slicing" Machine Also

It will be seen, however, that these variations as they are received must be reproduced in perpendicular "slices" across the face of the plate in order to build up again the completed picture. Here Mr. Jenkins devised a new type of disc prism, which he has patented, constituting in appearance a circular glass plate, about ten inches in diameter, with a rim beveled to form a prism of spiral shape and of gradually increasing thickness at the edge. As the beam of light from the mirror strikes this revolving prism it is bent along a perpendicular path downward across the plate, repeating this movement until each section of the original picture, sliced up in a similar way by circular prisms, has been neatly laid down beside its neighbor to form the completed reproduction. The correct horizontal spacing is maintained by a system of like discs, revolving in the sending and receiving stations at the same speed.



At the left is shown the wonderful complicated mechanism by which pictures are sent through the ether. The four discs are the "Slicer Prisms" and the small driving motor is to the right. Above in circle is C. Francis Jenkins, the inventor

Second System Simpler

The second method, just recently developed and the one which, because of its simplicity, probably will be permanently substituted for the former system, consists in sending the Radio current as amplified by the Radio receiving outfit through a specially constructed incandescent electric light bulb, the tiny filament of which is surrounded with hydrogen. About two volts of a storage battery current are conveyed constantly through this filament, so as to produce a red glow in the bulb.

As the varying Radio currents course through, the filament lights up, dies down to produce half tones, and shades. Thus it reflects directly on the plate the varying intensities of light. This method does away with the uncertainty of reflecting mirrors, which are always subject to vibrations likely to distort the reproduction.

Needs Little New Apparatus

It is evident, therefore, that little apparatus is required, in addition to standard Radio equipment, to make the usual receiving set a picture-receiving outfit. The entire adjunct takes up but a small amount of room and can easily be placed on the library table for operation. A person of constructive inclinations could readily manufacture his own set, providing, of course, he could obtain possession of the disc prisms.

Heretofore, inventors have succeeded in sending etchings by Radio by curving the etchings over a revolving cylinder and passing slowly across the cylinder an electrical contact, which sent out current impulses as it touched the high points of the etching. Never before, Mr. Jenkins says, have photographs themselves been transmitted because of the inability in times past to reproduce halftones.

The first distant transmission of photographs by Radio was made by Mr. Jenkins on March 3 when they were sent from the naval Radio station in this city to the receiving station of the Philadelphia Evening Bulletin.

The test was made under the auspices of the North American Newspaper Alliance in the presence of newspaper publishers and scientists. At that time pictures of President Harding, Vice President Colidge, and Governor Pinchot of Pennsylvania were sent and received very successfully.

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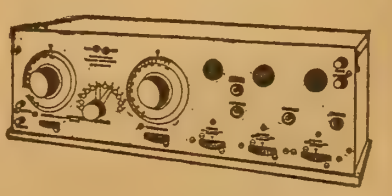

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The Week's Advance Broadcast Programs

Tuesday, May 22

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Frederick Stanger, tenor; Mannie Roth, violinist.
KFDB (Pacific, 400), 2:00-2:30 P. M., Y. W. C. A. talk, Margaret LeSeur, Sec'y San Francisco Y. W. C. A.
KPO (Pacific, 400), 8:00-10:00 P. M., Chorus, 20 male voices.
KSD (Central, 546), 8:00 P. M., Musical program, Marguerite Wessels, soprano; Adelaide Blase, Genevieve Seibert, violinist; Ruth Haynie, O. R. McHughes, Brittie L. McGee, pianists; Address, "Veterans of the Allies," Capt. Francis L. Tottenham, O. B. E., Royal Navy, Naval Attaché to British Embassy in Washington; Address, "Municipal Opera," Nelson Cunliff, Chairman Executive Committee, Municipal Opera Association of St. Louis.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Bergey Chicago Opera School, Theodore S. Bergey, director; Elsie C. Melius, Pansy G. Bird, sopranos; Ruth Freeman, pianist; A. E. Bredemeir, tenor; Theodore S. Bergey, baritone.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Band from Gorman, Tex.
WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program by Chicago Fine Arts Conservatory of Music; Jack Chapman's Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray, editor of The Semi-Weekly Farm News; 8:30-9:30 P. M., Musical program, Mrs. LaRue Nelson and assisting musicians; 11:00-12:00 P. M., Musical program under auspices of Lester Gunst Company.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Song and quartet recital; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; Children's stories, Cousin Sue; 8:00-9:55 P. M., Musical program; 10:10-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales," Uncle David; 8:30 P. M., Evening program; Business report, Roger W. Babson; Selections, Winchester Laundries' Orchestra; Lecture, Tufts College; Winchester Laundries' Orchestra.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest; Scientific American Article.
WGY (Eastern, 380), 7:45 P. M., Musical program, Georgia Minstrel Boys; Old Southland Melodies, WGY Orchestra; Darktown humor, Minstrel Boys; "I Wish I Was in Dixie," Male Quartet; Dialogue, William Jackson, Washington Lee; "Georgia Cabin Door," Washington J. Lee, baritone; "Swanee Smiles," "The Heart of Virginia," "Lonesome Mamma Blues," Orchestra; "My Southern Home," Orchestra; "Black Trash," Minstrel Boys; "Mah Mandy Lee," Tambo Jones, tenor; "Kentucky Babe," "Massa's in de Cold, Cold Ground," Radio Four; "Hot Time in the Old Town Tonight, Minstrel and Orchestra.
WHAS (Central, 400), 4:00-5:00 P. M., Organ recital, C. Conrad, Alamo Theater; Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Charles Myer Orchestra; Grace Deppe, soprano.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Recital and dinner music; 3:00-4:30 P. M., Short talks; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Concert, Charlie Kerr's Orchestra in L'Aiglon Cafe.
WLW (Eastern, 360), 10:00 P. M., Musical program, "Burlesque," "Cradle Song," Francis Wolff, cellist; "Le Nil," "Elegie," Mrs. R. Sayler Wright, soprano; Physical culture talk, Dr. C. A. Wulzbach, of Central Y. M. C. A.; "Eklog," "Spring Song," Francis Wolff; "Mother, My Dear," "Dreams," "Darkness," "My Love Is Come to Me," Mrs. Wright; Radio farce, "Fearfully Fat for Forty," A. R. Plough, Louis Koetter; "Scherzo," "Venetian Love Song," Francis Wolff; "Songs My Mother Taught Me," "Homeward," Mrs. Wright.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Bush Conservatory of Music; Report, Babson; Talk on "Farm and Garden Society;" "The Way of Business," Henry Walter Graham, humorous reading; Axel Christensen, pianist; 9:15 P. M., Compositions, Mrs. Floy Little Bartlett.
WMC (Central, 500), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gasper Papalardo, director; 11:00 P. M., Midnight Frolic.
WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Organ recital, Mary E. Vogt.
WWJ (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Walter Bates, tenor; Edith Pickles, soprano; Harrison Burch, pianist.

Wednesday, May 23

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Albert Downing, tenor; H. Saunders, cellist.
KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Banking," Officers Mercantile Trust Co.; 2:30-3:00 P. M., Music, lecture; 8:00-10:00 P. M., French music; One-act play in French, professional actors of San Francisco French colony.
KSD (Central, 546), 8:00-9:45 P. M., Musical program, Overture, "Egmont," "The Sawmill River Road," Missouri Concert Orchestra; Organ recital, Stuart Barrie; Vocal specialty, Cliff Nazarro; Band specialty, George Hall and orchestra.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Jessie R. Edwards, soprano; Sallie Menkes, accompanist; Katharine Gorin, pianist; Theodora Beidlung, violinist; Alma Broberg, reader.
WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:45 P. M., Evening program; Girls' Hour, Eunice L. Randall; Concert, Boston Masonic Club; "Summer," Henry Copley Greene, American Red Cross.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest; 9:00-11:00 P. M., Musical program, Morris E. Bennet, Buffalo, N. Y.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Mildred Schirmer, pianist; 7:30-9:00 P. M., Concert; Alyce Everin, pianist; Mrs. William Corrigan, soprano; Esther Brown, violinist; Bernice Lake, soprano; Oakley H. Kellogg, flute; solos; Maurice Mennen, George A. Resta, clarinetists.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Short talks and piano recital; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.
WLW (Eastern, 360), 8:00 P. M., Musical program, "Awakening," Mrs. E. B. Hausfeld; Roger Hill Dance Orchestra; Mrs. Henry Risch, soprano; Henry Risch, violinist; Mabel Moore, accompanist; "Lorely," "In Einem Kuhlen Grunde," "Haidenroslein," Bavarian Male Chorus; Radio drama, "Magda;" "Der Lindenbaum," "Es Steht Einer Lind," "Spinn-Spinn," Bavarian Chorus.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Cosmopolitan School of Music and Dramatic Art; 7:00 P. M., Stories, Georgene Faulkner; 9:15 P. M., Musical program; Hilda Butler Farr, pianist; Helen Hedges, soprano; Cooper Lawley, tenor.
WOC (Central, 484), 3:30 P. M., Talk, D. K. Kirk; 6:30 P. M., Sandman's visit; 7:00 P. M., Musical program, Erwin Swindell, director; Grace Harper, Gertrude McKinsey, Elsie Dack and Roscoe Williams; 8:00 P. M., Lecture, "Electricity on the Farm," Jos. Kimmel of Delco Light Co.; 10:00 P. M., Musical program, J. Dwight Clark, John McGreevy, Mrs. John McGreevy, Blanch Whitcomb.
KFDB (Pacific, 484), 2:00-2:30 P. M., Talk, D. K. Nielsen Laurik, San Francisco Palace of Fine Arts; 2:30-3:00 P. M., Lecture, "The Making of Fine Pottery," Wm. V. Bragdon, Tile Shop of Berkeley; Recital, Mrs. Emily Kauffeld, pianist.
KPO (Pacific, 400), 8:00-10:00 P. M., Organ recital, Gladys Salisbury.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, Violet Tait, soprano; Howard Nielson, tenor; Sallie Menkes, accompanist; Harriet G. Allen, contralto; Mildred Kilmer, whistler; Maybell Wells, accompanist; 9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. J., head of Dept. of English, Loyola University.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Knights Ku Klux Klan, Realm 101, Fort Worth.
WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program, Paramount Orchestra; Songs, C. W. Stewart; Jack Chapman's Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and piano selections; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Stories for the little tots by Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Dealing With Public Utilities," J. W. Everman, Supervisor of Public Utilities of Dallas; 8:30-9:30 P. M., Program by Honey Grove representatives, arranged by J. H. Lowry, editor of Honey Grove Signal; 11:00-12:00 P. M., Musical program under auspices of Will A. Watkin Company.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:00 P. M., Musical program; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra; Children's stories, Cousin Sue; 8:00-12:00 P. M., Song recital; Dance music, Meyer Davis, Bellevue-Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "General Conditions in the Shoe and Leather Industry," Weekly Review New England Shoe and Leather Assn.; Evening program; "Romance of the Shoe," Harry M. Wood; Concert, Amrad Banjo-Mandolin Club.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Ampico recital; 7:30 P. M., News Digest, Boy Scout Radiograms, Industrial Employment Bulletin.
WGY (Eastern, 380), 1:00 P. M., Music and address, "Foods for Growth—Milk," Mary G. McCormick, Supervisor of Nutrition, N. Y. State Dept. of Health; 7:45 P. M., Radio drama, "What Happened to Jones;" Selection from "You're in Love," WGY Instrumental Quartet.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ recital, Roy C. Parks, Rialto Theater; 7:30-9:00 P. M., Concert, Beta Chapter Beta Pi Omega Sorority; Betty Maoris, soprano; Mary Emily Chenault, pianist; Thelma Duffin, soprano; Sara Hill Richardson, violinist; Sallie Pennington, soprano; Ruth Blakey, pianist; Reading, Mrs. G. L. Gibson; Mary Gibson Craig, soprano; Sunday School lesson, Dr. Harris Malinckrodt; Talk, S. W. McGill, Child Welfare; Charlie Bynum, pianist.

(Continued on page 9)

Thursday, May 24

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Concert Orchestra; Norma Hermiston, soprano; Harry Adaskin, violinist; 10:00-11:00 P. M., Dance program, Star Orchestra.

What Time Is It?

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

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Variable Resistance Leaks
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Can be mounted on the panel
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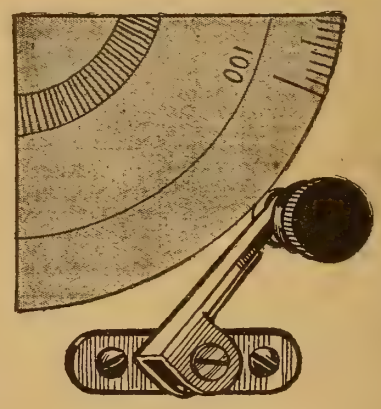

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When you write, give us the name of your favorite Radio Dealer, as we want to tell him about our *Exclusive M. R. C. Franchise* which will put him in *control* of the whole Radio Situation in his territory.
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How to Make One Condenser Flivver Super Set

Part IV—Panel Layout and Wiring

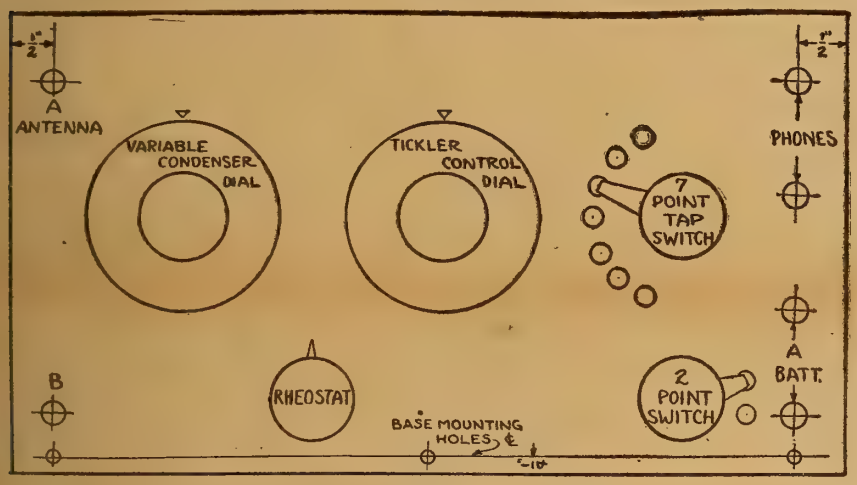
By E. T. Flewelling

A DISCUSSION of panel arrangement for any Radio set will often bring up some more or less interesting points. For instance, it can be readily seen that an absolutely improper layout might easily result in the failure of the entire set. For a general rule to follow when considering panel layouts, perhaps the idea of progression is the best and certainly is the one that is most generally accepted. Progress with your layout in direct line with the signals that are received. That is, if the signal comes first to the extreme left of the panel, use every care that the layout of your panel does not make this signal repeat its course back and forth until it finally reaches the output point. Start it at the extreme left for the input side and see that the layout is such that it goes to the right or output side in progressive steps as it goes through each individual piece of apparatus, and make each connection as short as possible.

Suitable Layout for Flewelling Set

A panel layout that will comply with these requirements, is given in Figure 1. The output posts are at the extreme left of the panel and the signal will travel through the set progressively until it reaches the extreme right of the panel where the output posts are located.

Because of different types of dials, condensers, inductances, etc., will be used by different builders, no dimensions can be given. It is suggested that you assemble the various parts together, and place them on a flat surface, such as a table top, following the arrangement pictured.



Flewelling One Condenser Super Panel Layout

This will enable you to determine the spacing required for the parts and from this you can decide upon the size of the panel needed to accommodate the parts that you are using. Secure the proper sized panel and a piece of copper shielding of the same size, mark the panel for the various holes, then have the copper shielding held firmly under it so both shield and panel are drilled at one operation. When the drilling is finished there will be several holes in the shield that it will be necessary to enlarge so that no short circuits will occur between the instrument shafts and the shielding. Note the three holes on the bottom line of the panel, and the holes for the 2-point switch.

The holes for the switch should be spaced far enough apart so that when the switch is thrown from one point to the other that the two points are not connected together by the switch blade and thus short circuit the B battery. The holes in the bottom line of the panel are to be used for screws to mount the panel in an upright position on the edge of a suitable board referred to in a previous article.

The panel and shielding should now be lined up with each other and fastened to the base board. It is then in good solid and convenient position for mounting the various parts.

Mounting the Parts

Mount the parts on the panel and watch carefully that the shafts and parts do not touch the shield as you mount each separate piece. If this is cared for at this time you will not have to tear your set down later to remove a troublesome ground or short circuit.

Our next work is to make the various connections and it is quite important to put the best efforts on this part of the construction. Let me say a word about soldering. All parts to be soldered must be very clean, always use copper soldering clips at the points of connection. Do not attempt to solder direct to a binding post or other heavy metallic point unless you are an adept at the art. The heavier points must, for correct soldering, be brought to a high heat and the time required to do this may result in injury to the fiber or other parts. A small copper clip reaches this high point of heat so quickly that the work is done before harm can come to the other parts. Use a very small amount of soldering paste or flux, also of solder, and heat the joint just to the point where the solder flows quickly through the joint then remove the iron immediately. Because you have arranged for your panel to be in an upright self-supporting position you will find this work very interesting due to the fact that both hands may be used exclusively for soldering.

Systematic Wiring

Like everything else the wiring of a Radio set is best done if a system of some kind is followed. Without a systematic method of wiring one is apt to become confused as they carry out the diagram. Lots of folks start out bravely with even such a simple diagram as ours, and find out later that their set does not work because they have forgotten one little connection.

The more experienced worker always divides his diagram into separate parts, is thus able to wire one simple section correctly, and having done this goes on from one section to the other until he finds his work completed, and completed correctly.

Doing Work in Sections

In line with the above let me suggest a suitable division of the sections of a Radio set. If it is followed, I believe that you will be much pleased with your results. When you start to wire your set forget for the moment, every other part of it but the filament lighting circuit with its socket, rheostat, etc. Complete this circuit first and having done so, insert the tube in the socket, connect the battery and you can immediately see whether or not this circuit is correct. If it is, proceed to the next part of the diagram.

The grid circuit or the part of the diagram to the left of the tube is usually the best part to work on second. Start this section by connecting the antenna post A to one side of the variable condenser C-1, and connect the other side of the condenser C-1 to the top point or beginning of the tuning inductance L-1.

Stop now and connect the taps of the inductance to their respective points on the panel switch. This is best done by mounting the coil on the board first. The switch points are all ready in place on the panel so that if a wire is soldered to each switch point and left long enough, all that we have to do is to pull the wire over to its correct tap on the inductance and solder it there. This results in short, clean-cut taps on the inductance. We can now go on with the rest of the circuit.

Finishing the Circuit

Carrying along the signal's path, connect the top point of the inductance to the grid leak and condenser and then from the other side of the leak and condenser go to the grid post of the tube. Be sure that these connections are as short as possible.

The next thing the program calls for is to complete the grid circuit wiring by connecting the inductance tap switch arm to the .006 mfd. condenser and the arm of the 2-point switch S-1, and finish the grid circuit by connecting the .006 mfd. condenser to both the switch contact of S-2 and to the positive filament post of the socket.

Plate Circuit

If this scheme is followed you may go on to the wiring of the plate circuit with the feeling that you have nothing to do but get that one remaining circuit right, and that your receiver is correct so far. Detailed directions for the plate circuit wiring are not considered necessary and I would only suggest that you leave the connection marked X until the last and run this connection from the remaining point of the 2-point switch to the most convenient point between the phones and the tickler coil, using great care that you make the connection exactly as shown on the diagram. This is the most critical point about the set, hence the caution.

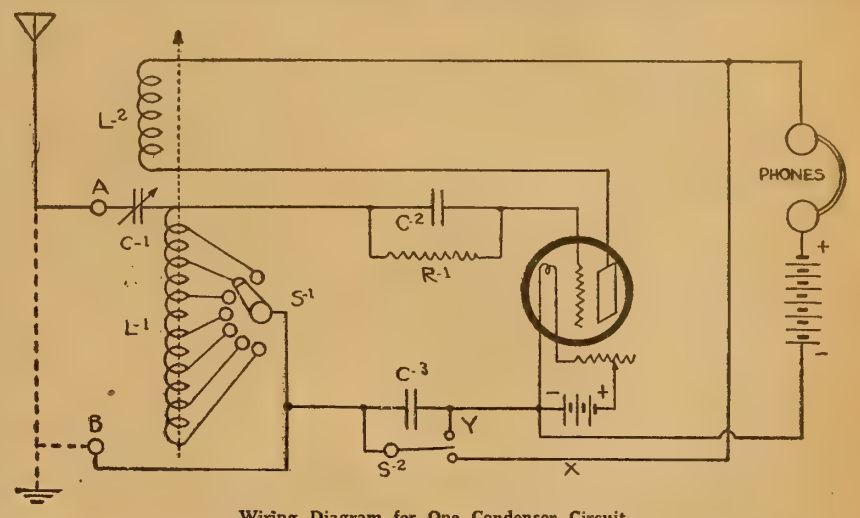
This completes the panel layout and wiring instructions for the set and if directions have been carefully followed out should result in a good clean cut piece of Radio receiving apparatus of an up to the minute type.

Suitable Cabinet

The matter of a suitable cabinet for such a set must of course be left to the individual. Most cabinets are recessed to receive the panel flush with the front of the cabinet. That is the reason for mounting the panel on a base board that was slightly shorter than the panel. The board cannot interfere then with the sides of any cabinet that is used, when the panel and set are mounted.

Note also that on the right or output side of the panel are binding posts for the phones and also for the filament battery. This enables us to carry on to an amplifier if we wish. For this reason connections to the B battery have been left to be made from the back of the set at a point that is most convenient for the individual builder.

If a panel mounting type grid leak is used the builder can place it on the panel according to the particular make of leak used. No two makes are identical so that this point must be left to the maker.



Wiring Diagram for One Condenser Circuit

For the convenience of those who wish to follow the diagram with this article, last week's wiring diagram is again shown in this issue with some changes the writer deemed advisable.

(TO BE CONTINUED.)

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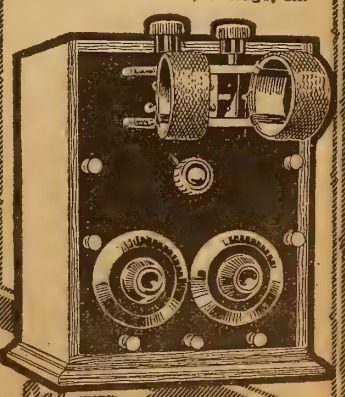

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Tucson, KFDH

Arkansas:
Fayetteville, KFDV
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
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Bakersfield, KDZB, KYI
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KMJ
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KFCL, KFI, KHJ, KJS, KNN, KNV, KNX, KUS, KWH
Modesto, KXD
Oakland, KLS, KLX, KZM
Reedley, KFAZ
Richmond, KFCM
Sacramento, KFBK
San Diego, KDPT, KDYM, KFBC, KFFA
San Francisco, KDN, KDZG, KDZX, KFDB, KPO, KSL, KUO
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Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFCK
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KFIC, KLZ
Gunnison, KFHA
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WGAH, WPAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT, WPAW

District of Columbia:
Washington, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WPM, WQAW

Florida:
Jacksonville, WDAL
Miami, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WEAT, WHAW
West Palm Beach, WKAH
Winter Park, WRAF

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WMAZ
Savannah, WHAO, WRAB

Idaho:
Boise, KFAU, KFDD, KFFB
Kellogg, KFEY
Moscow, KFAN

Illinois:
Belvidere, WQAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WHAP
Elgin, WTAS
Galesburg, WRAM
Lake Forest, WABA
Mattoon, WQAL
McLeansboro, WRAS
Peoria, WJAN, WQAX
Quincy, WCAW
Rockford, WIAB
Springfield, WDAC
Tuscola, WDZ
Urbana, WRM

Indiana:
Brookville, WSAL
Evansville, WAOU
Greencastle, WLAX
Huntington, WHAY
La Porte, WRAF
Marion, WIAQ
Mishawaka, WOAO
Muncie, WIAF
South Bend, WGAZ
West Lafayette, WBAA

Iowa:
Ames, WOI
Boone, KFGQ
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Lamoni, KFFV
Le Mars, KFCY, WIAU
Newton, WIAH
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Cheney, KFGP
Emporia, WAAZ
Hutchinson, WLAS
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WTG
Marion, WRAD
Parsons, WOAJ
Topeka, WJAQ, WPAM
Wichita, KFHI, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS WLAP
Paducah, WIAR

Louisiana:
Alexandria, KFFY
Baton Rouge, KFGC
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, KFHF, WGAQ

Maine:
Bangor, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAY
Frostburg, WPAQ

Massachusetts:
Boston, WFAU, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Berrien Springs, KFGZ
Dearborn, WWJ
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Baudette, KFGY
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, WBAD, WBAH, WCAS, WLAG, WRAH
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, KFHD, WEAK
St. Louis, KFEZ, KFGJ, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Lincoln, KFDU, WFAV, WJAB, WKAC, WMAH, WQAP
Norfolk, WJAG
Oak, KFEQ
Omaha, KFCZ, KFFX, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ

State, City, Call

Utica, KFGV
York, KFDR

Nevada:
Reno, KDZK
Sparks, KFFR

New Hampshire:
Laconia, WKAV

New Jersey:
Atlantic City, WHAR
Camden, WRP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WJZ, WOR
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
Roswell, KNJ
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Binghamton, WIAV
Buffalo, WGR
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WEAF, WJX, WLAW, WSAP
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Stapleton, WDT
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

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Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

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Canton, WWB
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Dayton, WAL, WABD, WJAJ
Fairfield, WL2
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Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Sandusky, WQAF
Springfield, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA
Chickasha, KFGD
Norman, KFHC, WNAD
Okemah, WKAK
Oklahoma City, WKY
Okmulgee, WPAC
Tulsa, WEH, WGAF, WLAL

Oregon:
Arlington, KFGL
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW
Salem, KFCD

Pennsylvania:
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Harrisburg, WABB
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Brookings, KFDY
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas :
Abilene, KFGM, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, KFFZ, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WRAA, WSAY
Laredo, WWAX
Orange, KFGX, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, WCAR, WAOI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KFCP
Salt Lake City, KDYL, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZR
Everett, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFV

West Virginia:
Clarksburg, WHAK
Morgantown, WHD

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CFAC, CFCN, CJCY
Edmonton, CFCK, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS, CJGGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CJCC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCR, CHVC, CJCD, CJCH, CJCN, CJSC, CKCE, CKCZ, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKY, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE—The third and last part of the schedule list appears below. Next week the first part will appear.)

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 360 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. 360 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-8:30 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 360 meters. Crosley Mfg. Co. Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat, 2 pm, special. Sun, 11 am, church services. Eastern.

WMAC, Cazenovia, N. Y. 360 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. 360 meters. Atchinson County Mail.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp.

WMAG, Liberal, Kan. 360 meters. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 254 meters. 500 mi. General Supply Co. Temporarily discontinued.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. No-r ton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Mon, Thur, 7:30-9 pm, music, lecture. Eastern.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 360 meters. 50 mi. First Baptist Church Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 360 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Mon, 4:35-5 pm, 9:15-10. Wed, Fri, 7-7:30 pm. Tues, Thurs, Sat, 7-8 pm. Central, Daylight Saving.

WMAR, Waterloo, Iowa. 360 meters. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 360 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. 250 meters. Ala. Polytechnic Institute.

WMAW, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 7-7:30 pm, music, sports, news. Central.

WMAX, Ann Arbor, Mich. 360 meters. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Sun, 11 am, 8 pm. Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. 360 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 360 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Tues, Thur, 7-8:30 pm. Wed, Sat, 9:30-11 pm, Fri, 8-9:30 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAL, Omaha, Neb. 360 meters. R. J. Rockwell.

WNAM, Evansville, Ind. 200 mi. 360 meters. Ideal Apparatus Co., Inc. Mon, Wed, Fri, Sat. 10-11 am, music, reports; 3-4 pm, 7-8, entertainment. Sun, 3-4 pm, music. Central.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern.

WNAV, Knoxville, Tenn. 360 meters. People's Tel & Telg. Co.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yanktown, S. D. 360 meters. Dakota Radio Apparatus Co.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.

WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 360 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 400 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 360 meters. 50 mi. C. E. Ervin. Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 360 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAS, Middletown, Conn. 360 meters. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAU, Evansville, Ind. 360 meters. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 527 meters. Woodmen of the World.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert. Wed only; 9:30 pm, concert. Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Sun, 11-12 m, 7:30 pm, church service. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12 m, time; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Thurs, 7:50 pm, concert. Eastern.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment, lectures. Eastern.

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOU, Omaha, Neb. 360 meters. Metropolitan Utilities Dist.

WOV, Omaha, Neb. 360 meters. R. B. Howell.

WPA, Ft. Worth, Tex. 360 meters. 1,000 mi. Fort Worth Record. Daily ex Sun, 10:58-11 am, 11:30-12 m, 1:30-2 pm, 2:30-3, 6-6:30. Daily ex Sun, Mon, Wed, 8:30-9:30 pm, 10-10:05. Mon, 11-12 mid. Sun, 3-3:30 pm, 9-9:30. Central.

WPAA, Waco, Neb. 360 meters. Anderson & Webster Elec. Co.

WPAB, State College, Pa. 360 meters. Pa. State College.

WPAC, Okmulgee, Okla. Donaldson Radio Co.

WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, 6:30-7 pm, music. Wed, Fri, 10-11 pm. Sun, 2:30-3:30 pm. Central, Daylight Saving.

WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 485 only. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 8:30 am, 9:30, 10:30, 11:30, 3 pm, 5, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. 360 meters. Doolittle Radio Corp.

WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.

WPAL, Columbus, O. 360 meters. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. 360 meters. Awerbach & Guettel.

WPAP, Winchester, Ky. 360 meters. Theodore Phillips.

WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.

WPAR, Beloit, Kans. 360 meters. 50 mi. R. A. Ward. No definite schedule.

WPAS, Amsterdam, N. Y. 360 meters. J. & M. Electric Co.

WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. 360 meters. Concordia College.

WPAW, Wilmington, Del. 360 meters. 50 mi. The Radio Installation Co. Daily ex Sun, 4-6:30 pm, music, code instruction. Wed, 8-10:30 pm, music. Eastern.

WPAY, Bangor, Me. 360 meters. Bangor Radio Lab.

WPAZ, Charleston, W. Va. 360 meters. Dr. John R. Koch.

WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. 360 meters. Elec. Supply Co.

WPM, Washington, D. C., 360 meters. 200 mi. Thos. J. Williams, Inc. (Washington Daily News.) Daily ex Sun, 12:30 pm, news. Mon, 8 pm, concert. Eastern.

WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. 360 meters. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

WQAD, Waterburg, Conn. 360 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 6:30-7:45 pm, music, Boy Scout news. Eastern.

WQAF, Sandusky, O. 240 meters. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

WQAJ, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.

WQAK, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.

WQAL, Mattoon, Ill. 360 meters. 100 mi. Coles County Tel. & Telg. Co. Tues, Thurs, 9-11 pm, music, lectures. Central.

WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern.

WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.

WQAR, Muncie, Ind. 360 meters. Press Pub. Co.

WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

WQAT, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5. Eastern.

WQAV, Greenville, S. C. 360 meters. 75 mi. Huntington & Guerry, Inc. Tues, Thurs, 7:30-8:30 pm, music. Sat, 7:30-8 pm, music. Eastern.

WQAW, Washington, D. C. 360 meters. Catholic University of America.

WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.

WQAX, Peoria, Ill. Radio Equipment Co.

WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.

WRAC, Mayville, N. D. 360 meters. State Normal School.

WRAD, Marion, Kans. 360 meters. Taylor Radio Shop.

WRAF, La Porte, Ind. 224 meters. Radio Club, Inc.

(Continued on page 9)

STATION SCHEDULES

(Continued from page 8)

WRAH, Providence, R. I. 360 meters. Stanley N. Read.
WRAK, Escanaba, Mich. 360 meters. Economy Light Co.
WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.
WRAM, Galesburg, Ill. 360 meters. 200 mi. Lombard College. Wed. 7:30-9 pm, college activities, announcements. Schedule irregular. Central.
WRAN, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8 30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAR, David City, Nebr. 360 meters. 100 mi. Jacob C Thomas. Tues, Fri, 7-9 pm. Central.
WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.
WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs. 8:00-9:00 pm, music. Central.
WRAV, Yellow Spring, O. 360 meters. Antioch College.
WRAY, Scranton, Pa. 360 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15, 10:30 pm, music. Sun, 4 pm, chapel. Eastern.
WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Tues, Thur, 9-10:30 pm, music, lecture. Sun, 10:30 am, church service. Central.
WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.
WRM, Urbana, Ill. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30. Univ. news, talks, music. Central.
WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.
WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Mon, Wed, Fri, 7:30-11:30 pm. Sun, 7:30-9:30 pm. Eastern.
WSAA, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed. 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.
WSAH, Chicago, Ill. 360 meters. A. G. Leonard, Jr.
WSAI, Cincinnati, O. 309 meters. United States Playing Card Co.
WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.
WSAP, New York, N. Y. 360 meters. Seventh Day Adventist Church.
WSAV, Houston, Tex. 360 meters. Clifford W. Vick. Temporarily discontinued.
WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10:5‡ am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 360 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat. 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. 360 meters. Penn Traffic Co.
WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.
WTAU, Tecumseh, Neb. 360 meters. Buegy Battery & Elec. Co.
WTAW, College Station, Tex. 360 meters. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. 360 meters, Wright & Wright, Inc.
WWAJ, Columbus, O. 360 meters. Columbus Radio Club.
WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat. 8-9 pm, music. Central.
WWAY, Chicago, Ill. 360 meters. Marigold Gardens.
WWB, Canton, O. 360 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 360 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, 3-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks. 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.
WWL, New Orleans, La. 360 meters. Loyola Univ. (Note.—This completes the station schedule list. The first part will appear again next week.)

ADVANCE PROGRAMS

(Continued from page 4)

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Song recital; 5:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Song and piano recital; Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.
WIW (Eastern, 360), 10:00 P. M., Musical program, "Welcome, Sweet Springtime," Women's Chorus; "Spring's Awakening," Mrs. E. B. Hausfeld, whistler; "The Kiss," Jeanette Tibbs, soprano; "Scherzando," Mrs. C. E. Haddock; "May Morning," Mrs. Eugene Zimmerman; "The Land of the Sky Blue Water," Mrs. E. B. Hausfeld, whistler; "Blue Bells," Mrs. Howard Case; "Concerto No. 4," McMorris Houston, cellist; "My Song of You," Mrs. R. E. Hine; "Down in the Woodland," Chorus; "Polonaise," piano solo; "Rackety Coo," Cora Abernathy; "Sunlight Waltz," Jeanette Tibbs, Mrs. E. B. Hausfeld; "March Triumphant," Mrs. C. E. Haddock.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Pupils Lyceum Arts Conservatory; Talk, Edw. Price Bell; 7:00 P. M., Talk, "Auto Trails," Rockwell Stephens; Helen Ethel Levine, David Charles Levine, pianists; 9:15 P. M., Hamilton Club Male Chorus.
WMC (Central, 500), 8:00 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.
WOC (Central, 484), 3:30 P. M., Talk, Karl G. Stephan; 7:00 P. M., Musical program, Washington Band. Washington, Ia.; 8:00 P. M., Lecture, "Chemistry and Its By-Products," Prof. J. P. Magnusson, Augustana College, Rock Island, Ill.
WOO (Eastern, Daylight Saving, 509), 11:00-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Short talks; 4:30-6:00 P. M., Organ recital, Mary E. Vogt.
WWJ (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Mattie B. Lamphere, soprano; Belle Mangold, contralto; 11:00 P. M., News Orchestra; Mattie B. Lamphere, soprano; Belle Mangold, contralto.

Friday, May 25

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Orchestra; Meza Deeton, soprano; W. Woods, cornetist.
KFDB (Pacific, 400), 2:00-2:30 P. M., Talk, "Growth of Bones," Dr. A. D. Fisher; 2:30-3:00 P. M., Lecture, "Health," San Francisco Tuberculosis Assn.; 8:00-10:00 P. M., Concert, Lyric Trio of Berkeley.
KSD (Central, 546), 8:00-9:45 P. M., Musical program, Michel Gusikoff, violinist; Larry Conley, trombonist; Arthur L. Utt, organist; Gene Rodemich's Orchestra.
KYW (Central, Daylight Saving, 447), 8:00-858 P. M., Musical program, Lulu McNelley, soprano; Alfred Newman, baritone; Elizabeth Dollison, pianist; Madeline Pendelton, reader; 9:05-9:25 P. M., Book reviews, Llewellyn Jones; 10:00 P. M.-1:00 A. M., Midnight Revue.
WBAA (Central, 360), 7:15 P. M., Lecture, "Care of Milk and Cream on the Farm," B. C Manhart.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Christian University, Ft. Worth.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and short talks; 4:30-6:00 P. M., Talk, Betsy Logan on "Affairs of the Heart;" Stories for the little tots by Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-12:00 P. M., Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.
WFAA (Central, 476), 12:30-1:00 P. M., Talk on Sunday School Lesson, Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Musical program, Vera Marzian, supervisor of music in O. M. Roberts Public School.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:00 P. M., Musical program and song recital; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Dance Orchestra; Children's stories, Cousin Sue.
WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., Girls' Story Hour, Irene H. Veno; 9:30 P. M., Evening program; "Silversmith Series." David M. Cheney; Concert, Franklin Field, baritone; Marjorie Leadbetter, soprano.
WGR (Eastern, Daylight Saving, 319), 2:00-4:00 P. M., Amplico recital; 7:30 P. M., News Digest; 9:00-11:00 P. M., Musical program, Ralf Dlettrich, director; Lecture, "Missing Motors." F. B. Thompson, engineer of Vacuum Oil Co.
WGY (Eastern, 380), 7:45 P. M., Musical program, "Estudiantino," Red and White Trio; "Little Azure Rings." Marjory Barnes, soprano; "Valse Chromatique," Raymond Heindorf, pianist; Address, "The Citizens' Military Training Camp," Major Edgar C. Leonard; "Barcarolle," Red and White Trio; "Cohen on the Radiophone," Lillian Fisher, reader; "Kamenoi Ostrow," Raymond Heindorf; "Such a Lil' Fellow," "The Call of Love," Marjory Barnes; "Waves of the Danube," Trio; "Goblins," Lillian Fisher, reader; "Adagio" from "Moonlight Sonata," Raymond Heindorf; "Where the Sad Waters Flow," Marjory Barnes; "Three Winners," Lillian Fisher; "Liebestraum," Raymond Heindorf; 10:30 P. M., Concert, "Intermezzo," WGY Orchestra; "Marching," "Until the Dawn," Male Quartet; "To a Wild Rose," "Anno Domine 1620," Joseph Walsh, pianist; "Scherzetto," Quartet; "Kentucky Babe," "Honey, I Want Yer Now," Quartet: "Sea Pieces," "Twilight," Joseph Walsh; "Serenade," Instrumental Quartet; "Story of a Tack;" "Fishing," Male Quartet; "Polonaise in A," Joseph Walsh; "Entr'acte Valse," Instrumental Quartet.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ, Clifford Gorman, Rialto Theater; 7:30-9:00 P. M., Concert, Blue Grass Orchestra; Hellen C. Honaker, soprano; Mrs. Emery Nold, contralto.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Musical program; 6:00-7:30 P. M., Dinner dance music; Uncle Wip's bedtime stories.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Program, Pupils Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Marx E. Oberndorfer; 9:15 P. M., Mrs. Justine Durchanek-Siroky, soprano; Irene Pitlik, violinist.
WMC (Central, 500), 8:00 P. M., Concert, arranged by Goldsmith's Department Store; 11:00 P. M., Midnight Frolic.
WOC (Central, 484), 3:30 P. M., Talk, C. E. Wilent; 7:00 P. M., Musical program, The P. S. C. Orchestra.
WOO (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song and piano recital; short talks; 4:30-6:00 P. M., Organ recital, Mary E. Vogt; 8:00-12:00 P. M., J. W. C. I. Band concert and dance music.
WWJ (Eastern, 580), 8:30 P. M., The Town Crier; Musical program, News Orchestra; Mabel Osborne, soprano; Herbert Lamb, baritone; Mrs. Gus Sorge, soprano.

Saturday, May 26

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Star Orchestra; Violin solos, Mannie Roth, Harry Adaskin; Rupert Lucas, baritone.
KFDB (Pacific, 400), 2:00-2:30 P. M., Lecture, Dr. Jau Dou Ball, "Juvenile Delinquency;" 2:30-3:00 P. M., Music.
KPO (Pacific, 400), 8:00-10:00 P. M., Entertainment, Elks' Lodge 522, Santa Cruz.
KSD (Central, 546), 8:00-9:45 P. M., Musical program, Stuart Barrie, organist; Isadore Cohen's Concert Orchestra and vocal selections.
KYW (Central, Daylight Saving, 447), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy Concert Dept.; 9:25 P. M., "Under the Evening Lamp," Youth's Companion.
WBAP (Central, 476), 7:00-7:30 P. M., Radio Bible Class, W. F. Barnum, First Methodist Church.
WDAP (Central, Daylight Saving, 390), 10:00 P. M., Musical program; Marion McDonough, soprano; Jack Chapman's Orchestra.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theater; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Musical program, J. I. Wright's Male Quartet; 11:00-12:00 P. M., Popular music, Grace Methodist Church Orchestra, Earle D. Behrends, director.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; 3:00-4:30 P. M., Song recital and short talks; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue-Stratford Orchestra; Stories, Cousin Sue; 8:00-12:00 P. M., Dance music, Meyer Davis Bellevue-Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 8:00 P. M., Evening program; Talk, "New England Problems." New England Business Magazine; Farce, "Box and Cox," Amrad Players; Music; Comedy, "Blood Will Tell," Amrad Players.
WGY (Eastern, 380), 8:00 P. M., Dance program, Cain's Castle Orchestra.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Organ, Roy C. Parks, Rialto Theater; 7:30-9:00 P. M., Concert, Joe Schnur Kentucky Melody Boys.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Talk by a professor of the Philadelphia College of Pharmacy; 6:00-7:50 P. M., Dinner dance music; Uncle Wip's bedtime stories; 8:00-12:00 P. M., Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.
WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Musical program, S. J. Cassell, tenor; 9:15 P. M., Maywood Temple Band.
WOC (Central, 484), 3:30 P. M., Talk, C. C. Hall; 7:00 P. M., Musical program, Apollo Mandolin Club; Henry Dismer, Louis Crowder. 9:30 P. M., Dance program, P. S. C. Orchestra.
WOO (Eastern, Daylight Saving, 509), 11:00 A. M.-1:00 P. M., Organ recital, Mary E. Vogt; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Organ recital and band concert.

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Sunday, May 27

KPO (Pacific, 400), 11:00-12:15 P. M., Organ recital, Gladys Salisbury.
WBAP (Central, 476), 11:00 A. M.-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor; Will Foster, organist.
WDAP (Central, Daylight Saving, 390), 9:15 P. M., Henry Selinger and Drake Concert Ensemble; two soloists from University of Chicago Band.
WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, Dallas; 9:30-10:00 P. M., Singers from Christ Church, Episcopal, Mrs. J. W. Ohl, director; 10:00-11:00 P. M., Concert, Harris Bros. Orchestra.
WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Chapel services; 7:30 P. M., Church services, Arch Street Presbyterian Church; Sermon, Rev. Clarence Edward Macartney; Organ recital, Alton K. Dougherty, organist; 9:30 P. M., Organ recital.
WGI (Eastern, Daylight Saving, 360), 4:00 P. M., Twilight program; "Adventure Hour," Youth's Companion; Concert, Amrad Juvenile Orchestra; 8:30 P. M., Federation Church Service, Mass. Fed. of Churches; 9:00 P. M., Musicale.
WGR (Eastern, Daylight Saving, 319), 3:00 P. M., Vesper services, Rev. Walter Lord.
WGY (Eastern, 380), 9:30 A. M., Church services, First English Lutheran Church; Sermon, "The New Age, the Young Man, the Old Gospel," Rev. Herbert D. Shimer; 3:00 P. M., Symphony concert, "The Merry Wives of Windsor," WGY Orchestra; "I Will Extol Thee," Corabel MacCrossen, soprano; "Espagnole," Orchestra; Excerpts from "La Traviata," Orchestra; "Hear Ye, Israel," Corabel MacCrossen; "Largo," Orchestra; 6:30 P. M., Church services, First English Lutheran Church; Sermon, "God's Call to the Unselfish Life," Rev. Herbert D. Shimer.
WHAS (Central, 400), 9:57 A. M., Organ; 10:00 A. M., Church service, Trinity Methodist Church, Rev. Dr. John Lowe Fort; 4:00-5:00 P. M., Concert, Trinity Methodist Church choir.
WIP (Eastern, Daylight Saving, 509), 11:00 A. M., Church service, Holy Trinity Memorial Chapel, B. Janney Rudderow, minister; Ernest Felix Potter, organist and choir leader, choir of male voices; 2:00-3:30 P. M., Orchestra concert.
WLW (Eastern, 360), 11:00 A. M., Church services, Church of the Covenant.
WWJ (Eastern, 580), 11:00 A. M., Church services, St. Paul's Cathedral; 4:00 P. M., Detroit News Orchestra.

Monday, May 28

KFDB (Pacific, 400), 2:00-2:30 P. M., Mrs. Lucile Strawn, "Detective and Mystery Stories" and "Sleuthing for Odd Books," Paul Elder Book Store.

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5.00	UV-200 Tube	4.55
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6.50	WR-21 Tube (Dry Cell)	4.95
.75	3" Dials—Hard Rubber	.22
.25	Binding Posts—Hard Rubber	.05
.10	Metal Binding Post	.02
.35	Switch Points and Stops, dozen	.10
.50	Fada Switch Lever	.19
.75	Single Circuit Jacks	.29
1.00	Double Circuit Jacks	.39
.75	Fresh'man Variable Grid Leak	.49
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1.00	.006 Micadon Condensers	.60
12.00	Nathaniel Baldwin, Type C	8.95
6.00	Baldwin Single Units, Type C	4.95
15.00	Western Electric Phones	9.25
5.00	Frost Phones (2000 ohm)	3.95
6.00	Frost Phones (3000 ohm)	4.45
8.00	Brandes Superior	5.65
5.00	Murdock No. 55	2.75
5.50	Murdock Special No. 57	3.85
12.00	Dictograph Headset	5.65
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Pacent Single Circuit	$0.35
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1,500 Turns	$1.50
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, May 26, 1923 No. 7

Better Outlook for Summer

Distribution of Stations Helps Reception

SUMMER is approaching, and likewise as a result a general decrease in broadcasting reception range. However, the outlook for the coming summer to the Radiophans is a great deal better than it was at this time last year.

Jazz for Vacationists

Hosts of Tourists Will Carry Sets on Trips

SOME few people seem to think that because they can go to shore or mountain the stay-at-home has no form of amusement, forgetting entirely Radio, probably the most popular of all forms of amusement yet devised.

Likewise, these same shore or mountain vacationists are missing a lot of good things that are broadcast from every part of this country. As a matter of fact, there are any number of thousands of vacationists who carry their sets with them, erecting an aerial at the vacation point.

Campers, automobilists on tour, canoe tourists and others will take along sets and trade in Radio equipment should not fall off so appreciably as it is fallaciously predicted that it will every year. Most vacationers, and especially those who go to places other than the big resorts, are literally snatched away from a jazz point, and something must be provided to fill the aching void. The Radio receiving set does the trick.

Just a Little Thoughtlessness

Spark Stations Should Use Discretion

IN A CERTAIN section of a city in the northwest owners of Radio receiving sets have a great deal of trouble with interference from a spark set in the neighborhood that paralyzes all reception. Is this the case with you in your city? It stands to reason we all have the same trouble. Just about the time you get the set working on a very fine selection, then all of a sudden the sender of a spark station near you fills the air with a carrier wave that drowns out any reception coming in.

It is not believed that anyone is mean enough to purposely do this when aware of the results. The ones doing this are not versed in Radio, but are usually some beginner that does not know of the offense.

Everyone interested in Radio should get together for the benefit of the game. The amateur has his rights and they shoud be, and are, respected. The beginner should respect the rights and privileges of his brother amateurs and broadcast receivers and not give all the amateurs a "black eye" because of his thoughtlessness.

About the Copyright Situation

The Independent Station May Be Driven Out

THE long fight for the amendment of our copyright laws may be hastened considerably by the present difficulty encountered in the broadcasting of Radio music.

Action on the part of the Society of Authors, Composers and publishers, in stopping broadcasting stations from transmitting music within their control, has brought on such severe criticism and objections by broadcasters generally, that this may result in a demand for a change in our copyright laws for the benefit of broadcasters and Radio listeners.

So far as the great Radio audience and public opinion is concerned this action will react very unfavorably. It is said the copyright group controls about 95 per cent of copyrighted music and musical productions in the United States.

It is needless to say that if action taken holds good it will drive out many independent stations that should be encouraged as a bulwark against a possible monopoly of Radio broadcasting in the future.

No one wants to deprive an author, composer or publisher of the fruits of his labor. He has a right to ask returns on his copyrights, but Congress, in establishing a copyright law, had in mind protection, not extortion. The moment such a right, conferred by the American people, is used as a weapon of monopoly and aggression against them, then the American people have it in their power to take away this right, and they certainly will, through their Congress, take such action.

RADIO INDI-GEST

CASH COPPER CONTEST AWAKES KEEN INTEREST OF RADIOKNUTS

The big **$000,000,000,000.19 Cash Copper Contest** has brought in such a flood of mail that it has been impossible to open and read it all to date. Every day brings in new papers on the Stebbin's Sooper Degenerative. The papers are coming in thick and fast so if you intend to enter the contest MAIL YOUR PAPER OR DRAWING AT ONCE! —There is still time to get in.

Parts of the vast number of letters and telegrams are:

"Inclosed find my drawing and paper. Where is the first prize?" —Imp.

"If I win the first prize I shall use the money to buy a new set of switch points." —Nutz.

"It is so sweet of you, Indi, to enable me to have the chance to assume such wealth. Paper under separate cover." —Lotta Static.

"Have never built a Stebbin's set (thankgod) but am sending in my paper on how I did it." —Lillian G.

"Can I bribe judges with A. R. R. L. hootch to award me first prize." Spider Webb.

"Am sending drawings by wire." —Polly W.

"It is such a jolly contest, old thing. Am sending my bally drawings by the silly letter vender." —Alagonquin Tonsils III.

"Am holding my paper until I find out if you have enough to pay prizes. Looking you up in Bradstreet." —LaVerne C.

"Inclosed please find my paper. Mail check for first prize to me at once." —Q. R. M.

"My husband wishes me to inform you that he is too occupied with compiling his data and transcribing statistics for his contest paper to write himself. It is his sincere wish that you be so exceedingly kind as to hold the contest open until he has the requisite time in which to complete his work. I am Most cordially." Mrs. Ezra Hecht.

A RADIO NIGHT

I was seated alone by my tube set,
Weary from loss of sleep,
My fingers o'er the dials wandered,
The stations were hard to keep.
The constant whistle and howling,
Shrieked through my throbbing head,
I tried to tune in till disgusted,
I thought of my cozy bed.
But the lure of the game was upon me,
I'm an ardent Radiophan,
When you once get the bug you can't shake it,
Try as hard as ever you can.
So I staid with my set and I coaxed it,
I'm a Radioknut, you guessed right,
At last it worked fine and I listened,
While the Night Hawk Club signed off "Goodnight."
—MAC.

Another Satisfied Customer

Deer Endy: I houked-up the lem stebbin's souper circut & busted the detectur fust thing. After getting the blamed thing all set the fust thing i recei·ed wuz h—l frum my wife acct. spilling contents uv detectur over carput. It rely wurked betur than i xpectud.
—eZra hechT.

Thanx!

Dear Indi: I am inclosing a Radioknut kink which has proved a hum-dinger, hope it works as well by those that try it. Am inclosing a dollar ($) for same. Thanx.
—Spark Coil.

P. S.—I find that I have lost the kink and can not think what it was. Am closing the dollar ($) anyhow. Thanx.
—S. C.

We Don't Know—Yes—You Are In, Go Ahead!

Indigest, Sir: Who are they and how do they do it?—Polly W. and Lillian G. . . . I have written somewhere about sixty contribs to your column and I never can get in—I ask you, is it fair? Yet these above two are always making the column. If I do not get in pretty soon I am just going to get mad and stop sending 'em in.
—Jackie.

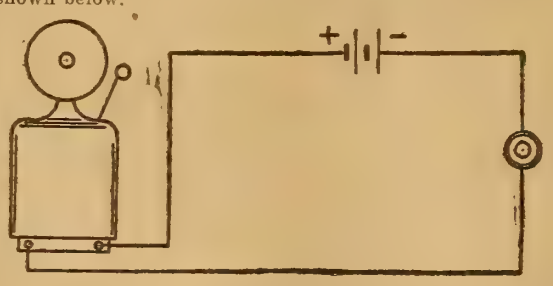
There Ain't No Sech Critter

Dear Indigest: Local dime store is offering new aerial wire that "takes all the static out of the air." Any fans not receiving their full share of static should get the new type aerial. —Clinton, Iowa.

QUESTIONS AND ANSWERS

Dear Indi: Last week I tuned in a station that opened their broadcast with the ringing of a bell. I have been unable to get them any more, though I have tried hard. I think the trouble is in my set so will you give me a hook-up of a circuit that will enable me to hear the bell?
—Spider Webb.

A.—Sure. A very good circuit for this purpose is shown below.



Dear Indi: I am very seriously annoyed by the spark amateur in the next block. I can not hear any broadcast programs for his constant sending. How can I stop him?
—R. E. Ostat.

A—Get sawed off shotgun (commonly known as riot, or scatter-gun), load with washers, screws, ten penny nails and heavy charge of black powder. Point gun at amateur and pull trigger with quick motion of index finger. If this does not bring desired results, tell him we shall write him a letter and severely reprimand him for his ungentlemanly conduct.

Looking Ahead

The Great $000,000,000,000.19 Cash Copper Contest is rapidly drawing to a close. There is a lot of work yet to be done by the judges, opening and sorting the papers. So there is still time for you to sneak in your drawing or paper. If you have not entered the contest—Do So At Once! Watch INDIGEST for awards of prices. Get INDIGEST from your most handsome newsdealer—10c.

Condensed

By DIELECTRIC

The owners of Station WJZ, well known all over the world, are about ready to move into their new studios in the Aeolian building in New York city. It is understood that here the artists who appear in Aeolian Hall may have their concerts broadcast through this station, and some of the greatest musicians appear there. Two wavelengths will be used so that varied types of programs may be broadcast at one time.

To many who have had the joy of working out problems in algebra the talks from Station WOR may prove of little interest. On the other hand, they may be the very ones who wish to refresh their minds on the subject. But to any desiring some knowledge of the subject, they have only to tune in the station and listen to a very simple explanation of the rules and application of this branch of mathematics.

The Irish, that is those in Dublin, will have a modern Radio station erected in their midst to be patterned after the Eiffel tower in Paris. It is to be a government operated station and will broadcast market reports, weather forecasts and news for the benefit of towns in the provinces. Providing the station is sufficiently powerful, we may yet hear the innumerable disputes between Irishmen in place of reading about them.

For a while at least we shall find it rather hard to think in kilocycles instead of meters; however, if the improved broadcasting service becomes all that is expected of it, then the matter will be quite easy. When QRM is rampant the meter of a station is seldom referred to. It's generally a more profane part of the transmitter to which attention is given. In order to secure the greatest good from the new ruling it will be very necessary for the stations to stick to their assigned kilocycles.

In Ohio the state Federation of Women's Clubs devoted a week to increasing the interest in gardening, including landscaping. Of course, they made use of the time-honored custom of broadcasting through the columns of the press, also the newer medium—the movies, and then wisely chose to avail themselves of Radio. Many a person will linger long enough at the dials to be told of a thing that he never would take time to read.

It may be recalled that prior to removal one column nearer to passing off the last page of Radio Digest, I mentioned the good one could do in supply Radio receiving sets to leper colonies. Whether the gentleman in New York got his inspiration from my suggestion or not is immaterial; at any rate, he contributed one hundred dollars toward a set to be installed in the leper colony in Porto Rico. Now, you healthy fans, who will be the next?

The Army Radio experts are working all the time to increase the efficiency of mechanical code reception. They have so far succeeded in sending one hundred words a minute by use of certain mechanism and a reception speed of sixty-five words a minute. That seems like saving considerable time at both ends, yet they expect to be able to mechanically copy the messages as received visually as well as by ear. Thus saving even more time.

While the season of Grand Opera in this country is over, Cuba is just beginning hers. On the opening night of the San Carlo company in Havana the opera of "The Barber of Seville" was broadcast and many in the United States were able to listen to the entire performance produced by several of the world's noted artists. Station PWX had the honor of sending out the first opera ever broadcast from Cuba. Future opera broadcasts will be anticipated with pleasure by those capable of tuning in this station.

First Steps for Beginners in Radio

Chapter III, Part II—Pointers About Aerials and Grounds

By Thomas W. Benson, A. M. I. R. E.

AS STATED in the first part about aerials either the capacity or the inductance in the tuned primary circuit of a receiving set may be made large enough to serve as an efficient collector for Radio waves. Having dealt with the form of aerial in which the capacity is large we may now consider cases where the inductance acts as the energy collector.

Briefly then, a loop aerial, disguise it as you will, is simply an oversize tuning inductance but since it is usually limited to a comparatively few feet on a side it does not pick up as much energy as the outdoor aerial. It might be said to be loosely coupled to the wave and therein lies its greater selectivity aside from its directional properties. As a matter of fact when a loop is used it is not necessary to employ any coupling device for tuning, the usual practice being to simply connect a condenser across the loop for tuning.

Selectivity of Loop

The selectivity of a loop aerial might be better understood from Figure 10. Here is shown the usual type of outdoor aerial connected to the stator of a variometer or similar tuning device. Placed in inductive relation to the stator is the rotor connected to the detecting and amplifying apparatus. Now it will be clear that only part of the energy flowing in the aerial circuit is transferred to the secondary circuit.

We can control the degree of coupling between the two circuits and thus select the particular wave energy we wish. The circuits are said to be loosely coupled.

Now consider the loop aerial where, instead of bringing in a comparatively large amount of energy and selecting what we want, we pick up from the wave but a small amount of energy and thus get selectivity. To all intents and purposes the loop aerial acts as the secondary of a variocoupler or the older form known as the loose coupler.

The analogy can be carried further in that both the secondary of a variocoupler and the loop circuits can be made with a low resistance and having both lumped capacity and inductance which makes for sharp tuning.

Little Energy Picked Up

It should be borne in mind, however, that except with a very large loop the total energy picked up is much less than

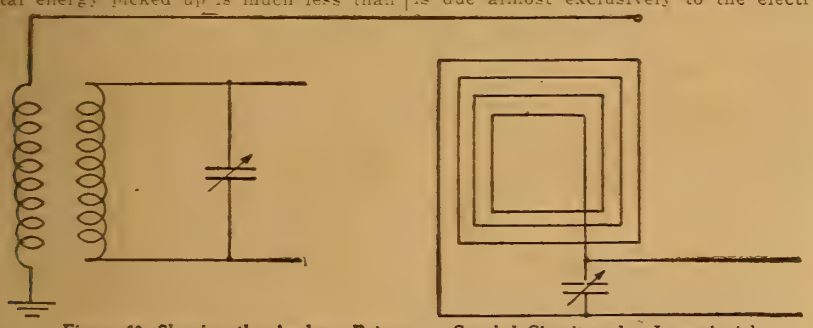


Figure 10—Showing the Analogy Between a Coupled Circuit and a Loop Aerial

that transferred from the primary to the secondary of a coupling device connected to an outdoor antennae or aerial. We then only obtain selectivity at the sacrifice of wave energy which can be compensated for by using Radio frequency amplification to amplify the received energy sufficiently to give good signals when rectified by the detector tube.

Apparently then there would be little

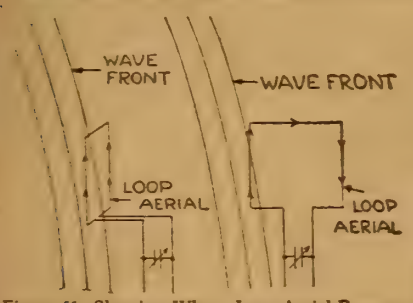


Figure 11—Showing Why a Loop Aerial Possesses Directive Effects

advantage in using a loop aerial simply on the ground of greater selectivity because the saving in cost of installation is offset by the additional tube and transformers required to bring the signal up to standard. However, the loop possesses other characteristics that will continue to make it more popular especially as the summer months approach.

Less Atmospherics with Loop

The outdoor aerial not only picks up Radio waves but is also effective in picking up static, strays, etc., because these are due to electrostatic stresses between the clouds and the earth. The loop on the other hand is freer from such disturbances and, when static is heavy in summer, it will bring in the broadcast programs with a minimum amount of static interference.

In addition we have the well known directional effect that increases its selectivity by enabling one to "spot," as it were, a particular station and eliminate others to a great extent. The reason for this directive effect will be clear after a little consideration.

Explains Directional Effect.

The energy picked up by a loop aerial is due almost exclusively to the electromagnetic field of the Radio wave. When a wave strikes a loop aerial on the side, that is, when the loop lies at right angles to the direction from which the wave is coming, equal currents are induced in both sides of the loop which neutralize each other and do not affect the amplifiers or detector. However, as the loop is gradually turned it will be clear that the wave strikes one side before the other with the result that a slight current flows, sufficient to affect the amplifier and a response is heard in the phone. When the loop is placed so that it lies in line with the transmitting station the effect is at a maximum and the loudest signals are heard.

It will be noticed at times that grounding one side of the loop increases the signal strength. This is due to the fact that the loop is acting as a capacity aerial and currents induced by the electrostatic effect are added to those picked up by the loop itself.

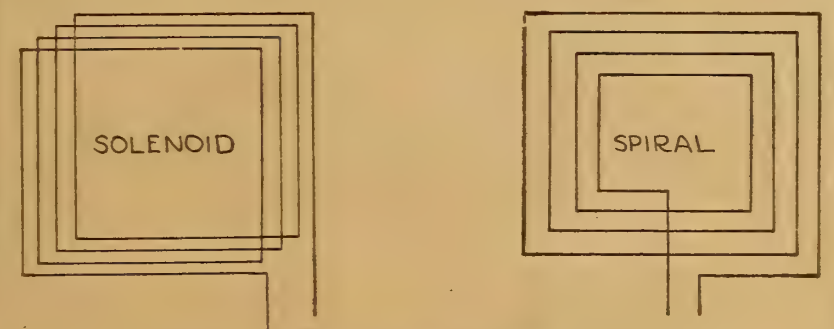


Figure 12—Showing the Two Important Types of Loop Aerials

Constructional Details

A loop should, of course, have a low high frequency resistance and for that reason stranded wire should be used, the sixteen strand wire, being softer, is preferable. Obviously the loop should be as large as conditions will permit but one larger than 3 feet on a side is usually out of the question. This gives us a basis to work from.

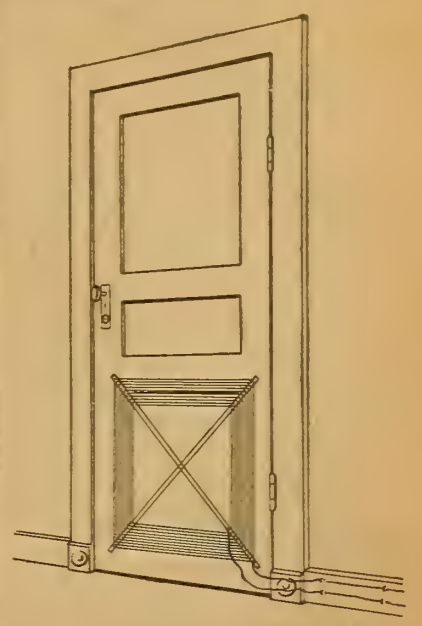


Figure 13—A Novel Effective Method of Mounting a Loop Aerial Back of a Door which Is Convenient

Loops are of two types; namely, the solenoid, and the spiral, both shown in Figure 12. There is little preference between them on the score of efficiency but the spiral is easier to build and makes a neat job.

An efficient spiral loop can be made

(Continued on page 12)

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:

Chapter IV—About Condensers and Inductances.
Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
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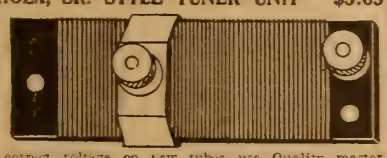

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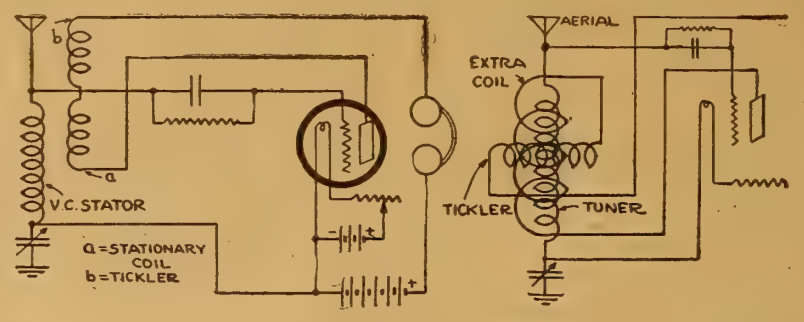
Second Coil on Variocoupler Stator

Extra Winding Produces More Selective Tuning

In building a single tube circuit regenerative set I made my own variocoupler to use with it. After I tried it out I found that the tickler coil was too small in inductive capacity, and I was stumped for a few minutes as to what to do, for I did not care to use any smaller wire on the rotor in order to get more turns on it. Finally I hit upon the following kink:

Over the coils of the tuner (stator) part of the variocoupler I placed a coil equal in turns to the tickler. This coil I connected in series with the tickler and was very gratified to find the results were very good, and besides the added feed-back inductance gained, I found that the tickler now operated over a range of 180 degrees, instead of 90 as it did before. So the set I built later I deliberately used this idea to get more critical adjustment on the tickler.—Phil Rulon, San Jose, Cal.

INCREASES CAPACITY OF STATOR



WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

FIRST STEPS IN RADIO

(Continued from page 11)

from a simple wooden cross using glass push pins to wind the wire around and thus insulate the separate turns. Fiber tubes can be used by joining in the center by a block of wood and cutting slots in the arms to hold the wires. With a 3-foot loop, 12 turns spaced ¼-inch apart will be found suitable for broadcast reception. The loop should be mounted so it can be rotated to obtain the full advantage of its directive effect.

Loop on a Door

A rather novel and unobtrusive method of mounting a loop is to attach it to the back of a convenient door, running flexible leads to a pair of wires fastened to the baseboard and connected to the set. There is always some door that can be used for this purpose. The loop is then out of the way and it can be swung by simply opening or closing the door.

If a door is selected that is usually left open against a wall the loop will hardly be noticed except when actually in use and the direction of the transmitter demands it.

Proper Grounding

It would not be out of place to cover the subject of grounding while discussing aerials. When using an outdoor aerial the ground connection is of greater importance than most Radiophans believe. In fact consistent long distance reception depends to a great extent on having a perfect ground. Simply wrapping a wire around any handy pipe, whether it is gas, heating or water will give results to be sure, but watch the improvement when a good ground is connected.

Briefly, a ground connection should be just as good as it can possibly be made. Use No. 8 or 10 wire and run it in as direct a line as possible to the street side of the water cock in the basement. Use a heavy ground clamp, solder the wire securely to the clamp, clean the pipe thoroughly by scraping with a knife or filing and clamp the ground tightly and securely. When this job has been carefully done then one can say his set is properly grounded.

Heavy Wire Required

One might question the need of heavy wire for grounding but there is a very good reason for it. In an oscillating circuit such as the primary circuit of a receiving set, which includes the aerial and ground, it will be found that the voltage is greatest at the free end of the aerial while the current is greatest at the ground

(Continued on Page 14)

Longer Life for Tubes

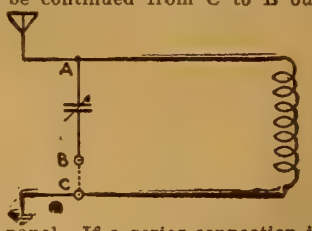
Just like electric lights if the voltage is too high and the burden of the load is too great, the life of a vacuum tube is greatly shortened by burning it above its rating. It is cheaper in the end to add a stage of amplification than to overwork your tube. One of the manufacturers of tubes says that an increase of 3 per cent over the rating of the filament of a vacuum tube will halve the life of the tube. Naturally, using your audion at 3 per cent lower than its rating will double its life.

Remedy for Noisy Storage Cells

If you have trouble with noisy storage batteries take a cloth dipped in ammonia and wipe off the top carefully. This neutralizes the acid. This may be done on either A or B batteries.—P. R. Gould, Minneapolis, Minn.

One More Binding Post Used Instead of Switch

Why use a series parallel switch when one additional binding post on the front of the panel will be sufficient? Ordinarily for parallel connections the ground wire would be continued from C to B outside



of the panel. If a series connection is desired this connection is broken and the aerial fastened to B instead of A. This saves the cost of a series parallel switch and simplifies the wiring.—Gordon G. Logan, Portage la Prairie, Manitoba.

Loud speakers can be made of sea shells, by cutting off the stem and attaching a receiver to the small opening.

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Making a Three Tube Reflex De Luxe Receiver

Part IV—Cabinet Mounting, Operation and Conclusion

By H. J. Marx

IN ORDER to give all the details necessary for the complete assembly of the Reflex De Luxe, the plans of the cabinet construction are shown. The original is made of walnut and has natural wood finish. A wax polish keeps it neat in appearance and there is no need of worrying about scratching, as would be the case with a piano finish.

Stock Used in Cabinet

The top, bottom and sides are cut from ¾-inch stock, while the back is only ¼-inch in thickness. The front edges have a ¼-inch flange on all four sides. This flange projects 7/16-inch and permits the panel to set in with the face flush with the flange. Twelve nickle plated, round head wood screws, ¾-inch long, hold the panel in place in the cabinet.

A word of caution—in wiring be sure that all wires are kept inside of the cabinet dimensions or it will be crushed and probably shorted when the panel is fastened in the cabinet.

Eight holes are drilled in the back of the cabinet—in alignment with the binding posts on the sub panel. Small hard rubber bushings, called grommets, can be purchased in most any five and ten cent store. They will help improve the appearance of the finished set.

The binding posts are identified in the sub panel layout (Figure 2, May 12 issue). The antenna and ground binding posts are used when a permanent outside aerial is used. A loop aerial can be plugged in through the loop jack in the upper left corner on the main panel. The positive A and negative B batteries have one binding post in common.

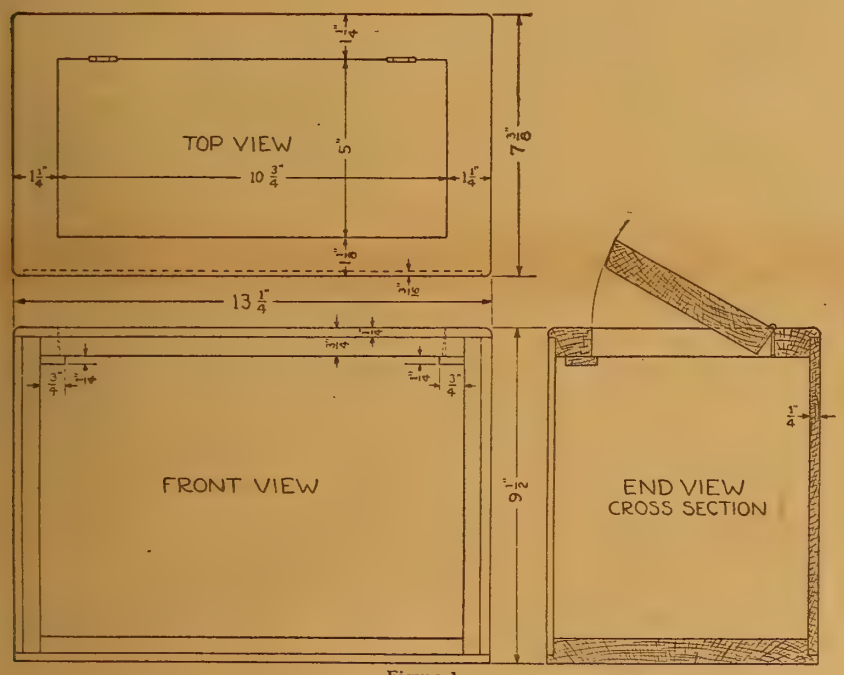

Figure 1

The fourth binding post from the right hand side of the sub panel layout is one positive plate battery terminal. The voltage there should run from 45 to 90 volts. The third from the right is the second positive plate battery post and the value here can vary from 67 to 150 volts, depending on the tubes used.

The last two binding posts on the right side are for a permanent loud speaker connection if desired. This is optional as the two jacks on the right side (front panel) can be used.

Flexible Wire Leads

Since these binding posts are rather inaccessible unless the panel is taken out, some form of making convenient connections is desirable. Flexible wire is easily obtainable. Cut seven pieces each 2 feet in length. On two of the pieces solder a heavy A battery clip at one end. On the remainder, solder the small type of wire clips at one end. These will snap on the plate battery terminals and will permit simple readjustments of voltages. They can also be used for snapping to the antenna and ground leads.

The terminals to be soldered to the other ends of these flexible leads depend upon the type of binding posts that are used. Either the eyelet type or phone cord tips are advisable. It might be well to make sure that the eyelet terminals will pass through the grommet holes in the back of the cabinet before they are soldered on the wires.

Circuit Changes

Since the first part of this article was published in the Digest, a few unimportant circuit changes have developed. It was found that a one megohm grid leak connected between the grid and plate terminals of the second tube helped clear up some noises without detracting from the volume. It may be found worthwhile to add a series-parallel switch for the primary condenser. The capacity of the by-pass condenser across the primary of the first audio frequency transformer was changed from .002 to .006 mfd. A 200 ohm potentiometer can be substituted for P-1 but the control will not be as good as with the higher resistance type.

Directions for Tuning Operation

For simplicity, the use of a loop aerial will first be assumed. The phones or loud speaker should be plugged in on the top jack. Turn on the Reflex rheostat knob. Depending on the type of tube and the plate voltage, also the condenser and potentiometer position, it may start howling after a certain point on the rheostat is reached. Occasionally, if the rheostat is turned further it may stop again. Either turn back or to the point where the purring is heard. If the howling cannot be overcome it may be due to the following causes:

1. Crystal detector not adjusted.
2. Inductive interference in leads.
3. Wrong by-pass condenser values.
4. Defective transformers.
5. Poor tubes.
6. Too much plate voltage for tubes.

Rheostats and Secondary Condenser

The filament rheostat adjustment is not necessarily very critical but it will be found that readjustment after a station has been tuned in will improve reception. Using only a loop aerial the entire wave length tuning is confined more or less to the secondary condenser. This should give the finer wave length adjustments. For any wide range of wave bands it is advisable to tap the number of turns on the loop, giving an inductance variation. The potentiometer is then adjusted for clearest reception and volume.

When the loud speaker is plugged in on the last stage, the amplifier filament is adjusted, as are the reflex tubes. It may also be necessary to advance the reflex rheostat slightly to compensate for the extra drain on the battery. Volume can usually be controlled by rheostat and plate voltage adjustments. Blurred reception indicates too much B battery.

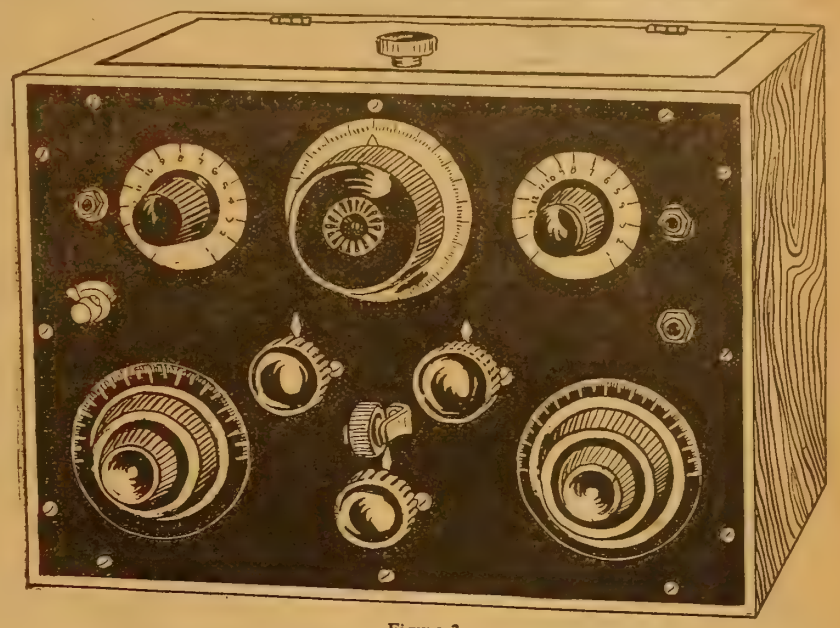

Figure 2

Tuning with Variocoupler

When an antenna and ground connections are used, four additional controls must be adjusted. The rough and fine inductance switches present no serious difficulties in tuning. The two variable condensers give accurate control of the wave length adjustment, but the key to station selection lies in the adjustment of the coupling. Some form of vernier dial control is recommended, since two stations on the same condenser setting can be separated by the coupling adjustment. The peculiar part noticeable is the fact that this control covers the entire 360 rotation of the secondary. It is because of this unusual coupling control that the circuit has such a high rating as a long distance receiver. Code station interference can in this way be kept at a minimum.

The directional effect of a loop is not as marked as might be anticipated, but the fan will be surprised at the volume that can be expected from a loop.

(THE END.)

The natural wave length of an antenna is that which will pick up signals without any tuning whatsoever.

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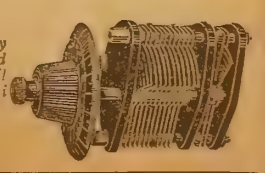

For the Loud Speaker Fans

More About Talker Described April 21

By Thos. W. Benson

IT IS regrettable, in view of the great interest shown in the description in the April 21 issue of the loud speaker constructed by this writer that certain mistakes crept into the article that resulted in a flood of letters and inquiries. Not that any real mistakes were made, but most fans desired more information.

What seemed to trouble the greatest number was the winding of the field coil. This coil is wound in the usual manner with No. 20 D.C.C. wire, 75 turns in a layer and 18 layers. Nearly two pounds of this wire are required. This coil serves to create a dense magnetic field between the center pole and the circular pole piece.

Moving Coil Location

Through an error the illustration of the cross sectional view of the talker shows the moving coil above the pole piece. Checking dimensions will show that this coil lies in the space between the center pole piece and the circular ring, that is, in the magnetic field created by the field coil.

As to the transformer winding. The secondary consists of 115 feet of No. 38 enameled or S.C.C. wire wound smoothly into place. The primary was wound with No. 38 enameled and takes about 1¼ ounces of wire. This will give very close to 1000 ohms resistance. One ounce of No. 40 enameled will give a little over 2000 ohms. The latter winding was not tried but slightly better results might be expected from its use.

Winding on Moving Coil

The winding of the moving coil should present no difficulties. Starting as close to the edge of the form as possible, make a few turns and fasten them with a drop of collodion. Then wind the wire in smooth layers back and forth till 360 turns of No. 40 enameled wire are in place. The ends of the winding are then tied to legs of the supporting spider and the whole coil given a coat of collodion to make it rigid.

The above data with that furnished in the article on the loud speaker in the April 21 issue should be complete enough for anyone to build this instrument. Any further inquiries will receive immediate attention if addressed to the writer, care of Radio Digest.

FIRST STEPS IN RADIO

(Continued from page 12)

connection. Hence any resistance in the ground wire has what is termed a damping effect upon the oscillations and chokes them out. That is, when the aerial circuit is put into oscillation by the wave instead of the current being allowed to flow freely to and fro it is choked off by the resistance. This has two ill effects.

The first thing it does is to reduce the amplitude of the current in the circuit, naturally cutting the signal strength to some extent. In addition the damping effect broadens the tuning and it will be found more difficult to cut out unwanted stations. These effects will be more noticeable with the smaller crystal sets but the condition applies as well to the larger tube sets.

Conditions are often such that quite a long lead will be required to reach the water pipes in the basement. This should cause no worry as it is an advantage in a certain sense. Knowing that the voltage is greater near the free end of the aerial and remembering that the tube detector is a device depending on voltage for its operation it should be apparent that a set connected in the aerial-ground circuit nearer the free end will have a higher voltage impressed upon the grid of the tube. For this reason the signals may be slightly louder with the long ground than if a wire were run to a nearby gas pipe or radiator.

Need for Lightning Arrester

The protection of buildings from lightning is too often overlooked when installing a Radio set but it is poor policy to take chances with the elements. It is universally known that such protection is demanded by the Fire Underwriters yet it is safe to say that the majority of crystal sets have no protection. Too much emphasis cannot be laid upon this part of a Radio installation. By all means put in a lightning arrester the day the aerial is installed.

There are a number of such devices on the market selling at a reasonable price that perform their work well. Any type approved by the Underwriters may be used. Install it outside of the building if at all possible and run a ground wire to a water pipe. Number 14 wire may be used for a lightning ground, but heavier wire is advised. The Underwriters do not require switches or fuses, except in the case of transmitters which will not operate with the arrester connected to the aerial while sending.

Fastening Wires in Building

Wires inside the building should be firmly fastened to prevent mechanical injury and to prevent them coming in contact with lighting or power wires. In no case should gas pipes be used for a ground.

Summing up the chief points to be remembered in constructing an aerial; use stranded wire, insulate it perfectly, let it touch no woodwork or other surface, run it as direct as possible to the set, protect it from lightning and run it as straight to ground as possible and make a good ground connection. For with good connections, low resistance, you are sure to have consistent results when the rest of the set is functioning properly.

(TO BE CONTINUED.)

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Radio Experimenter's Handbook. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

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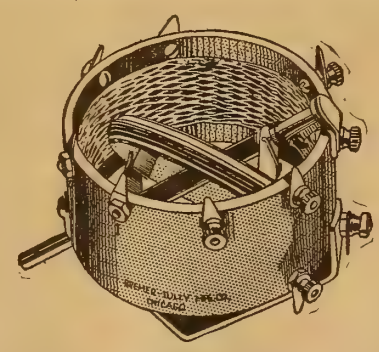

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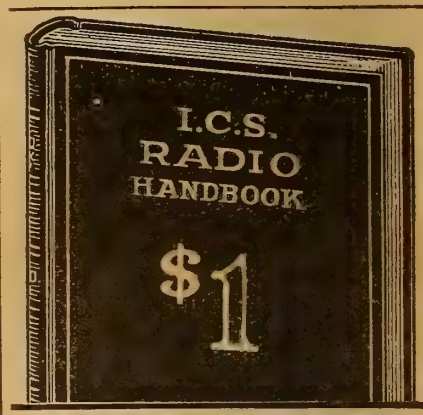

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Questions and Answers

Honeycomb Coil Set

(2573) R.T., Talmadge, Ohio.

I am building a three circuit regenerative receiver, making use of honeycomb coils. I expect to wind my own coils and I am asking for advice upon winding these coils.

Does the inside lead connect to the plug or the socket of the coil mounting (not panel mounting)?

When these coils are mounted and placed in a panel mounting, are the coils wound in a clockwise or counter-clockwise direction?

Do hand wound honeycomb coils compare favorably with machine wound coils? I wish to connect them so I can use either machine wound or hand wound coils without changing the wiring.

A.—Answering your inquiry with reference to winding of honeycomb coils will advise that the outside lead connects to the socket, and that coils are wound counter clockwise.

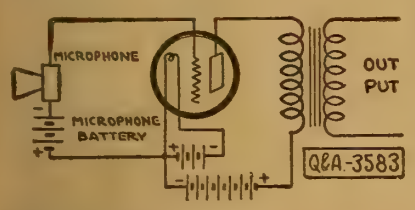
Effectiveness of any homemade apparatus depends upon the skill and care with which it is constructed. Unless you are able to exercise these qualities by special adaptation along mechanical lines you will doubtless find greater satisfaction in the manufactured coil. They are inexpensive.

Speech Amplifier

(3583)·9E.A.H., Moline, Ill.

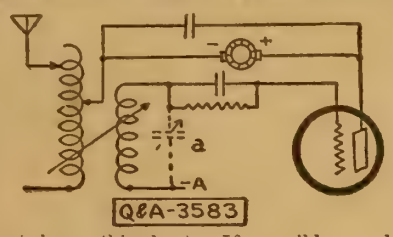
How should a speech amplifier to be used with a 10-watt phone set be constructed? I use the Colpitts circuit. For some reason or other, on phone I am very weak. I think by adding a speech amplifier I may be able to overcome this difficulty.

Can you furnish me with the circuit used



in the Paragon 2-5-U-Radiophone set? I have been trying for several months to get a copy of this circuit but so far have been unsuccessful.

What, in your opinion it the best set of today? My equipment consists of this 12 tube super-hetrodyne, 3 tube Reinharts, 1 tube Flewelling, and a 3 tube honeycomb set. Is there any other set, regardless of price, that would give better results? A few of the results I have had already on the super-hetrodyne are as follows: 500 amateurs logged, some in every district, in three weeks. Eng. 2 LO copied in the recent tests. French 8 A.B. copies once. Station such as 4 GL, 6 AWP, 7 LU, 8 ZZ, 5 LA, etc., copied almost any time they are on. Commercial stations too numerous to mention, among them, POZ (Nauen) I have heard, though, that there are sets



that have this beat. If possible would like to get circuit, data, etc.

A.—Answering your inquiry we are advising that a speech amplifier is merely audio frequency amplification. A simple one tube speech amplifier may be constructed in accordance with first diagram shown. An ordinary amplifying tube, B battery and audio frequency transformer are used as indicated.

Your phone signals come in fairly well here, but of course, should not be compared with straight C. W.

The circuit used in the Paragon 2-5-U Radiophone set is merely the grid tickler circuit. The second diagram shown explains this.

The super-hetrodyne circuit is the best of those cited and probably has no rival at this time.

We take pleasure in congratulating you upon your log.

Super Hetrodyne

(2830) J.H., Hackensack, N. J.

Referring to the Super-Hetrodyne on page 14, February 24th issue of your paper, R-D-73, will you kindly give me the information desired?

Are the tubes critical, that is, do they have to be matched as you do in R.F. Circuits?

Will WD11 tubes work satisfactorily? If so, what results will they give as compared with Radiotron UV 201 or UV 201-A? What are the very best tubes to use?

Not considering the detector, can good results be obtained with less than five tubes? If so, how many?

What do you consider the proper number of tubes to use to get the very best results, everything considered?

A.—Answering your inquiries with reference to super-hetrodyne circuit appearing in Radio Digest of February 14th issue, will advise that tubes are not very critical. Would not compare the WD11 tube as affording results to be obtained by employment of Radiotron UV 201 or UV 201-A. Exceptional results have been secured in use of these tubes. VT1 is also used effectively.

At least five tubes, exclusive of detector, are required. Seven tubes in circuit make a very efficient set.

Aerial and Ground

(2824) W. M. G., Sea Bright, N. J.

The lead in from my aerial to my set is about 20 feet from the window and I have run the wire under my rugs. My ground is about 25 feet from my set and this also is under the rugs. Both wires are not insulated. As I have no way of placing a lightning arrester on the outside, I would like to know if there will be any danger if I connect the arrester inside and how would I do it?

A.—Noting your specifications with reference to antenna construction will advise that there is no danger whatever in the method employed. Merely connect lightning arrester in the same manner as you would if both were outside.

VT-2

(2388) FTS, Le Mars, Ia.

In the issue of January 20, page 14, you give an illustration of Flewelling circuit shown as R.D.-70, making mention of VT-2 or E tube. I cannot make this out. Please make mention of what this tube is, and who makes it, for which I thank you in advance.

A.—Answering your inquiry with reference to Flewelling circuit, would advise that the VT2 or E tube mentioned is one of the best obtainable today and is manufactured by the Western Electric Company of Chicago. However, any other make of hard tube may be used satisfactorily.

Holes in bakelite hard rubber or fiber must be made with a drill. In making up panels for a set using such materials do not use nails or tacks.

It is possible to light the filament of your tube with alternating current, but it is accompanied by hum.

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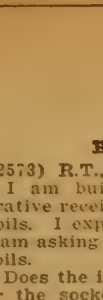
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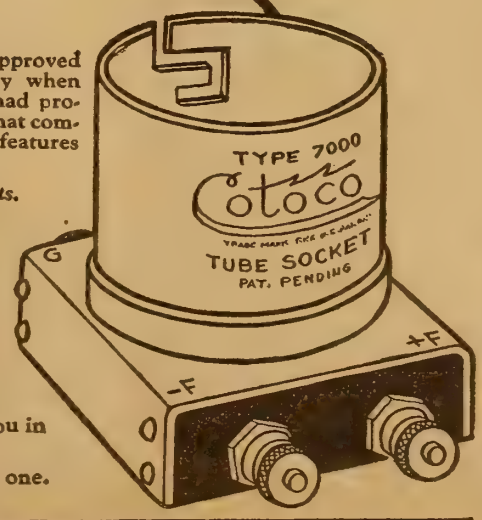

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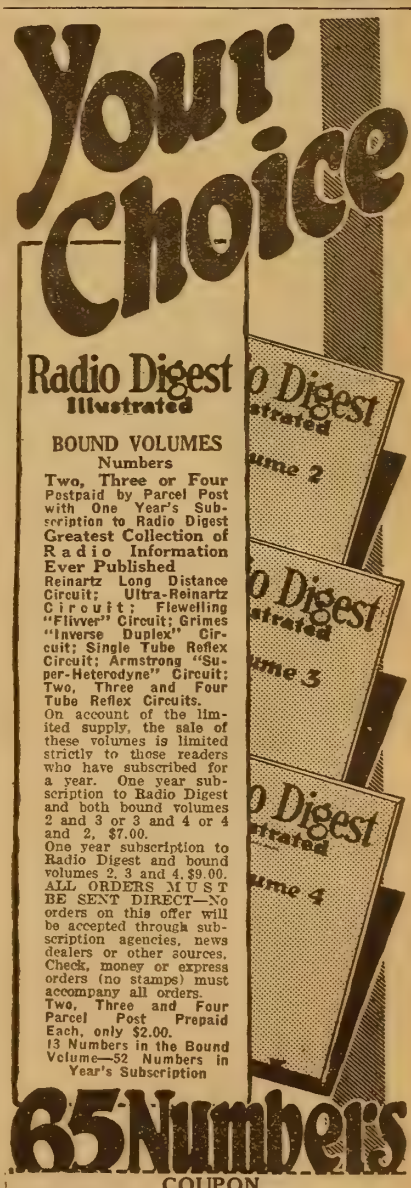

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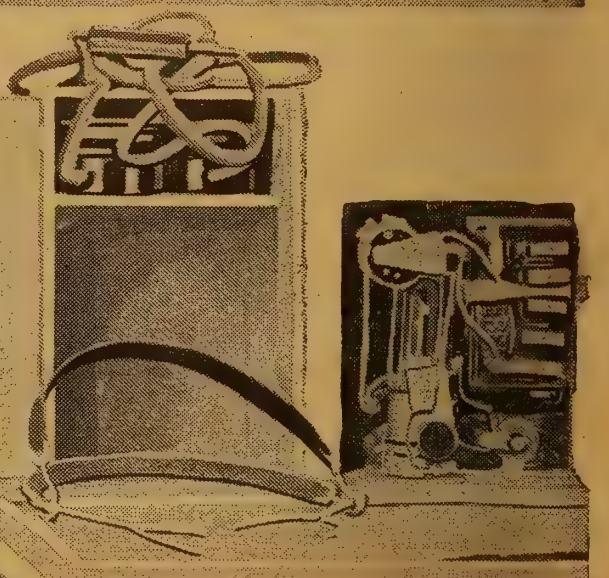
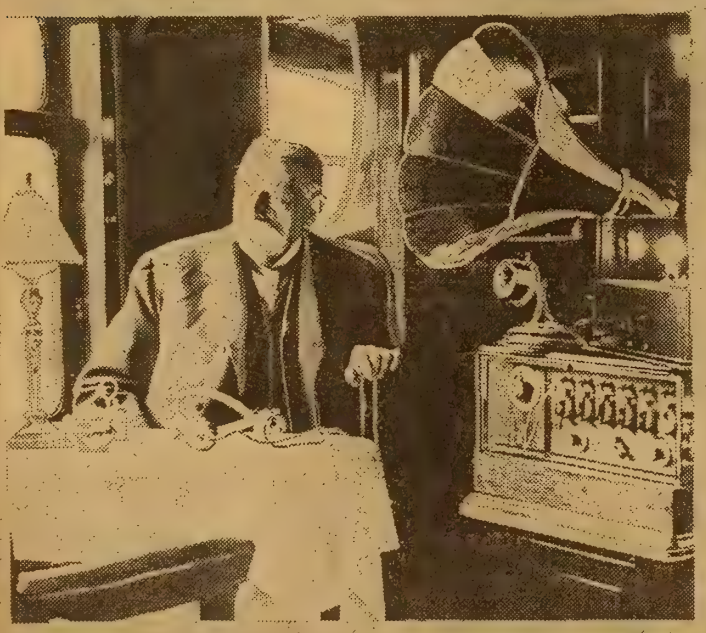
Radio Illustrated

Marjorie Rambeau in "As You Like It," which was broadcasted from the stage in New York City Wednesday night, April 25th, by WJZ. Miss Rambeau was acclaimed as the most beautiful Rosalind seen for many, many years on the old white way

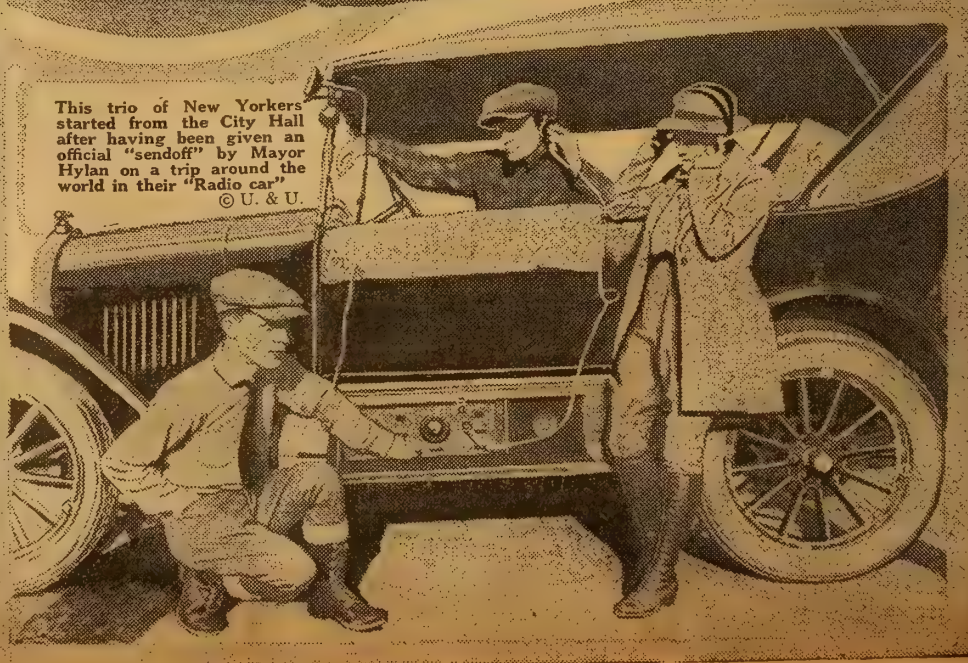


The latest thing in a tube set as to smallness was made by Eber Byam of Rogers Park, Chicago. It is said to be the smallest Radio tube set constructed of standard parts
© Swastika

It's great to be able to take a honeymoon just when you feel like it. Here are Mr. and Mrs. Cornelius Vanderbilt, Jr., who are revelling in the sunshine and balmy weather on the outskirts of Los Angeles, Calif. Just to keep in touch with daily events, Mr. Vanderbilt uses his Radio set daily, taking in everything from Bedtime Stories to Market Reports
© Keystone



For the entertainment of the passengers on the Pullman cars traveling between London and Dover, a Radio telephone loud speaker has been installed on the boat train. In spite of the noise of the moving train, the result is more than satisfactory. Photo shows Sir Davison Dalziel listening in enroute to Dover
© Keystone



This trio of New Yorkers started from the City Hall after having been given an official "sendoff" by Mayor Hylan on a trip around the world in their "Radio car"
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New Reinartz; 4-Circuit Set; See Offer Page 2

Radio Digest

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FIGHTS RADIO CHURCH

Miss Edith Church (above) is the highly gifted prima donna of WHK, Cleveland, Ohio. Miss Church will be heard every Sunday from this station during the summer months. In the center is Miss Lela Gordon Saling, who sang recently from Station KPO, San Francisco, and was heard in Hawaii, Samoa and Alaska. At the right is a photo of Miss Margaret Buckley, soprano, who recently sang for the listeners of KQV

LIGHTNING STRIKES "FL," EIFFEL TOWER

ANTENNA SYSTEM CRASHES DOWN TO EARTH

Giant French Plant Forced to Halt Service Until Repairs Are Made —Tours Handles Traffic

PARIS.—Lightning recently struck the antenna of the Eiffel Tower Radio installation and cut one of the six 1,200-foot wires which stretch from the ground to

(Continued on page 2)

AIR SERVICES NOT WORSHIP SAYS PASTOR

Boosts Weekday Sermons

Reverend P. E. Osgood Claims Church Attendance Drops Twenty-five Percent

By S. L. Huntley

Has broadcasting church services cut down on the attendance of the churches as a whole? This is the issue that is being met pro and con today by the American clergy.

In a recent address at the Church Club, Chicago, Reverend Phillips E. Osgood says, "There is many a report that broadcasting church services are depleting the

(Continued on page 2)

CFCK Broadcasting Music

EDMONTON, ALTA.—New license papers have been received from Ottawa for the broadcasting station of the Royal George Hotel, operated by the Radio Supply Company here. This station is working under the call CFCK and is now broadcasting musical programs from 8:00 to 8:30 o'clock every night of the week days and from 3:30 to 4:30 o'clock on Sundays.

ZITHER MAKES DEBUT AT ATLANTA STATION

ATLANTA, GA.—The zither, a musical instrument popular in the Spanish-American war days, invaded Dixie ether for the first time during a recent broadcast by WSB, Atlanta. Although the Journal station has been in operation fourteen months as the first newspaper broadcaster in the south, the old-fashioned instrument had never made an appearance before.

AIRPHONE TO BENEFIT ICE PATROL SERVICE

KFOG to Broadcast Location of "Danger Zone"

BOSTON, MASS.—Radio will play an important part in the international ice patrol service which will begin for the summer when the coast guard cutter Tampa leaves Boston. The purpose of this service to which the cutters Tampa and Modoc have been assigned by the coast guard is to locate dangerous ice near the trans-Atlantic steamship lane, patrol the section and broadcast warnings twice daily on 600 meters.

The ship on patrol answers to call KFOG and gives information upon request.

Airway Interscholastic Meet Held by Oklahoma

Ten High Schools Compete in Three Tests

NORMAN, OKLA.—The University of Oklahoma electrical engineering department recently completed successfully what is believed the first state Radio interscholastic meet in the United States. Thirty-five entrants from 10 different high schools over the state competed in the three tests which were held in connection with the nineteenth interscholastic track and field meet. The three contests consisted of a code test, theory test and equipment test of receiving sets.

SPECIAL LICENSE TO BE ISSUED STATIONS

WASHINGTON.—In an effort to encourage the scientific development of broadcasting and apparatus for that purpose, the Department of Commerce has created a new form of special license known as the "Broadcasting Development Class." Licenses in this class will be issued to station owners having transmitting and receiving sets of their own design.

FIGHTS RADIO CHURCH

(Continued from page 1)

congregations of the non-broadcasting churches. In some country churches the percentage may even mount to twenty-five or more. I have been told that even such services as the Sunday Night Club, in Chicago, have fallen off a thousand in attendance since the broadcasting begun.

"Hearing a sermon and religious music is not worship. Participation in worship is the essence of worship. I have seldom heard of a Radio listener who knelt for the prayers, stood to join in the hymns, said the Creed, created any churchly atmosphere for his hour of listening. Occasionally someone mails in an offering, but if money talks, the ratio of caring is still very scant. But the climacteric argument is that of the Communion Service; that certainly cannot be broadcast so that the homestayer participates. You get out of anything what you put into it, always.

Fears Spiritual Let-Down

"Here is a more subtle danger, however, than mere physical absence from worship. There is the danger of spiritual let-down on the part of the person who considers listening-in the equivalent of worship.

"But, so far as the Church is concerned, there is another side of the question. (Please understand that I am speaking now ONLY of the broadcasting of the regular services of the Church as they occur.) How of the effect upon the churches which do NOT broadcast?

"The sick and isolated are after all substantially a minority of the listeners-in. There is a great majority of able-bodied town or village dwellers. (I recognize that too many of these would not go to church anyway, and that they do listen in, more or less, to broadcasted services just because they come in over their Radio sets. I do not forget the possibility of missionary good to these. In passing, my only answer is that these persons would probably listen in at any other time as well.)

Comfort Keeps Radiophan Home

"You can see how the argument runs in the mind of the Radio owner. 'Why should I bother to dress up and plod out (or drive over) to the village church. I won't be half so comfortable as I am here at home in my slippers and soft collar, in my rocking chair. The choir over at the church can't touch the one I can hear over the Radio. And our parson, though he's good as gold, is no such star preacher as I can hear in Detroit or Pittsburgh or Pasadena. And besides, if I get sleepy I can turn off the machine and take forty winks. This old rocking chair and my pipe for me this morning!'

"There is no question at all that weekday sermon and music will reach its proper constituency. Invalids and the isolated can listen as conveniently on a Wednesday evening as on a Sunday morning. As for the great number of Radio possessors, they, too, will as readily be brought to listen to the weekday program from the Church as to an orchestral dance-program now available. The religious program for 'edification' (to use the old-fashioned, but appropriate word) will increasingly be recognized by key churches as their opportunity and duty.

"My urgency is only that the churches leave the usual worship-time untouched by broadcasting, and that, particularly for the sake of the sick, shut-in and isolated, they undertake the broadcasting of sermons and religious music at some other time, preferably on a weekday."

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-door photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago.

LIGHTNING HITS "FL"

(Continued from page 1)

the top of the great tower to serve in receiving and transmitting messages.

The cable and its giant insulators crashed to the ground and were buried deeply in the earth.

Four other insulators were broken and the entire service put out of action, so that receiving stations all over Europe for the first time in years failed to get their usual evening call from the Tower.

Repair Work Being Pushed

The electric discharge which caused the accident seems to have been in no way remarkable, and insulated as the cables were, they were believed to be immune from any risk of rupture. The break occurred just below the top of the insulators, and only one of the six cables remains undamaged. Repair work is being rapidly pushed.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440			11:30-12:30			11:30-12:30	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	10:00-12:00		10:00-12:00		10:00-12:00		9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00		10:00-11:00		9:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00		8:00-12:30	8:00-10:00	
KYW, Chicago, Ill.	345	7:00- 8:30	9:00- 9:30	7:00- 8:30	7:00- 8:30	10:00-12:00	7:00- 8:30	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas.	476	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30	7:15-10:30		6:30- 6:45
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	5:30-11:00	5:30- 6:00	
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	7:00- 9:00		7:00- 9:00		7:00- 9:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	7:15- 8:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	5:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	
WJAX, Cleveland, O.	390		6:00- 7:30		7:15- 9:30			
WJZ, New York, N. Y.	455	6:30- 8:30	5:00- 8:30	7:00- 8:30	6:30- 8:30	6:30- 8:30	6:30- 9:00	6:30- 8:00
WKAQ, San Juan, P. R.	360		7:30- 9:30				7:30- 9:30	
WLAG, Minneapolis, Minn.	417	10:10-11:30	6:00- 7:30	6:00- 7:30	9:15-10:30	6:00- 7:30	8:30-10:30	
WLW, Cincinnati, O.	360	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas.	400		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:50-10:00			5:50- 8:10			
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Radio Digest, Illustrated, Volume 5, Number 8, published Chicago, Illinois, June 2, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign, Six Dollars; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

Why Is a Variometer and What Does It Do?—That's just one of the many questions to be answered next week by Thomas W. Benson in his beginner's series chapter on "Condensers and Inductances." Why does turning the rotor ball over change the wave length, although no switch was used to cut in or out turns of wire? Let Mr. Benson tell you June 9.

"Tubes Are Often the Black Sheep of the Radio Family," says H. J. Marx. Mr. Marx has found the wide variance in the tube characteristics responsible for much Radiophan "grief" and will continue next week to tell of his research and what can be done to remedy the situation.

The Best Flewelling Super Question will be answered next week by the best authority, E. T. Flewelling, who has just concluded his One Condenser Flivver series this issue. See page seven for further details.

Want Apparatus? Save the Coupons—The Digest has a Special Reward Offer beginning this issue. See right column, this page. Quite a nice idea, isn't it? All you must do is save consecutive coupons, so buy the June 9 issue early.

How About a Portable Set? Planning one, surely. Let the Digest aid you. June 23 is the date of the Digest Portable Set Number, but ideas for vacationists will receive their due share of attention before and after that date as well. Which reminds us. How about a few outdoor Radio photos? Read the box in the left column of this page. See if you can land a dollar.

Wave Length Changes Are Occurring Thick and Fast—but they can't get ahead of the Digest Broadcasting Station Directory. See the additions made this week. For example, wave lengths for all plants, station slogans, ranges, schedules, owners, kind of time used. Buy the next two issues and you'll have the directory complete.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

BIG REWARD OFFER TO DIGEST READERS

TO GIVE PARTS FOR COUPONS AND REMITTANCE

Special Offer to Benefit Regular Readers in Return for Splendid Support Given Publication

SPECIAL REWARD OFFER

Coupon Number 1

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer given below.

Save Me—I Am Valuable

Appreciative of the splendid support of you regular readers of the paper and the interest you have shown in the growth of the Digest, we have decided to inaugurate a Special Reward Offer for your benefit. With this offer which starts with this issue you are given the opportunity of securing desirable standard apparatus at a decided saving by simply clipping the coupons which will appear on this page each week in the Digest and sending them to us accompanied by the necessary small remittance. As you will note below many kinds of parts and apparatus dear to the heart of every Radiophan have been included in this special offer. Other items will be added later.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin Copeland Sta Put Plug.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV1199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-Point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1

(Continued on page 9)

WASHINGTON WILL HAVE WEAF'S TWIN

NEW PLANT TO HAVE PUBLIC BROADCAST SERVICE

Washington Broadcasters May Organize Association and Arrange Time to Care for Members

WASHINGTON.—A new class B broadcasting station is now under operation here. It is owned by the Chesapeake and Potomac Telephone Company.

This company, which is a member of the American Telegraph and Telephone Company, has erected the second of the Bell-System broadcasting stations, and plans to duplicate in power and quality the New York station WEAF.

A unique feature is that the new plant will be a public service station; that is, it will be operated without profit and may be leased or chartered by other interests for periodic broadcasting at a rate equivalent to the proportional cost of operation.

Broadcasters May Organize

It is understood that a local broadcasters' association may be organized and the operating time of the station scheduled to care for its members. This, it is believed, will save small operators considerable money in comparison to the costs of installation and upkeep of private broadcasting stations. Certain hours of any schedule would be received by the Telephone company for the transmission of matter of public interest such as presidential addresses, congressional debates and governmental information. Important concerts broadcasted from WEAF in New York may be sent by land line to Washington and broadcasted simultaneously from the new station, officials say.

The electrical equipment is the product of the Western Electric Co., and has been installed under the direction of C. & P. and A. T. & T. Co. engineers. The station is located on the telephone building, 725 Thirteenth street; the towers are erected on the roof.

STATIONS SAY IT WITH MUSIC TO DODGE LAW

6XB and CFCN Find New Method of Communication

By Jeffery J. Dingman

CALGARY, ALTA.—No laws were ever enacted, no rules ever promulgated, no regulations ever laid down in which loopholes could not be found and which could not be avoided, even regulations governing Radiophone broadcasting in the United States. This is the opinion at which Canadian Radio operators have arrived after a recent occurrence.

Recently CFCN at Calgary came on the air on its test night, calling 6XB (KFDB), Telegraph Hill, San Francisco.

"Hello, 6XB, San Francisco," said W. W. Grant into the CFCN microphone. "Hello, 6XB. How are we coming through tonight I know, old man, it is regrettable, but you cannot answer me. However, if we are coming through good play the 'Parade of the Wooden Soldiers' and if we are coming through poorly play 'Mr. Gallagher and Mr. Shean.'"

CFCN signed off and listened in for 6XB.

In a few moments the stirring strains of the "Parade of the Wooden Soldiers" could be heard.

The barriers of restriction imposed by regulations governing the sixth district had been overcome.

Mr. Grant, while on a test, suggested to 6XB that it launch a petition to obtain permission to communicate with other broadcasting stations while operating on its experimental license. The CFCN operator pointed out that in the seventh district this was allowed. Evidently there was some misunderstanding, as the rules are complicated and different inspectors read them in a different way.

TRAIN RECEPTION IS FIRE CHIEFS' STUNT

SPRINGFIELD, MASS.—A recent successful test of the reception of Radiophone music on board a moving train was the first ever held in New England. The firemen's special from Boston to the National Safety Week convention held in this city accomplished the feat. The train carried 100 representatives of the Massachusetts Fire Chief's Club.

ATLANTA PLANT WSB BECOMES GODFATHER

ATLANTA, GA.—WSB became a sort of a godfather recently when this station named a baby via Radio at the request of the infant's mother, Mrs. J. F. Coker, of Atlanta. The name announced was Winnifred Susan Beatrice, the initials representing the station's call letters, WSB. Two visiting Chicago newspaper men, who selected the name for the baby, sent handsome presents.

KYW BROADCASTS BLACK FRIARS

Above is a photo of Clark Shaw, of the Black Friars of the University of Chicago, as Ethelind Nielson, the movie vamp. The photo was taken as Mr. Shaw appeared in the "Filming of the Friars," a musical comedy recently produced by the organization and broadcast by Station KYW, Chicago. Altho the cast called for feminine roles, all parts were played by men. © Khonigon.

One Broadcaster for India

WASHINGTON, D. C.—Broadcasting in India will probably be limited to a single company, composed of British and Indian firms, according to a report of the recent Delhi conference forwarded to the Department of Commerce by Vice Consul Harold Shantz, Calcutta. Non-British firms will not be allowed to participate, it is said.

No Change in Time

DAVENPORT, IA.—Station WOC will continue to broadcast all musical programs, market quotations, weather reports and lectures according to Central Standard Time, the same as heretofore, and those living where Daylight Saving Time is being used will have to be governed accordingly.

NEW RECORD MADE BY CRUISER OMAHA

CODE MESSAGES RECEIVED 1,800 MILES AWAY

New Scout Cruiser Reaches Pearl Harbor, 2,300 Miles, on 300-Watt Radiophone Set

WASHINGTON.—Naval Radio experts are delighted with the performance of the Radio equipment on the new scout cruiser Omaha, which recently broke all long distance records in transmitting during her "shake-down" cruise in the Pacific.

While maneuvering at sea off the coast of Washington, the newly installed Radio transmitting sets were given a thorough test. Code messages transmitted with the 20 KW arc set, such as the larger naval craft, as now equipped with, were copied by all naval Radio stations along the west coast from lower California to Saint Paul, Alaska, and on the East coast at Bar Harbor, Me., Washington, D. C., and Key West, Fla. One of the stations reached was San Diego, 1,800 miles away from the Omaha. This new cruiser's arc was copied by the battleship California, which was 1,800 miles distant, but it is reported that she could not pick up the California's replies.

Heard by Pearl Harbor

Not only in code dispatches did the Omaha Radio experts excel, but with her 300-watt tube set, spoken messages were transmitted to Pearl Harbor, Honolulu, 2,300 nautical miles distant. They were also heard at Key West, Fla., approximately 2,100 miles over land and sea.

Part of the credit for the long-distance work is attributed to the 180-foot wooden masts, which carry the Omaha's aerials, almost 50 feet higher than the steel masts on battleships. The mean effective height on the Omaha is better than 100 feet, it is stated by naval experts. Her Radio equipment is also installed on the "topside" and not below eliminating long cable and wire leads.

Radio Personnel in Navy Over Two Thousand Men

Many Men Transferred to Meet Shortage at Plants

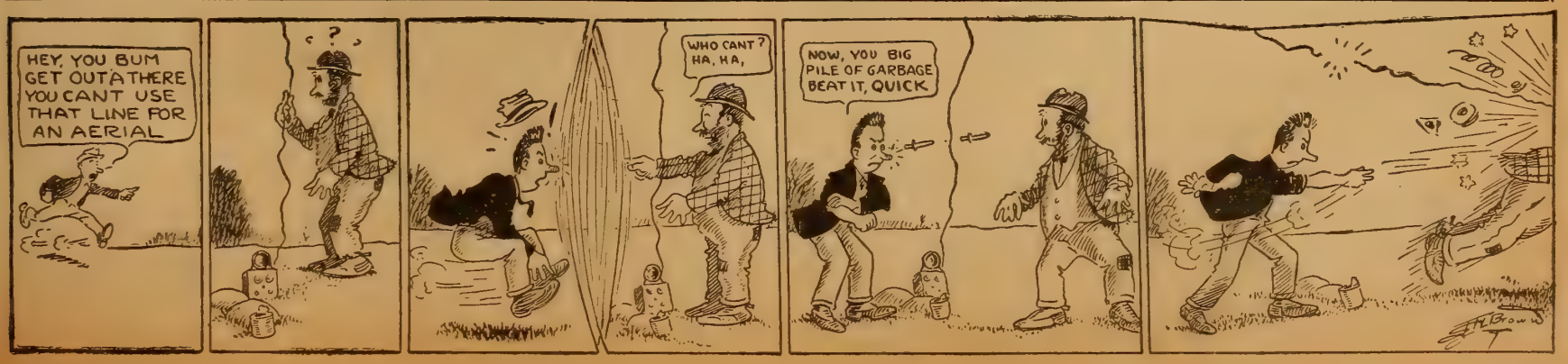
WASHINGTON, April 30.—An exhaustive study of the Radio personnel situation in the navy is now under way, both afloat and ashore, in an effort to increase the efficiency of naval communications. Some of the less important shore establishments have been closed and the personnel sent to busy stations where shortages existed or to ships at sea which were in need of new operators and experienced Radio men. The present Radio personnel of the navy is 2,419 men.

The training of Radio-men now in naval schools is to be pushed, it is understood, with a hope of relieving all shortages by July 1. Previously all third class Radiomen were at once assigned to fleet work for military training, with the result that the ships-of-war were deprived of a number of higher rates, including first-class men and chiefs. This matter is now being adjusted so that some third-class men will be assigned to shore duty. In the near future many transfers will be made between the fleets and shore stations to adjust the situation.

Atlanta Star's Friends Hear Her Sing at WEAF

ATLANTA, GA.—An especially large audience of Atlanta listeners tuned in on WEAF, New York, recently, when Madeleine Hauff, sensational Atlanta coloratura soprano, now preparing for a Metropolitan opera debut in New York, gave a recital at the American Telephone and Telegraph Company station.

THE ANTENNA BROTHERS — Spir L. and Lew P. — The Set Was on the Bum



PRESIDENT TO USE ALASKAN AIRPHONE

TO KEEP IN DIRECT TOUCH WITH STATES

Experts Looking Forward to Time When Alaska Will Be World Relay

WASHINGTON.—President Harding, on his coming trip to Alaska, will be almost entirely dependent on Radio to keep him in touch with affairs back home.

The President, heretofore just a Radio fan like most of his fellow citizens, will have an opportunity to see its great practical use demonstrated.

By Radio the President will learn of political developments following the series of speeches he will make through the West on his way to Alaska. On account of the prominence of several issues he will develop it will be most important that he keep constantly in touch with the reaction to the international court of justice speeches, as well as those on the railroad consolidation plan and his shipping program.

Cable Break Possible.

After the President and his party get to Alaska, there will be only a thin thread of copper cable between him and the United States, as far as wire communication is concerned. It stretches 1,000 miles from Cordova to Sitka, and thence to Seattle. During cable breaks, which sometimes last for several weeks, this system is useless.

But cable breaks are not so disastrous as formerly, for Radio can take up their burden, as it frequently has in the last few years.

When the President gets to Alaska he will also find that the land wire systems are very inadequate, on account of the contour of the country. On the other hand, conditions are exceptionally favorable to Radio transmission. In the summer "static season," atmospheric or other disturbances are much less severe in Alaska than in the United States. During other seasons of the year static is rarely experienced. Radio waves do not lose their effectiveness in Alaska as in this country.

Radio Stations Plentiful

Alaska and its coast are well supplied with Radio stations, so that the President will always be in touch with the United States, as well as with parts of Alaska with which he wishes to communicate. There are also nine Radio stations maintained by the navy along the coasts of the Gulf of Alaska and in the Behring Sea. They are in touch with Radio stations along the Pacific coast in Washington, Oregon and California, and thus with the entire United States.

President to See Conditions

While the President is in Alaska he will also learn the great possibilities for future development of Radio in Alaska, both as a means of communication within the rich territory itself and as a connecting link between international Radio lines.

Radio experts are looking forward to the time when Alaska will become the crossroads in the ether lanes of the northern hemisphere—the point of relay for Radio signals between North America, Europe and Asia—for which it is particularly adapted from its situation literally at the top of the world.

FANS HAVE QUEER VISION OF CANADA

U. S. Consul Reat Asked if Canucks Speak English Throughout Country

CALGARY, ALTA.—Inter-communication by Radiophone between the United States and Canada has still a great deal to accomplish. At least, this is the conclusion which has been reached in Calgary Radio circles.

Samuel C. Reat, United States consul at Calgary, has received a letter from a resident of Philadelphia asking whether the English language is spoken in Canada. How many thousands of Radiophans in the United States, who nightly are entertained by powerful Canadian broadcasting stations, can testify to the fact that real American is spoken, with no British accent or dropping of the "H's".

Evidently there are still some residents of the great republic across the line, who picture Canada as a vast wilderness, a land of everlasting ice and snow, inhabited by only a few hardy pioneers. It is these erroneous impressions which Radio is facilitating the abolition of. Canadian Radiophones are among the finest and most powerful in the world, and operators are telling the world so!

Canada is a civilized country, a country of cities, of farms, and of pleasure haunts in the bigger cities. For the information of the Philadelphia resident, it might be stated that many avenues can be found in Canada to compare favorable with Michigan boulevard in Chicago.

Here is a copy of the letter received by United States Consul Reat:

"The American Consul;

Honourable Sir:

Kindly let me know if the English language is spoken in part or parts of Canada and surrounding islands.

Also what other language other than their native tongue is spoken and what race of people inhabit the country.

Thanking you in advance,

Sincerely,

....."

LIGHT HOUSE SERVICE ISSUES NEW CIRCULAR

Gives Four Blueprints and "How to Wind Coil"

WASHINGTON, D. C.—The Light House Service is sending out an announcement to officials in the nature of a circular letter of Radio information, which is accompanied by four blueprints showing the method of assembling and wiring Radio apparatus, as well as instructions how to wind a spider web coil.

The information is being sent out to those in the service who are interested in a Radio receiving set that is simple, cheap, easily constructed and easily handled. The service states that after experimenting for some months with several hook-ups with the object of developing a set with these advantages, this set has been decided by the amateur members of the Radio Club at the Bureau of Lighthouses as being the best at this time. The announcement states that it is a single type receiving set only, but amplification may be added at the option of the builder. The volt and one half-type soft tube is recommended, using a single dry cell for the filament current, thereby eliminating the storage battery and charging device.

White Star Steamer Has Loud Speaker Installed

NEW YORK.—On a recent trip of the White Star liner, Olympic, from here to Southampton, a big loud speaker was used for the first time. This was attached to the ship's Radio receiver by a cable, the loud speaker being placed in the foyer of the upper deck. Concerts, speeches and all the features of the many broadcasting programs were received from both continents and heard on three decks at the same time. Tuning was done in the regular Radio cabin of the ship. If the innovation meets with approval of passengers it will be made permanent.

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No aerial or antenna needed

All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.

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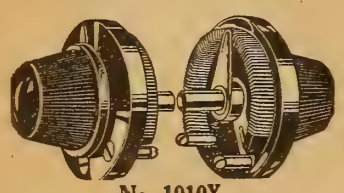

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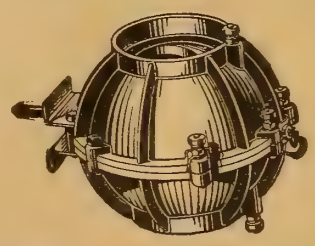

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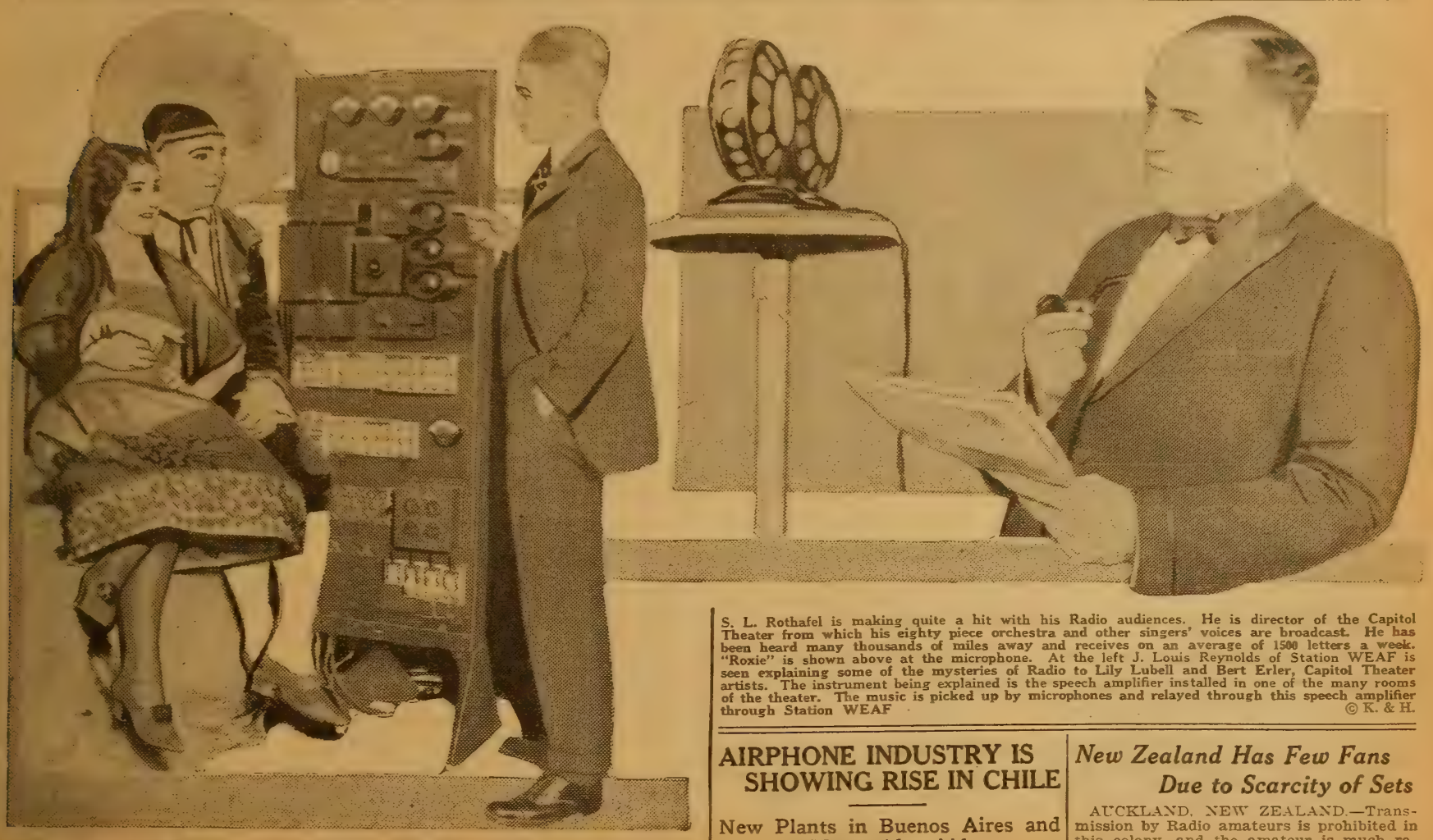

S. L. Rothafel is making quite a hit with his Radio audiences. He is director of the Capitol Theater from which his eighty piece orchestra and other singers' voices are broadcast. He has been heard many thousands of miles away and receives on an average of 1500 letters a week. "Roxie" is shown above at the microphone. At the left J. Louis Reynolds of Station WEAF is seen explaining some of the mysteries of Radio to Lily Lubell and Bert Erler, Capitol Theater artists. The instrument being explained is the speech amplifier installed in one of the many rooms of the theater. The music is picked up by microphones and relayed through this speech amplifier through Station WEAF © K. & H.

Capitol Theater, New York, Broadcasts Sunday Evening Programs Through WEAF

By Evelyn Lanzius

Ten thousand letters a week pour in upon "Roxie," S. L. Rothafel, Director of the Capitol Theater, New York City, largest moving picture theater in the world. This theater, with an orchestra of 85- supplemented by a wonderful organ, equipped with a special studio, is the biggest individual unit broadcasting in the world—every Sunday evening at seven-thiry the musical program, including overture, music incidental to the magazine, the subjects of which are explained by Mr. Rothafel to the Radio audience at seven-twenty before the music begins. For instance, one evening recently, previous to the rendering of "Love's Old Sweet Song" by "Betsy," Mr. Rothafel requested his Radio audience to lower their lights, thus bringing his own lighting effects into their homes. Many wrote in to say that they had followed this suggestion with telling effect. The following week, "Roxie," in beginning the customary announcing, apologized for his oversight in forgetting to suggest that the lights be raised again. The "Radiophans" forgave him, so we are told.

Mr. Rothafel brings a human interest touch into his broadcasting which is quite different from the cut and dried program announcing which is practically always the rule at the big studios. So many requests have been made for pictures of the artists broadcasting from the special studio of the Capitol Theater, that Mr. Rothafel has had a special studio picture made, from which a postcard will be reproduced to be mailed out to all the fans who have requested photographs of the various artists. Thousands of these requests are on file waiting to be filled.

Many people accustomed to go out for dinner Sunday evening, now wait for the announcement in Mr. Rothafel's inimitable manner of the Capitol's musical programs, which are uniformly the finest series of concerts offered either on the air or in the concert hall. They include the best of the symphonic overtures and orchestral compositions, the tabloid presentations of the popular operas performed by well known operatic artists, while the studio concert which supplements the regular program is devoted to classic and semi-classic numbers.

By his unusual method of announcing, Mr. Rothafel has established a personal contact between the million Radio listeners and the various performers in the studio. Dr. William Axt, whose services at the piano are one of the invaluable features of each week's program, is familiarly known as "Dr. Billy"; Betsy Ayres, whose fresh young soprano and periodical ripple of laughter is known to all of the Capitol's Radio listeners, is just plain "Betsy," and Eugene Ormandy Blau, whose violin leads the strains of the Capitol Trio numbers, answers to soubriquet of "The Blue Blonde." "Roxie" introduces each artist most informally, and encourages them to talk in little personalities to the invisible audience, these being mostly in humorous vein, and there is no doubt that there is an unusual sympathy and bond of interest between the artists of the Capitol broadcasting studio and the Radio listeners.

Mr. Rothafel feels that the motion picture is in a peculiarly favorable position with respect to broadcasting. Its chief form of entertainment, the picture, can not be transmitted through the air—yet—and if people who hear the Radio concert like them in Radio form they must actually attend the theater to get the picture and their interest is greatly stimulated by the Radio presentation. Of course, the most rabid Radiophan does not claim that the musical program on the air is as perfect as that given in the theater and that thousands of Radiophans attend the theatre to get the original music and to see the performers who have been broadcasting is an indubitable fact.

At seven-twenty each Sunday evening, "Roxie" "takes the air" and describes the regular theater performance which is about to be broadcast. He describes briefly the operatic impressions to be given. All this is done from a microphone near the stage, and without interference with the performance in the theater. The performance is then given and frequently the manager during a short subject film will describe various shots on the screen. The complete musical program, a half hour of music, is then given, a microphone hanging in the auditorium about 20 feet from the orchestra pit transmitting the performance.

At about 8:15, selected artists from the regular performance are taken into the private broadcasting room where the evening concert is given. The concert room in this case happens to be the private screening room.

An interesting feature of this broadcasting experiment is that the heavy expense is not borne by the theater. The equipment is installed by the broadcasting service. It is compact equipment which is hooked up to broadcasting station WEAF, American Telephone and Telegraph Co., New York City.

AIRPHONE INDUSTRY IS SHOWING RISE IN CHILE

New Plants in Buenos Aires and Montevideo Aid

WASHINGTON, D. C.—In Santiago, Valparaiso, and several other smaller Chilean cities, interest in Radio telephony is growing steadily and its fuller development only awaits the establishment of a broadcasting station within the country such as those now in operation on the east coast of South America, says Assistant Trade Commissioner W. E. Embry in a report to the Department of Commerce. It is reported that the broadcasting stations recently erected in Buenos Aires, Montevideo, and Rio de Janeiro have given very satisfactory results and large numbers of amateur receiving sets have been sold in these countries.

New Zealand Has Few Fans Due to Scarcity of Sets

AUCKLAND, NEW ZEALAND.—Transmission by Radio amateurs is prohibited in this colony, and the amateur is much restricted, being required to get a special permit for receiving. Prices are high, Radio sets are scarce, and conditions generally are discouraging for the amateur. In spite of this, however, there are some enthusiasts, and according to advices sent to the American Radio Relay League, American amateurs have been heard here. R. Slade, owner of station 6-KA at Timaru, South Island, has been receiving American signals frequently, and picked up 5PX calling CQ; 6-BCR calling 9-BED and 9-BED working 9-UU.

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Regal, 43 Plates, .001 Mfd. Cap.	2.25
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Phone By-pass, A. J. M.	.35
RHEOSTATS	
Regal (High quality, 8 ohm)	.70
Klosner Vernier	.55
Paragon	.80
Roberts 6 Ohm Standard	.60
Bradleystats	1.30
Resistances	
SOCKETS	
Moulded	.35
Rameco	.35
Turney (All Metal)	.25
TRANSFORMERS (Radio Frequency)	
Tricoil (of Subway Reception Fame)	1.35
Radio Laboratory RT-1	2.50
Murad T-11	2.20
Baldwin	1.55
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Kesco 3½-inch Moulded	.30
Kesco 3-inch Moulded	.25
Kesco 2-inch Moulded	.25
American Hard Rubber, 3-inch	.50
American Hard Rubber, 1-inch	$0.55
Electrose, ½-inch Fada Knob	.55
Emeloid 3-inch Unbreakable	.30
Emeloid 2-inch Unbreakable	.20
Vernier Dial Adjustment	.20
HEAD TELEPHONES	
Royal Phones	3.75
Telephone Connectors, Regal, for 3 Pair Phones	.90
Phonograph Attachment "Y" Shape	1.00
Radiophone Adapter (Rubber Moulded)	1.35
TUBES	
Meyers High-Mu (Last Lot)	4.35
BATTERIES ("B" Only)	
Volton 22½ V., Small Size	.90
Volton 22½ V. Medium Size	1.14
Volton 22½ V. Large Size	1.35
Volton 45 V. Medium Size	1.98
Volton 45 V. Large Size	2.50
MISCELLANEOUS	
Single Circuit Jacks	.25
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Telephone Plugs	.85
Bus Bar Wire, per foot	.015
Spaghetti (any color), per length	.07
Single Coil Mounting	.35
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All merchandise guaranteed by both the manufacturer and ourselves. Will be shipped upon receipt of purchase price, including postage.

Radio & Mechanical Trading Corporation
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The Week's Advance Broadcast Programs

Tuesday, May 29

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; Lecture, "The Dependent Child," Geo. B. Ermger.
KHJ (Pacific, 400), 12:30-1:15 P. M., Concert; 7:30 P. M., Musical numbers; 8:00-10:00 P. M., Program, "The Junior Cabaret," M. Theresa Bessler.
KSD (Central, 546), 8:00 P. M., Concert, West Presbyterian Sunday School Orchestra.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy Concert Dept.; Wendell W. Hall, KYW's Music Maker.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Hubb Diggs and Singers.
WDAR (Eastern, Daylight Saving, 395), 11:00 A. M., 1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Talk on "Affairs of the Heart," Betsy Logan; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Concert, Titche-Goettinger Company's Orchestra, Ashley Brewster, director; 11:00-12:00 P. M., Musical program, W. A. Green Company Orchestra and Choral Club.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra; 3:30-4:30 P. M., Musical program; 6:00-7:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue; 8:00-9:55 P. M., Song recital and short talks; 10:00-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.
WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; 8:30 P. M., Selections, Samuel Adams School Orchestra; Ninety-third Tufts College Lecture.
WGY (Eastern, 380), 1:00 P. M., Address, "Safe Milk," Grace S. Babcock; 7:35 P. M., Address, "Oysters, America's Greatest Sea Crop," Russell Suter, N. Y. State Conservation Commission; 7:45 P. M., Boy Scout Program, Schenectady Boy Scouts of America.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Roy C. Parks, Rialto Theatre organist; 7:30-9:00 P. M., Lela Gunterman, soprano; Myer Green, violinist; A. A. Brooks, baritone; Mary Blain, reader; Concert, Mary Anderson Theater Orchestra; Mrs. Ida Asbury Wobbe, reader.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music and song recital; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Dance music, Charlie Kerr's L'Aiglon Cafe Orchestra.
WJAX (Eastern, 390), 7:30 P. M., Concert arranged by Cleveland News Dealer.
WLW (Eastern, 360), 10:00 P. M., Concert, Alpha Chapter of Delta Omicron Sorority, Cincinnati Conservatory of Music; Vocal concert, Delphi Quartet.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Bush Conservatory of Music; 7:00 P. M., Babson report; Stuart Barker Concert Party; 9:15 P. M., Concert, Mrs. Robertina Robertson, soprano; Mrs. Mabel Wrede Hunter, violinist.
WMC (Central, 500), 8:00 P. M., Musical program; Cleo Johnson, soprano; Martha Lahogue, reader; Marjorie Lamkin, singer; Hugh Sandidge, tenor; 11:00 P. M., Midnight Frolic.
WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon Music by Tea Room Orchestra; 4:45-5:00 P. M., Organ Recital; 7:30 P. M., Sports results and news dispatches.
WWJ (Eastern, 580), 8:30 P. M., Concert, News Orchestra; Chamber Music, Society of Detroit; Louise Law Cohn, pianist; Marion Frances Cohn, violinist; Dorothy Louise Cohn, cellist.

Wednesday, May 30

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, Decoration Day; 8:00-9:00 P. M., Program, Memorial Day, G. A. R.; Spanish War Veterans, American Legion.
KHJ (Pacific, 400), 8:00-10:00 P. M., Memorial Day program, arranged by Harriet E. Chubbie.
KSD (Central, 546), 8:00 P. M., Concert, orchestra; musical specialties, Grand Central Theatre talent.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Natalie Gilmartin, soprano; The Salvation Army Staff Band, Adj. J. Arthur Finn, conductor.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Euterpean Club.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ Recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks and musical program; 4:30-6:00 P. M., Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-9:55 P. M., Song recital and short talks; 10:10-12:00 P. M., Dance music, Arcadia Cafe Concert Orchestra; Songs by Harry Glyn.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Living Epistles," Rev. Robt. A. Hunt, pastor First Methodist Church.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:30 P. M., Short talks and musical program; 8:00-7:30 P. M., Dinner music; Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue.
WGI (Eastern, 360), 6:45 P. M., Girls Hour, Camp Fire Girls, "Big Smoke," "The Conjuror," Amrad Players.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Mildred Schirmer, pianist; Clifford Gorman, Rialto Theatre organ, 7:30-9:00 P. M., Concert, Lucile Schneider, Bernice Funk, Victoria Meagher, Marie Koehler, Mary Gordon, Mary Aubrey, Anna Blankenbaker, Katherine Plangemeir, Mary Agnes Ott, Virginia Woodson, Ethel Fisher, Ethel Hackmiller, Mrs. A. W. Ott, Mrs. J. P. Ferguson, sopranos; Mrs. William Herman, Mrs. Shirley Graves, Josephine Miller, Rubye Moser, Ione Hover, contraltos; Shirley Grares, saxophone.
WHK (Eastern, 360), 8:00 P. M., Babson's Radio Release; Automobile report; Concert, WHK Trio.
WIP (Eastern, Daylight Saving, 509), 10:00-11:00 A. M., Musical selections, 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Song recital; 6:00-7:00 P. M., Dinner dance music; Bedtime stories, Uncle Wip.
WLW (Eastern, 360), 8:00 P. M., Decoration Day program; "Grotto March," "Little Duchess," Pierce's Band; "Songs My Mother Taught Me," "Machushla," Helen Hofer, soprano; "Fond Hearts," Pierce's Band; Patriotic address, Major Norris Stayton; Ernest Daulton, pianist; "Determination," "Victory Bell," Pierce's Band; Helen Hofer, soprano; "Best Loved Southern Melodies," "Mary Flora," Pierce's Band; Ernest Daulton, pianist; "Lustspiel," Band.
WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Cosmopolitan School of Music & Dramatic Art; 7:00 P. M., Memorial Day stories, Georgene Faulkner; 9:15 P. M., Concert, Mrs. Lucille O'Brien, soprano; Mrs. Hilda Butler Farr, pianist.
WOC (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk; 8:00 P. M., Organ recital, E. John Richards, organist. Assisted by Jeanette Brewbaker, soprano; 10:00 P. M., Musical program, Ward Trio, Sterling, Ill.
WOO (Eastern, Daylight Saving, 509), 7:30-7:45 P. M., Results of Sporting Events; 7:45-8:30 P. M., Dinner music, Hotel Adelphia Orchestra; 8:30-10:50 P. M., Special Memorial Day Program.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

WWJ (Eastern, 580), 12:05 P. M., Concert, News Orchestra; 8:30 P. M., News Orchestra; Musical program, furnished by members of Chas. A. Learned Post, American Legion.

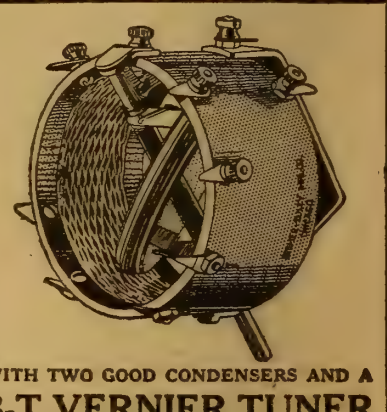
Thursday, May 31

KFDB (Pacific, 400), 2:00-3:00 P. M., Special music; 8:00-10:00 P. M., Musical program, Mills Trio, harp, piano and violin, Mills College.
KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; Lecture, "Character—The Basis of Bank Credit," Andrew Miller.
KHJ (Pacific, 400), 8:00-10:00 P. M., DeLuxe program, The Bay Nest of Orioles, Santa Monica, Calif.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Elizabeth Jenks, soprano; Raymond A. Moroney, baritone; Ned F. Dunn, pianist; The Roseland Trio; Jennie Gross, contralto; Adolph Gross, baritone; Thos. Liddell, tenor; Adale Wahlberg, accompanist.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, North Side High School Orchestra and Glee Club.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and piano selections; 4:30-6:00 P. M., talks, "Affairs of the Heart," Betsy Logan; Stories, Dream Daddy; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Texas, the Republic," Judge Chas. F. Greenwood; 8:30-9:30 P. M., Musical program, Emmett B. Peck, violinist; 1:00-12:00 P. M., Recital, Bush & Gerts Piano Company.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:00 P. M., Musical program; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue; 8:00-12:00 P. M. Song recital and musical program; Dance music, Meyer Davis Bellevue Stratford Orchestra.
WGI (Eastern, 360), 5:00 P. M., "Twilight Tales," Uncle David; 6:15 P. M., "General Conditions in the Shoe and Leather Industry," New England Shoe and Leather Assn.; 9:30 P. M., "Romance of the Shoe," Harry M. Wood; Concert, Amrad Choral and Glee Clubs.
WGY (Eastern, 380), 1:00 P. M., Address, "Foods for Growth—Vegetables and Fruits," Mary G. McCormick, Supervisor of Nutrition, N. Y. State Dept. of Health; 7:45 P. M., Radio drama, "The Copperhead," WGY Players.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; Roy C. Parks, organist; 7:30-9:00 P. M., Concert, Chas. Myers orchestra.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., Song and piano recital; 6:00-7:30 P. M., Dinner dance music, Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Song recital; Dance music, Charlie Kerr's Cafe L'Aiglon orchestra.
WJAX (Eastern, 390), 8:00 P. M., Organ recital, Edwin A. Kraft, organist; "Twilight Falls," "Julia's Garden," "Take Joy Home," "A Birthday," Helen M. Kraus, singer.
WLW (Eastern, 360), 10:00 P. M., Musical program; "If You Tried," "Old Fashioned Days," "Thelma," Stephens, auto editor of Daily News; Norman W. Taylor, pianist; **9:15 P. M.,** Concert, Mrs. Beatrice F. Erlinger, soprano; Frank Pfau, pianist; Frank Polesny, violinst.
WMC (Central, 500), 8:00 P. M., Concert, Chisca Philharmonic Orchestra, Clara Ahern, director.
WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital; 7:30-8:00 P. M., Sports results and news dispatches.
WWJ (Eastern, 580), 12:05 P. M., Concert, News Orchestra; 8:30 P. M., Concert, News Orchestra; Cathedral Male Quartet.

Friday, June 1

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; 7:00-7:30 P. M., University of Oregon, Lecture; 8:00-8:15 P. M., Mrs. Fred L. Olson, vocalist; 8:15-9:00 P. M., George Olsen's Metropolitan Orchestra; 11:12:00 P. M., "Hoot Owls."
KHJ (Pacific, 400), 8:00-10:00 P. M., DeLuxe program, Chamber of Commerce, Oxnard, Calif.; "Sugar Beet" Program.
KPO (Pacific, 423), 8:00-10:00 P. M., Musical program arranged by Y. M. C. A. Four minute talks by prominent men.
KSD (Central, 546), 8:00 P. M., Opera, "Naughty Marietta," Municipal Opera Theater.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, The Inland Electric Co.; Wendell W. Hall, KYW's Music Maker; 10:00-1:00 A. M., Midnight Revue.
WBAA (Central, 360), 7:15 P. M., Educational lecture, "Certification of Seed Wheat," W. A. Ostrander.
WBAP (Central, 476), 9:30-10:00 P. M., Fifty Year Jubilee Pageant program.
WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital and short talks; 4:30-6:00 P. M., Talk, on "Affairs of the Heart," Betsy Logan; Stories for little tots, Dream Daddy; 7:30-8:00 P. M., Dream Daddy with the boys and girls; 8:00-12:00 P. M., Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Jeremiah, the Prophet of Courage," Dr. Robt. Stewart Hyer; 8:30-9:30 P. M., Musical program, Methodist Episcopal Church Orchestra.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:00 P. M., Song recital; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue.
WGI (Eastern, 360), 3:00 P. M., Amrad Women's Club; Address, Miss D. H. Goodwin; 5:00 P. M., Girls Story Hour, Irene H. Veno; 9:30 P. M., "Silversmith Series," David M. Cheney; Concert, Amrad Quartet;

(Continued on page 9)



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How to Make One Condenser Flivver Super Set

Part V—Operating Kinks; Troubles; Conclusion

By E. T. Flewelling

MR. FLEWELLING ends his series with the following article. However, he has volunteered to answer each week the best Flewelling super question addressed him in care of the Digest. In this manner he hopes to put to end some of the troubles Radiophans have encountered in experimenting with his excellent, but critical, circuit. The weekly Flewelling question and answer will be given a special department outside of the usual questions and answers.

IN this, I believe, the last article of our series on the one condenser Flewelling Super, I am going to try to describe the best method of operating the set and also try to show the method that I have found best to use in order to get the set to operate in the beginning. From the letters received we must form the opinion that many fans are operating a Flewelling without any "soup" in it.

Power of Amplification

The "soup" or extraordinary power of amplification in the Flewelling comes from a blocking and freeing of the action of the vacuum tube working in conjunction with a charge and discharge ripple from the .006 mfd. condenser in the circuit. This action results in the high pitch whistle in the phones that we have so often mentioned. Unless this whistle is evident you may be sure that you are not getting proper results from your set. Knowing this then, we had best show how to put our set in this condition.

First look at the diagram and note the two points at the input side of the set, marked A and B. This diagram shows the wiring of a set that may be used either as a Flewelling super or as a straight regenerative set. As we are concerned for the moment with the Super part let us consider this side of the set first.

Super Action in Set

Place the 2-point switch on the point marked X, that is, to the connection that runs to a point between the phones and the inductance L-2, or tickler coil. This completes the super diagram and leaves condenser C-3 in its operating position. Now (and this is the most important thing that I can say to those that are trying to get a Flewelling to operate) *do not connect the set to any antenna or ground whatever, while you are testing it for the super action.* Once you have heard the whistle you will always remember it. This statement applies to either of the types of super that we have discussed, do not, until after you have heard the whistle, connect the set to anything but its own batteries and phones. Light the tube to full brilliancy and connect the B battery. As the connection is made, you should hear a sharp click in the phones. If you do not, reverse the leads to the B battery and if the click is not then heard you may be sure that you are wrong somewhere and connections should be entirely checked up.

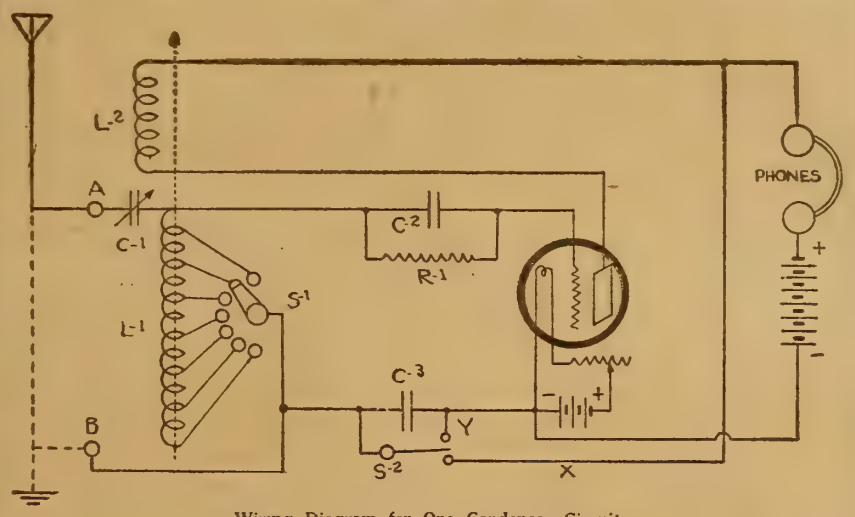
Finding the Whistle

Granted that the click is heard we may proceed. Loosen the coupling between coils L-1 and L-2. In the honeycomb coil type this means that the coils should be spaced about 1 to 2 inches apart. In the receiver we are discussing, the ball should be at about a one quarter turn position. Next slowly (emphasis on slowly) turn the variable condenser from its zero position to full value. If the whistle is then heard you may skip reading the next paragraph, but if it is not heard you have two more things to check.

Leaving the coils as they were, slowly move the variable grid leak from its zero point to its full capacity and if no whistle results somewhere in its travel you may be positively sure of where to locate the trouble. Either your set is wired incorrectly or the polarity of the tickler coil is such that the coil is working against instead of with, the inductance coil L-1. It is then simply a question of reversing the tickler coil, or finding the incorrect wiring in the set. For the above tests on the honeycomb coil type of set you are sure that you have the correct values of inductance. On the variable inductance that we are using in this set, however, some difficulty may be had with this point and I would suggest that you try the tests with the tap switch on one of the intermediate points, such as 3 to 5.

Variable Tuning Condenser

Now this set has the variable tuning condenser connected in series with the inductance and the energy collector, as the ground or antenna when they are used. When they are not used the condenser has but little value in the circuit as it is shown, but we can secure the full value of it by either of two methods. If we connect post A with the post marked B you can see that the condenser is then in multiple with the inductance and can then be used for tuning. Our other way out is to connect the post marked A to a short length of wire. This wire may run from 3 to 5 feet long up to a regular antenna, or it may be substituted for by any metallic object at hand. In other words, if you do not wish, or it is inconvenient, to use an antenna, then connect the post marked A to anything that is handy that you think might conduct a Radio wave to the set. Start in with the smaller objects first and then you will be able to follow the action and see when your energy collector is too large for your setting.



Wiring Diagram for One Condenser Circuit

Controlling the Whistle

The great point about the above is that your set should whistle and you should be able to control the whistle, and you will more likely learn how this is done if you start with the set itself before it is connected to anything. Watch, too, that the whistle is neither too loud nor too soft and this can best be judged by variation of the grid leak while listening to a station. Note also that once you have tuned a station with the grid leak that it should not be necessary to change the leak after that for other stations.

Having shown how to check the whistle of the set we can refer to another sound that should be heard. As the tuning is varied you should hear a sound like tearing of cloth. The ordinary regenerator gives this sound as a sort of hiss. The super gives it more like the coal man putting a ton of good hard coal into your cellar. If you are tuning your station through this noise you certainly will know what "noisy reception" means, but it is not necessary to do so. The station will come in just on the edge of this noise, or just as the noise is beginning.

The noise is entirely absent on local stations and enters into the scheme of things in direct proportion as such difficulties as lack of energy collector, static, distance or other obstacles present themselves.

Selectivity

A statement that the Flewelling circuit is not selective, is sure evidence that the person is not correctly operating the set. We are all willing to admit that the use of a vernier condenser adds nothing to the efficiency of a Radio circuit, yet the writer has consistently advised the use of one with the super. The answer is that the set tunes so sharply that even experienced Radio operators will go right past a station without knowing that it is there, while tuning as they ordinarily do. One must, while tuning this set, use extreme care and move the controls very slowly. This is not a hardship with this set because there are but two controls, the variable condenser and the tickler.

When used as a super the tube is at full brilliancy and neither the rheostat nor the polarity of the A battery are of any interest to us. The B battery voltage will be as high as your tube will stand for the super, and should be cut down to the average normal value when the set is used as a straight regenerator.

When using the set you may if you wish, use both antenna and ground in the usual manner either with or without the super. This is purely a matter of personal preference or convenience.

Locals Not Much Louder

Before closing the series I would like to bring out one point. If the super is used correctly you need expect not much greater results on local stations than a good regenerative set will give you. This can easily be checked with this set by changing from one set to the other. On the other hand, however, the super has a distinct field of its own. That it is with a weak signal, one that the plain set could not detect at all.

Perhaps the best way to find out if your super is up to normal is to check it up with a weak signal. If the set is operating correctly you should be able, without antenna or ground of any kind, hear a station if it is within 20 miles. This, during the daytime. At night conditions are very much better and we have received letters claiming reception of 500 to 1,000 miles. The writer believes this last to be more or less freak reception although he has himself done it, but it will show that there is at least the possibility of bringing the distant fellow if you handle the set correctly. Of course, things are considerably easier if the set is working on an antenna or a ground. In such a case you should, without trouble, consistently operate over distances of 1,000 to 1,500 miles and more.

(THE END.)

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AS6, San Antonio, Tex. 360 meters. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.
AV7, St. Paul, Minn. 400 meters. 500 mi. 6th Inf. Minn. Nat'l Guard, St. Paul Armory. Daily ex Sun, 2-2:30 pm, music, announcements. Tues, 8:30-10 pm. Thurs, 8:30-9:15 pm. Central.
BEI, Tacoma, Wash. 400 meters. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Sat, Sun, 6-7 pm, music, announcements, lectures. Pacific.
CFAC, Calgary, Alta., Can. 430 meters. 1,000 mi. Western Radio Co., Ltd. (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 meters. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 5:45-7:20, 7:45-8:45 pm, concert. Eastern Daylight Saving.
CFCB, Vancouver, B. C., Can. 440 meters. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.
CFCE, Halifax, N. S., Can. 440 meters. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Monday, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. 400 meters. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.
CFCK, Edmonton, Alta., Can. 410 meters. Radio Supply Co. Daily ex Sun, 8-8:30 pm, music. Sun, 3:30-4:30 pm, Concert. Mountain.
CFCN, Calgary, Alta., Can. 275, 440 meters. 1,500 mi. W. W. Grant Radio Ltd. Wed, Sat, 10:30-11:30 pm, dance music. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.
CFCX, London, Ont., Can. The London Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Can. Marconi Co. No regular program.
CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Motreal, Que., Can. B. L. Silver.
CHYC, Montreal, Que., Can. Northern Elec. Co.
CHXC, Ottawa, Ont., Can. 450 meters. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.
CJBC, Montreal, Que., Can. 420 meters. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.
CJCA, Edmonton, Alta., Can. 450 meters. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour. 8:30-9:30 pm, concert, reports. Mountain.
CJCB, Nelson, B. C., Can. 400 meters. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 meters. 200 mi. T. Eaton Co., No regular program.
CJCE, Vancouver, B. C., Can. 420 meters. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 meters. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 meters. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
CJNC, Winnipeg, Man., Can. 400 meters. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm, Fri, 8-10. Alternate Sun, 8:30-10 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram. Licensed only.
CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily ex Sun, 2 pm, 3:30, weather, news, markets. 5-5:15, music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-10 concert, Sun 4-5:30 pm, music. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music, Tues, 7:30-9 concert. Sun, 9 pm, sacred concert. Mountain.
CKCR, St. John, N. B., Can. 400 meters. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.
CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.
CKOC, Hamilton, Ont., Can. 410 meters. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 meters. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKY, Winnipeg, Man., Can. 450 meters. 500 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-1:30 pm, news, music; 1:45-2:00 pm, markets. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DD5, Denver, Colo. 360 meters. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.
DM4, San Antonio, Tex. 360 meters. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.
DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDKA, E. Pittsburgh, Pa. 360 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news features, markets, concert; 9:55-10, time. Sun 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern.
KDN, San Francisco, Calif. 360 meters. 500 mi. Leo J. Meyberg Co. Daily, 1-2 pm, 8:30-9, 4:30-5:30, 7-7:15, music, reports, concert. Pacific.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. 270 meters. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 360 meters. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.
KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.
KDYM, San Diego, Calif. 360 meters. Savoy Theater.
KDYQ, Portland, Ore. 360 meters. 200 mi. Oregon Institute of Technology. Tues, 9-10 pm, educational lectures, music. Pacific.
KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.
KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Huches & Co. Daily ex Sat, 7-7:30 pm. Mountain.
KDYX, Honolulu, T. H., Hawaii. 360 meters. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.
KDZB, Bakersfield, Calif. 360 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.
KDZE, Seattle, Wash. 360 meters. 500 mi. The Rhodes Co. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.
KDZF, Los Angeles, Calif. 360 meters. Automobile Club of Southern California.
KDZG, San Francisco, Calif. 360 meters. Cyrus Pierce & Co.
KDZI, Wenatchee, Wash. 360 meters. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.
KDZK, Reno, Nev. 360 meters. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal). Wed, Fri, 7-8 pm. Pacific.
KDZQ, Denver, Colo. 360 meters. Pyle & Nichols.
KDZR, Bellingham, Wash. 261 meters. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZT, Seattle, Wash. 360 meters. Seattle Radio Assn.
KFAD, Phoenix, Ariz. 360 meters. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock reports. Mountain.
KFAE, Pullman, Wash. 360 meters. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.
KFAF, Denver, Colo. 360 meters. 1,500 mi. Western Radio Corp. Slogan, "Voice from the Rockies—Out Where the West Is." Daily ex Wed and Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 360 meters. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Ida. 360 meters. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.
KFAP, Butte, Mont. 360 meters. Standard Pub. Co.
KFAQ, San Jose, Calif. 360 meters. City of San Jose.
KFAR, Hollywood, Calif. 360 meters. Studio Lighting Service Co.
KFAT, Eugene, Ore. 360 meters. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Sun, 8:30-9:15 pm, church service. Pacific.
KFAU, Boise, Ida. 360 meters. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.
KFAV, Venice, Calif. 360 meters. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.
KFAW, Santa Ana, Calif. 360 meters. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.
KFAY, Medford, Ore. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.
KFAZ, Reedley, Calif. 360 meters. 200 mi. C. H. T. Weatherill. Daily ex Sun, 9-9:15 pm, reports, news. Pacific.
KFDF, Casper, Wyo. 360 meters. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.
KFDH, Tucson, Ariz. 360 meters. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.
KFDJ, Corvallis, Ore. 360 meters. Oregon Agri. College.
KFDL, Denver, Colo. 360 meters. Knight-Campbell Music Co.
KFDO, Bozeman, Mont. 360 meters. H. Everett Cutting.
KFDP, Des Moines, Iowa. 278 meters. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3-3:45 pm, reports, music. Mon, 9-11 pm, music. Thurs, 9-11 pm, music, entertainment. Central.
KFDR, York, Neb. 360 meters. Bullock's.
KFDS, San Francisco, Calif. 360 meters. John D. McKee.
KFDU, Lincoln, Neb. 360 meters. Neb. Radio Elec. Co.
KFDV, Fayetteville, Ark. 360 meters. Gilbrech & Stinson.
KFDX, Shreveport, La. 360 meters. First Baptist Church.
KFDY, Brookings, S. D. 360 meters. S. D. State College of Agri. & Mech. Arts.
KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.
KFEB, Taft, Calif., 360 meters. 200 mi. City of Taft. Mon, Wed, Fri, 6:15-7 pm, music, news. Pacific.
KFEC, Portland, Ore. 360 meters. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, weather, reports; 4-5 pm, music; 6:30 pm, markets, reports. Thurs, 9-10 pm, concert. Sat, 11 am 12 m, children's hour. Pacific.
KFEJ, Tacoma, Wash. 360 meters. Guy Greason.
KFEL, Denver, Colo. 360 meters. Winner Radio Corp. Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4 pm, music. Mon, Fri, 9-10 pm, 12-1 am, concerts. Sun, 9-10 am, church services. Mountain.
KFEP, Denver, Colo. 240 meters. Radio Equipment Co.
KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.
KFER, Fort Dodge, Ia. 231 meters. Auto Electric Service Co.
KFEV, Douglas, Wyo. 360 meters. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.
KFEX, Minneapolis, Minn. 261 meters. Augsburg Seminary.
KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.
KFEZ, St. Louis, Mo. 360 meters. American Society of Mech. Engrs.
KFFA, San Diego, Calif. 242 meters. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.
KFFB, Boise, Ida. 360 meters. 70 mi. Jenkins Furn. Co. (Owyhee Hotel). Daily, 8-9 pm, concert. Mountain.
KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.
KFFO, Hillsboro, Ore. 360 meters. Dr. E. H. Smith.
KFFP, Moberly, Mo. 275 meters. First Baptist Church.
KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Marksheffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.
KFFR, Sparks, Nev. 360 meters. Jim Kirk.
KFFV, Lamoni, Ia. 360 meters. Graceland College.
KFFX, Omaha, Nebr. 278 meters. The McGraw Co.
KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.
KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes Amusement Co.
KFGB, Pueblo, Colo. 360 meters. Lowenthal Bros.
KFGC, Baton Rouge, La. 254 meters. Louisiana State University. No regular schedule.
KFGD, Chickasha, Okla. 360 meters. Chickasha Radio & Elec. Co.
KFGF, Mt. Vernon, Wash. 360 meters. 50 mi. Buchanan, Stevens & Co. Daily ex Sun, 4:30-5:30 pm. Mon, Wed, Fri, 7-9 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Sun, 2-3 pm. Pacific.
KFGH, Stanford Univ., Calif. 360 meters. 500 mi Leland Stanford Junior University. No regular schedule.
KFGJ, St. Louis, Mo. 266 meters. National Guards Missouri.
KFGL, Arlington, Ore. 234 meters. Arlington Garage.
KFGM, Abilene, Tex. 233 meters. Abilene Daily Reporter.
KFGP, Cheney, Kans. 229 meters. Cheney Radio Co.
KFGQ, Boone, Ia. 226 meters. Crary Hardware Co.
KFGV, Utica, Nebr. 224 meters. Reidbreder Radio Supply Co.
KFGX, Orange, Tex. 250 meters. First Presbyterian Church. Sun, 11 am, 7:30 pm, church services. Central.
KFGY, Baudette, Minn. 224 meters. Gjelhaug's Radio Shop.
KFGZ, Berrien Springs, Mich. 268 meters. Emanuel Missionary College.
KFHA, Gunnison, Colo. 360 meters. Colorado State
KFHB, Hood River, Ore. 280 meters. P. L. Boardwell. Normal School.
KFHC, Norman, Okla. 254 meters. Univ. of Oklahoma.
KFHD, St. Joseph, Mo. 226 meters. Utz Electric Co. Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat, 8-9:30 pm, concert. Central.
KFHF, Shreveport, La. 266 meters. Central Christian Church.
KFHH, Neah Bay, Wash. 283 meters. Ambrose A. McCue.
KFHI, Wichita, Kans. 224 meters. Charles V. Dixon.
KFHJ, Santa Barbara, Calif. 360 meters. Fallon Company.
KFHL, Oskaloosa, Ia. 227 meters. Penn College.
KFHP, Kearney, Neb. 246 meters. Radio Bug Products Co.
KFHR, Seattle, Wash. 360 meters. Star Elec. & Radio Co.
KFI, Los Angeles, Calif. 360 meters. 469 meters. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.
KFIB, St. Louis, Mo. 244 meters. Franklin W. Jenkens.
KFIC, Denver, Colo. 224 meters. Phillip Laskowitz.
KFID, Iola, Kans. 246 meters. Ross Arbuckles Garage.
KFIF, Portland, Ore. 360 meters. Benson Tech. Student Body.
KFIQ, Yakima, Wash. 224 meters. 200 mi. Yakima Valley Broadcasting Assn. Slogan, "The Station That Will Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Fri, 8-9 pm, concert. Pacific.
KFV, Yakima, Wash. 360 meters. 250 mi. Foster-Bradbury Radio Store. Daily ex Sun, 3-4 pm. Mon, Fri, 8-9 pm. Pacific.
KFZ, Spokane, Wash. 250 meters. 300 mi. Doerr-Mitchell Elec. Co. Tues, Fri, 7:30-9 pm, music. Sun, 6-7 pm. Pacific.
KGB, Tacoma, Wash. 360 meters. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.
KGG, Portland, Ore. 360 meters. 500 mi. Hallock & Watson Radio Service. Daily ex Sun, 5-6 pm, music, entertainment. 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.
KGN, Portland, Ore. 360 meters. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 360 meters. 300 mi. Altadena Radio Lab. No regular schedule.
KGU, Honolulu, Hawaii. 360 meters. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm, Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 492 meters. 1,500 mi. Oregonian Pub. Co. Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30, weather. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 11-12 pm, Hoot Owls. Fri, 7-7:30 pm, lecture. Sun, 7-8 pm, concert. Pacific.
KGY, Lacey, Wash. 258 meters. 250 mi. St. Martins College, Tues, Fri, Sun, 8:30-9:30 pm, news, concert, lecture, bedtime story. Pacific.
KHJ, Los Angeles, Calif. 395 meters. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific.
KHQ, Seattle, Wash. 360 meters. Louis Wasmer.
KJJ, Sunnyvale, Calif. 360 meters. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.
KJQ, Stockton, Calif. 360 meters. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.
KJR, Seattle, Wash. 270 meters. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.
KJS, Los Angeles, Calif. 360 meters. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30 pm, 6-6:45, 8-9, church services. Pacific.
KLN, Del Monte, Calif. 360 meters. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Tues, Fri, 7-7:30 pm, 8-8:30, concert. Pacific.
KLS, Oakland, Calif. 360 meters. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm. Sun, 12-1 pm. Pacific.
KLX, Oakland, Calif. 360 meters. 500 mi. Oakland Tribune. Daily ex Sun, 3:15-5:15 pm, sports; 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.
KLZ, Denver, Colo. 360 meters. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.
KMJ, Fresno, Calif. 360 meters. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.
KMO, Tacoma, Wash. 360 meters. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7 pm, 9:15-10, concert, news, lecture. Pacific.
KNI, Eureka, Calif. 360 meters. T. W. Smith.
KNJ, Roswell, New Mex. 360 meters. Temporarily discontinued.
KNN, Los Angeles, Calif. 360 meters. 100 mi. Bullock's. Temporarily discontinued.
KNT, Aberdeen, Wash. 263 meters. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert. Pacific.
KNV, Los Angeles, Calif. 360 meters. Radio Supply Co.
KNX, Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.
KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.
KOP, Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.
KPO, San Francisco, Calif. 423 meters. 1,500 mi. Hale Bros., Inc. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sat, 3-4:30 pm. Sun, 11-12:30 pm, church services. Pacific.
KQI, Berkeley, Calif. 360 meters. Univ. of Calif.
KQP, Hood River, Ore. 360 meters. Apple City Radio Club.
KQV, Pittsburgh, Pa. 360 meters. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.
KQW, San Jose, Calif. 360 meters. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed. 8-9 pm, concert. Pacific.
KRE, Berkeley, Calif. 360 meters. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.
KSD, St. Louis, Mo. 546 meters. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Fri, 11:30 pm, concerts. Central.
KSL, San Francisco, Calif. 360 meters. 50 mi. The Emporium. Temporarily discontinued.
KSS, Long Beach, Calif. 360 meters. Prest & Dean Radio Co. No regular schedule.
KTW, Seattle, Wash. 360 meters. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.
KUO, San Francisco, Calif. 360 meters. 1,500 mi. San Francisco Examiner. Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 n, 6:45 pm, weather reports. Sun, 9-10 am, 5-6, news. Pacific.
KUS, Los Angeles, Calif. 360 meters. 300 mi. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.
KUY, El Monte, Calif. 360 meters. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.
KWG, Stockton, Calif. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.
KWH, Los Angeles, Calif. 360 meters. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.
KXD, Modesto, Calif. 360 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.
KYI, Bakersfield, Calif. 360 meters. Bakersfield Californian.
KYQ, Honolulu, Hawaii. 360 meters. Electric Shop. No definite schedule.

(NOTE—The second part of the station schedule list will appear next week.)

Serially Continuously—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one third appearing this week, the second third to appear next week, and the last part, together with the state, city, station index, to appear the week following.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last third of the station schedules and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KFBB, Havre, Mont. 360 meters. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.
KFBC, San Diego, Calif. 360 meters. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.
KFBD, Hanford, Calif. 360 meters. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.
KFBE, San Luis Obispo, Calif. 360 meters. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.
KFBG, Tacoma, Wash. 360 meters. First Presbyterian Church.
KFBH, Marshfield, Ore. 360 meters. Thomas Musical Co.
KFBK, Sacramento, Calif. 360 meters. 300 mi. Kimball-Upson Co. Daily ex Sun, 6-6:45 pm, concert, news, codes. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.
KFBL, Everett, Wash. 360 meters. Leesee Bros.
KFBS, Trinidad, Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. 360 meters. Bishop N. S. Thomas.
KFCB, Phoenix, Ariz. 360 meters. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.
KFCD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.
KFCF, Walla Walla, Wash. 360 meters. Frank A. Moore.
KFCH, Billings, Mont. 360 meters. 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. 360 meters. Colorado Springs Radio Co.
KFCL, Los Angeles, Calif. 360 meters. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.
KFCM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Daily ex Sun, 1-2 pm, music. Tues, Fri, 8-9 pm, music. Pacific.
KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare.
KFCQ, Casper, Wyo. 360 meters. Motor Service Stn.
KFCV, Houston, Tex. 360 meters. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, church services. Central.
KFCY, Le Mars, Ia. 360 meters. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.
KFCZ, Omaha, Neb. 360 meters. Omaha Central H. S.
KFDA, Baker, Ore. 360 meters. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFDB, San Francisco, Calif. 509 meters. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures, concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories. Pacific.
KFDC, Spokane, Wash. 360 meters. 25 mi. E. B. Craney. Mon, Wed, Fri, Sat, 7:30-9 pm. Wed, Sat, 3-3:30 pm. Pacific.
KFDD, Boise, Idaho. 360 meters. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

ADVANCE PROGRAMS

(Continued from page 6)

Concert, Vreeland Mandolin Orchestra.

WGY (Eastern, 380), 5:30 P. M., Special children's program, "The Kewpie Doll," Anita and Jean Williams; "The Family Picnic," Jean Williams; "Sunny Jim," Jean and Anita Williams; "The Ginger Bread Man," Jean Williams; 7:45 P. M., Musical program: "Invictus," "On the Water," MacGregor Male Chorus; "Forgetting," Marion Fraisier, tenor; "Their Only Child," Mrs. Frank Benford, reader; "Macushla," "Barcarolle," Male Chorus; "The Bitterness of Love," Eleanore L. Hillebrand, soprano; "Light," John Morris, baritone; "He Found It," "Lament in A Flat," Male Octette; "Dream Longing," Edward Vines, tenor; "Swing Along," "Deep River," "Mother o' Mine," James A. Long; "Ma Curley Headed Baby," "The Little Damozel," Eleanore Hillebrand; "Gypsy Trail," "Ford Song," Howard Balch and Chorus; "Surprising Eliza," Mrs. Frank Benford, reader; "My Lady," George Raymond, tenor; "Old Black Joe," "The Rosary," "The Cossack," "I'se Gwine Back to Dixie," Chorus; 10:30 P. M., Musical program, "Le Rossignol," Earl Rice, pianist; "The Star," Clara Habel, contralto; "Prelude," American Trio; "Learning to Drive," Helen Zander, reader; "Extase," Ernest Burleigh, cellist; "By the Waters of Minnetonka," Clara Hebel, contralto; "Minuet," American Trio; "So Was I," Helen Zander; "From the Canebrake," Edward A. Rice, violinist; "Mighty Lak a Rose," Clara Habel; "Romance," American Trio; "Descended from Christofo Colombo," Helen Zander; "Chanson Sans Paroles," WGY Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Victor Rudolph Orchestra.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner music; 3:00-4:00 P. M., musical program; 6:00-7:30 P. M., dinner dance music; Bedtime stories by Uncle Wip.

WMAQ (Central, Daylight Saving, 447), 4:35 P. M., Musical program, Pupils of Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Marx E. Oberndorfer; Children's Stories, Marie Spears; 9:15 P. M., Musical program, Leo Deegan, tenor.

WMC (Central, 500), 8:00 P. M., Concert, Hotel Gayoso Orchestra, Gaspar Pappalardo, director; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital and trumpets; 7:30-8:00 P. M., Sports results and news dispatches; 8:00-9:00 P. M., WOO Orchestra, Robert E. Golden, director and violin soloist; 9:00-10:00 P. M., Organ recital, Clarence E. Bawden, organist; 10:00-10:55 P. M., Dance music, Hotel Adelphia Dance Orchestra.

WWJ (Eastern, 580), 12:05 P. M., Orchestra; 7:00 P. M., Orchestra; Jessie Phylis Kopatz, soprano; Mildred Seeman, pianist.

Saturday, June 2

KSD (Central, 546), 3:00 P. M., Concert, Dorothy Corkins, vocalist and reader; W. J. Forestel, Jr., reader; Esther Portman, pianist; 8:00 P. M., Concert, orchestra; Solos, Missouri Theatre talent; 11:30 P. M., Organ recital, Stuart Barrie.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Helen Engelke, soprano; Henry E. Nieman, accompanist; Mildred Bragdon, reader; Paula and Polly, Parrot Act; Robert G. Ball, baritone; Gertrude Grosscup Perkins, accompanist.

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum, First Methodist Church.

WDAR (Eastern, Daylight Saving, 395), 11:00 A. M.-1:00 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Dream Daddy with little tots; 7:30-8:00 P. M., Dream Daddy with the boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton; 8:30-9:30 P. M., Musical program, James G. Bennett, basso; Mrs. James G. Bennett, contralto; Dr. J. J. Simmons, reader; 11:00-12:00 P. M., Violin and piano recital, Walter J. Fried, Mrs. W. J. Fried, Paul Van Katwijk, of Southern Methodist University department of music.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00-4:30 P. M., Musical program and song recital; 6:00-7:30 P. M., Dinner dance music Meyer Davis Bellevue Stratford Orchestra; Safety talks, Stanley Cowman; 8:00-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, 360), 8:00 P. M., Talk, "New England Problems," New England Business Magazine; Music; Comedy-drama, "Barbara Makes Her Splash," Amrad Players.

WGY (Eastern, 380), 7:00 P. M., Address, "League of Nations," Justice John H. Clarke, U. S. Supreme Court.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Roy C. Parks, organist; 7:30-9:00 P. M., Concert, Mme. Cara Sapin in charge.

WIP (Eastern, Daylight Saving, 509), 10:00-11:00 A. M., Short talks; 1:00-2:00 P. M., Dinner Music; 3:00-4:00 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Musical program, Charlie Kerr's Cafe L'Aiglon Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Musical program, Sackett-Ryan Concert Company; 9:15 P. M., Band concert.

WMC (Central, 500), 8:00 P. M., Concert arranged by Woodmen of the World.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital; 7:30-8:00 P. M., Baseball scores and news dispatches.

WWJ (Eastern, 580), 12:05 P. M., News Orchestra.

Sunday, June 3

KPO (Pacific, 423), 11:00-12:15 P. M., Organ recital, Gladys Salisbury; Readings for shut-ins; Talk by local clergyman.

WBAP (Central, 476), 11:00 A. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor, Will Foster, organist.

WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. Wm. M. Anderson, Jr., First Presbyterian Church; 9:30-10:30 P. M., Recital, Sacred music, singers from Gaston Avenue Baptist Church Choir; 10:30-11:00, Dizzy Four Orchestra.

WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Chapel services; 7:30 P. M., Church services, Arch Street Presbyterian Church; Sermon, Reverend Clarence E. Macartney; Organ recital, Alton K. Dougherty, organist; 9:30 P. M., Organ recital.

WGI (Eastern, 360), 4:00 P. M., "Adventure Hour," Youth's Companion; Concert, The Walter Francis Vreeland Mandolin Orchestra; Selections, C. Fay Fleetwood, pianist; 8:30 P. M., Federation Church Service; 9:00 P. M., Concert, Henry R. Boardman, W. D. Strong, pianists.

WGY (Eastern, 380), 10:30 A. M., Church services, St. George Episcopal Church, Schenectady, N. Y.; Sermon, "Do Christians Really Know Christ?" Rev. B. W. R. Tayler, D.D.; 6:30 P. M., Church services, St. George Episcopal Church; Sermon, "The One Who Knows Us," Rev. B. W. R. Tayler.

WHAS (Central, 400), 9:57 A. M., Organ; 10:00 A. M., Church service, Fourth Avenue Presbyterian Church, Rev. Dr. Chas. W. Welch; Wm. E. Conen, organist; Mrs. Newton G. Crawford, soprano; Mrs. Virginia Shafer Herrick, contralto; H. Archer Culmer, tenor; Peter Schlicht, baritone; 4:00-5:00 P. M., Concert, Mrs. Jane Webster Murrell; Lucile Schneider, Bernice Funk, Mrs. William Herman, Mrs. A. W. Ott, sopranos; Misses Josephine Miller, Ione Hoover, contraltos; Albert Peterson, tenor; Mary Agness Ott, violinist.

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, Daylight Saving, 509), 11:00 A. M., Church services, Holy Trinity Memorial Chapel, B. Janney Rudderow, minister; Ernest Felix Potter, organist and choir leader, chorus of male voices; 2:00-3:30 P. M., Musical program.

WLW (Eastern, 360), 11:00 A. M., Church services, Church of the Covenant.

WWJ (Eastern, 580), 11:00 A. M., Church services, St. Paul's Cathedral; 4:00 P. M., News Orchestra.

Monday, June 4

WBAA (Central, 360), 7:15 P. M., Purdue news of the Week; Educational lecture.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Orchestra.

WDAR (Eastern, Daylight Saving, 395), 11:00-1:00 P. M., Organ recital, Stanley theatre; Dinner dance music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Short talks; Musical selections; Dream Daddy with the little tots; 7:30-8:00 P. M., Dream Daddy with the boys and Girls; 8:00-12:00 P. M., Musical program; Dance music, Arcadia Cafe Orchestra; Songs by Harry Glyn.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00-4:30 P. M., Short talks and song recital; 6:00-7:30 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; Stories, Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Musical program; "Idyl," WGY Instrumental Quartet; "Trick versus Trick," Mrs. Ralph A. Garrison, reader; "Fancy," WGY Quartet; "A Birthday," Sadie Gingold, soprano; Address, "Drug Addiction—An International Menace," James A. Hamilton, Secretary of State of New York; "Allegro," String Trio; "Mary Cary," Mrs. Ralph A. Garrison; "To a Wild Rose," Ernest Burleigh, cellist; "When Song Is Sweet," Sadie Gingold; "Mr. Brown Has His Hair Cut," Mrs. Ralph Garrison; "My Heart at Thy Sweet Voice," Sadie Gingold; "Cuban Dance," WGY Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; Roy C. Parks, Rialto Theatre Organist.

WIP (Eastern, Daylight Saving, 509), 10:00-11:00 A. M., Short talks; 1:00-2:00 P. M., Dinner music; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip.

WLW (Eastern, 360), 8:00 P. M., Musical program, "The Ambassador," "Magnolia Blossom," Mount Auburn School Orchestra, A. R. Kratz, director; Duet, Lockwood Doench, Ruby Doench, violinists; "An Irish Love Song," "A Thought," "Spring Fancy," Mrs. Neil Wright, soprano; "Desert Caravan," "Autumnal Days," "Orchestra; S. A. I. Trio, Lucy R. McKeever, violinist, Corrine Sammet, saxophonist, Francis Bejach, pianist; "Burlesca," Olive Terry, pianist; "Souvenir," "Guitarrero," Lucy R. McKeever, violinist; S. A. I. Trio; Chopin group, Olive Terry, pianist; Compositions by Burleigh, Lucy R. McKeever, violinist; S. A. I. Trio.

WMC (Central, 500), 8:00 P. M., Concert, Washington Syncopators, H. H. Guinett, director.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital; 7:30-7:45 P. M., Sports results and news dispatches; 7:45-8:45 P. M., Concert, John Wanamaker Commercial Institute Band, Arthur A. Rosander, conductor; 8:45-9:30 P. M., Musical program; 9:30-10:55 P. M., Organ recital, Clarence Bawden, organist.

Reviews of Books

Radio Telephony. By Alfred N. Goldsmith, Ph. D. This book is intended for Radio engineers, operators and experimenters. Students and other who desire to be clearly informed concerning Radio need this book. It is written in a clear style, fully illustrated with wiring diagrams and photographs of Radio apparatus. Price, $2.50.

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

SPECIAL REWARD OFFER

(Continued from page 2)

Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents $1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80) the following will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Democal Variable Condenser 11 Plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4).

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Master Baldwin Type C Headsets	6.95
Brandes Superior Headset	5.75
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WD-11 Bakelite Sockets	.50
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Rheostats	.45
Sponge Rubber Ear Caps, Pair	.50
Dials, 2, 3 and 3½ Inch	.25
Grewol Detectors	1.35
Signal Corps Super Sensitive Microphone Transmitters	2.45
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, June 2, 1923 No. 8

Secret Communication

Machine Reception Beats the Human Ear

BIG BUSINESS and other organizations will soon be sending their messages through the air with greater speed and secrecy than even their own private telegraph lines. The long expected system of secret and fast Radio communication is almost ready for general adoption. Tests made show that messages can be sent out faster than they can be typed by a competent stenographer. These messages are received with the same speed and a machine slows them down so that the typist may be able to copy them.

Now another step in the development of the device makes it unnecessary to slow them down, a machine sends and receives them in typewriting. More important, however, is secrecy. Large business firms have seen the practicability of interbranch Radio communication. Soon they will be using it to their advantage.

Ever Meet the Near Expert?

Meddlesome Parties Do Much Damage

AS A RULE everything goes along happily with the new Radio set until the near expert friend horns in. Having built a successful crystal set he feels qualified to advise the world.

If you have an adjustable grid leak on your set his fingers just itch to jiggle with it until it is hopelessly out of adjustment. Ofttimes, hearing that varying the plate voltage on the tube gives better results, he will bungle things until he gets the filament leads hooked up to the high voltage B battery and blow your tubes.

The wise Radio set owner never lets a novice monkey with it at all and plainly tells him to keep off. You know your outfit, or should at least, and know how to work it to get best results. It will function right if not tinkered with in an unintelligible manner. Beware of the near expert as you would smallpox.

Summer Boom Expected

Outlook Very Bright for Summer Reception

WHETHER the present boom in Radio business will keep up throughout the summer months depends largely on the attitude of the Radio manufacturers and the dealers themselves. There are many reasons why good business may be expected this summer. If there is a decrease in interest in Radio it need be only a slight one compared to the corresponding seasonal decrease in the phonograph business.

Radio has been until the past year an indoor sport. The usual apparatus is bulky and includes heavy storage batteries, and is difficult to move from indoors to outdoors to meet summer time conditions. The use to which an increasing number of people are putting Radio, that is, the day-by-day reception of broadcasting, makes the receiving appartus fill to an increasing extent a place in one's daily program which is quite similar to that of the phonograph. Dealers who make a specialty of complete Radio receiving sets appreciate that for many purposes a portable Radio set is as desirable as a small portable phonograph.

During the past year there have been two important things developed that brings Radio up to a level where it can be conveniently used out-of-doors. The dry battery tube and the loud speaker. It is quite possible now with the small portable sets to receive broadcasting while out camping, boating or on an automobile tour. It is a noteworthy fact that exploring parties now take Radio receiving sets with them for a dual purpose of furnishing amusement during the evening hours at camp and for receiving time signals with which to check their chronometers.

It must be conceded that transmission conditions are not as good in summer as in winter, but this need not interfere with good reception from local stations. Last year we had about 135 broadcasting stations and this year over 500 well distributed stations and it is quite possible to get reception in any section. About 95 per cent of the population is within 100 miles of a broadcasting station.

While this increase in the number of broadcasting stations in operation is an important factor in the Radio situation this year, a still more valuable factor from the viewpoint of the listener is the very notable improvement in the quality of broadcast programs.

RADIO INDI-GEST

CONTEST TO END

Contest letters are still coming in in our big $000,000,000,000.19 Cash Copper Contest and the judges swear they are going to strike on us if we do not close it soon. We have decided to close the contest and announce the winners in the issue of Indigest dated June 9. However you still have time to get your letter in. If you have not entered the contest—GET YOUR LETTER IN IN TIME TO GET IN THE JUNE 9 ISSUE. Below is a photo taken of two of the judges opening the mail.

When Pa Listens in

When Pa comes in, we kids sure scatter
Can't stay around at all, with out noise and clatter,
For when Pa listens in on our Radio,
Even Ma must whisper and act just so.

He fusses around turning each dial,
Gives each little knob and switch a trial,
Then settles back with a contented sigh
To listen to the jazz from W. O. A. I.

From the Red Apple Club and W. M. C.,
From the Merry Old Chief or W. D. T.,
Or the hired hand or Shut 'er down Ed,
Never moving except to smile or nod his head.

If old man Static should happen in, too,
We all know that trouble will sure brew,
He says the funniest things I ever heard,
But I can't understand, not even a word.

It's all about an aerial, a condenser and a ground,
And all he can get is that awful sound,
He even blames the fellow that lives close by,
Says when he tunes in he doesn't half try.

And so it goes on until way after two,
Then Pa retires just mad through and through,
He falls asleep wondering just what is wrong,
And hoping next time it will come in strong.

I wish the man that made the first Radio,
Had jumbled it up so it wouldn't ever go,
Then Pa would still be just one of the boys,
Instead of an old grouch that don't want no noise.
—I. M. HARNEY.

Absolutely. The Station Is Hanging New Wall Paper

Dear Indigestion: I know a fellow who has a friend who said he was fooling with the rheostat on his crystal set, after having disconnected the antenna, ground, batteries and loud speaker, and got Station AEIOU (and sometimes W and Y) in Kamtachatca, Mars. I say, 'taint true couse said station ain't operating no more on account of being remodelled and to prove it I showed him the "Advanced Programs" on page 8. Ain't I right? Yours until Niagra Falls. —Mike Rofrads.

Since printing the announcement of the Kink Department, in which we said Send A Dollar, we have received so many contributions with the dollar enclosed that we now have $0.04 as total collections from same. Our staff is working overtime to refund this money to the senders as we really did not mean for you to send them in. Indigest is supposed to be a funny column. Honest to goodness, we'll swear it. Don't take us so seriously. —Indi.

We Congratulate You

Dear Indi: Having read your article on the American Rum Running League I though I would try your plan out. I placed the faucet in the ground circuit and at once began to get some Wireless Raw Whiskey from WRW. This was too strong for me so I tried WHB and got some Wireless High Balls. I then tried for some Wireless Light Wines from WLW but there was so much Wild Orange Squeeze coming from WOS that the high balls were rather weak. I must have been a little tipsy then for I accidently tuned in KOP and one of them must of smelled my breath, because I'm writing from the jail. —Edward S. Pattison.
W.S.F.P. (Wireless Sets For Prisoners.)

Dear Indi: I have just built a ten-tube portable set with a two-ton motor generator in the cabinet. However I am having trouble with the howls of the tubes. Do you think I have been successful? —Polly W.
A.—Yes, by all means. Your set is a howling success.

Here lies the remains
Of Johnnie McHoltz.
He tried to grab hold
Of three thousand volts.

We Have Taken Steps to Stop It

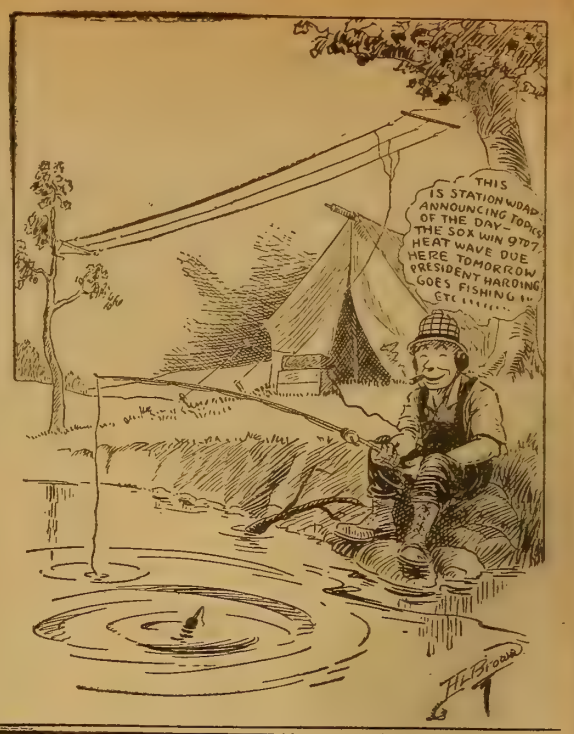
Dear Indi—In listening in on a recent program I heard the announcer say, "The next number will be when the leaves come tumbling down by request." I have been looking forward to spring and want to know if there is some way we can stop the Broadcasters changing the season. —I. M. Hart.

Your Dollar Was Excepted

Dear Indi: Your ishu of May 5 received and I see you are excepting good one dollar notes from anyone so foolish to send it with a kink that will prove bothersome to Radio-knuts. I have discovered that connecting a 45-volt B battery to the filament posts of a tube will quickly dispose of same. Some wise dummy named them "B Batteries" because this is one way you can get stung. —I. Amthick.
P. S. Enclosed try to find a dollar.

Looking Ahead

Indigest Is Going to Have a Broadcasting Station. We have the buildings built and the apparatus installed, all that is lacking is the antenna system and the interior decorators and paper-hangers are now at work on the finishing of this. As this goes to press a speeding airplane is on its way from the Pacific Coast with the latest pictures of the station and we are going to show them to you next week. Get INDIGEST from your most prosperous news dealers—10c—and read all about our new plant NEXT WEEK!



Condensed

By DIELECTRIC

We have been reading of "largest" stations for some time past, and they have been increasing in power right along, but now comes the station with power to transmit over a range of several thousand miles. This is to be built in Oakland, Cal., by the General Electric company and officials of the company claim it will have the most power of any station in the world. "More power to it."

Still another country is falling into line with the Radioized nations, which reduces the number of backward States in the world. This newest nation is Norway. It is planned to build three stations in Christiania, Trondhjem and Bergen so that Norway may keep in touch via Radio with the other broadcasting stations throughout the world. It will eventually be possible to talk from your room to ANY part of the civilized globe—and that isn't a pipe dream either.

No matter how fantastic the prophecy may seem to you at the moment depend on it most of them become realities. Many of the statements made but a short time ago were derided as "pipe dreams," yet in many cases we are witnessing the actual operation of the impossible. A Radio expert has said that within six months time anyone may talk from his home to parties in London or Paris by simply using the ordinary telephone and having his speech relayed by Radio to the other side.

You hear knowing ones who persist in telling you that this Radio stuff is all a fad and will die out in time. Well, don't dispute that point with them because it's true. In due season all things will come to an end, however, the fad part of it is pure buncombe. Every day it is being used in a business connection to disprove the idea of mere plaything. The city of Boston is getting ready to install Radio sets on the three fire boats kept in the harbor and the cost of so equipping them amounts to several thousand dollars.

Station KSD in St. Louis proposes to "show us" how to broadcast light opera now that the season of "heavy" opera is over. The Municipal Opera Company will have two of its evening performances sent out each week for the benefit of the regular Radio audiences of this popular station. Victor Herbert has the honor of having his opera "Naughty Marietta" open the season on the 28th of this month.

Since the new regulations with respect to broadcasting stations was determined upon there have been sixteen applicants for Class A licenses. These are pretty well scattered over the country, and while some of them are on the same wavelength such are not in one state or district, so do not conflict in the area in which they may best be heard. It is this feature of the new plan which augurs well for better reception by those anxious to hear stations in other states.

General Squier is ever on the alert to find new and better means of sending and receiving Radio signals. It is safe to say that few men active in this branch of science are giving more time than he to certain details which may result in a great saving of time and money. The plan which he has presented for a universal code would, if adopted, save many costly hours under the present system of pauses.

Those holding copyrights to certain musical compositions in this country have shown a jealousy as regards the general use of said music with a tendency well known to us all. In France it is reported a musical performance could not proceed until the musicians were assured no transmitting outfit could be used in the opera house. One famous opera singer complained of the very small remuneration he was to receive for singing in a studio, and insisted the public who could hear via Radio would never pay the price to come to the opera house to both see and hear him. I believe

First Steps for Beginners in Radio

Chapter IV—About Condensers and Inductances

By Thomas W. Benson, A. M. I. R. E.

A CONDENSER is simply a device that possesses the ability to store electrical charges. It consists of two conductors placed close together but separated by some insulating medium termed the dielectric. Thus any two conductors between which there exists a difference of potential acts as a condenser and they possess capacity or the power to store an electric charge.

Capacity of a Condenser

There are a number of conditions that determine the capacity of a condenser or the amount of current it will store. Thus the closer the plates are together the greater will be the capacity and likewise the greater the area of the plates, the greater the capacity. We find also that the insulating medium or dielectric between the plates has a great effect upon

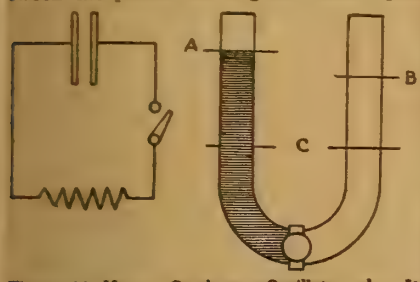


Figure 14—How a Condenser Oscillates when It Is Discharged

the capacity of a condenser. For the sake of comparison air is taken as unity or one and all other dielectrics are measured from that base. This property is termed the specific inductive capacity of the substance, the following table giving the more common insulators and their inductive capacity:

Plate Glass	8
Window Glass	5
Paraffin Wax	2
Shellac	3
Sulphur	3
Mica	5

It should be clear that if two plates a certain distance apart in air have a certain capacity and we insert a piece of common glass between them of the same

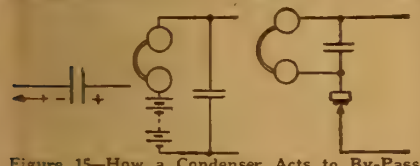


Figure 15—How a Condenser Acts to By-Pass Radio Frequency Currents

thickness as their spacing and the capacity will now be 5 times as great.

Unit of Capacity

The unit of capacity is the farad. That is, a condenser has a capacity of one farad when it will store 1 ampere of current at one volt potential. This unit is entirely too large for practical use, so the practical unit is the microfarad or one thousandths of a farad. This is abbreviated to mfd. The condensers used in Radio work are rated then in decimal parts of the mfd.

So much for the condenser itself, now let us see how it is used in the Radio receiving set and how it functions.

In Radio sets condensers are used for a variety of purposes and the particular type of condenser to be used will depend upon the service for which it is intended. The first and most important function of the condenser is to tune the circuits in connection with inductances to a certain wave length. How this is accomplished will be clearer when we consider the effect of a condenser in an oscillating circuit.

Analogy of Condenser

Referring to Figure 14 we have a condenser shunted across an inductance. As

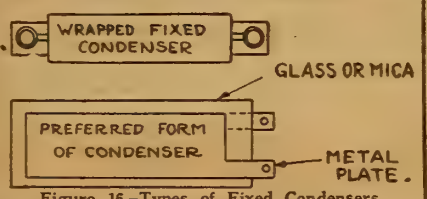


Figure 16—Types of Fixed Condensers

an analogy to this circuit there is also shown a U-tube fitted with a stopcock at the bend. When an electric charge is impressed on one plate of the condenser it is equivalent to filling one leg of the U-tube with water up to the point A. Confining ourselves to the tube it will be apparent that when the stopcock is suddenly opened the water will run out of one leg up into the other leg of the tube, but due to its inertia it will rise to the point B and will then flow back again. This action will continue for a short while but each time the water does not rise as high, finally coming to rest at a level C where equilibrium is established. And so with the condenser, when the switch is closed the current rushes to the other plate, but due to the inductance it overreaches itself so to speak and charges the condenser in the opposite way, only to discharge back again.

The length of time it takes for each oscillation of the circuit depends upon the amount of current in the condenser and the impedance of the circuit. With an increase in the size or capacity of the condenser it will be clear that it takes a longer time for the oscillation to take place. We know from a previous article that the frequency of a current falls off as the wave length increases. Therefore when we increase the capacity of a condenser in a tuned circuit the circuit will oscillate fewer times per second and hence is tuned to a longer wave length. More about this will come in the chapter on tuning.

Condensers Used as a By-Pass

Condensers are also used as a by-pass for high frequency currents. This application is seen in the condenser across the phones in a crystal set, that across the phones and B battery in a regenerative set and across the audio frequency transformers in a reflex circuit. These condensers will pass the high frequency or Radio frequency currents but are effective checks to direct current.

Just how this is possible will be clear from the following. Consider Figure 15, which shows the two applications of by-pass condensers and also a simple condenser to explain their operation. When a positive charge is impressed upon one plate, as shown in the illustration, it induces a negative charge on the opposite

(Continued on page 14)

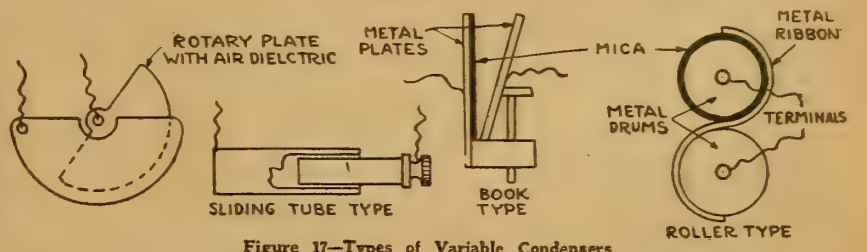


Figure 17—Types of Variable Condensers

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The first chapter of his series appeared in the May 5 issue. The articles yet to appear are:

Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

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Reinartz Tuner Hook-Up Gets Results

Reception Better with Less Filament Current

After reading of C. K. Beebe's improvement of the Reinartz tuner I decided to try a little experimenting myself. To say that I got results would be putting it very mild. I secured the best results with the arrangement as shown in the accompanying sketch. The rotary plates of the condenser should be connected to the switch lever in order to reduce body capacity.

The greatest improvement in this hook-up is that the filament current in the detector tube can be reduced about 10 or 15 per cent and the reception will be much louder.

The choke coil in the input side of the transformer consists of about 150 turns of No. 26 S.C.C. wire wound on the core of an old telegraph relay. This tends to reduce howling which is the result of untuned waves. I find this much superior to the phone condenser.—C. T. Hanavan, Little Rock, Ark.

WORKSHOP KINKS? EARN A DOLLAR—

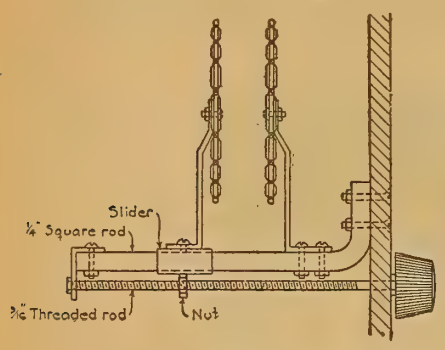
THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

Vernier for Spider Web Coils

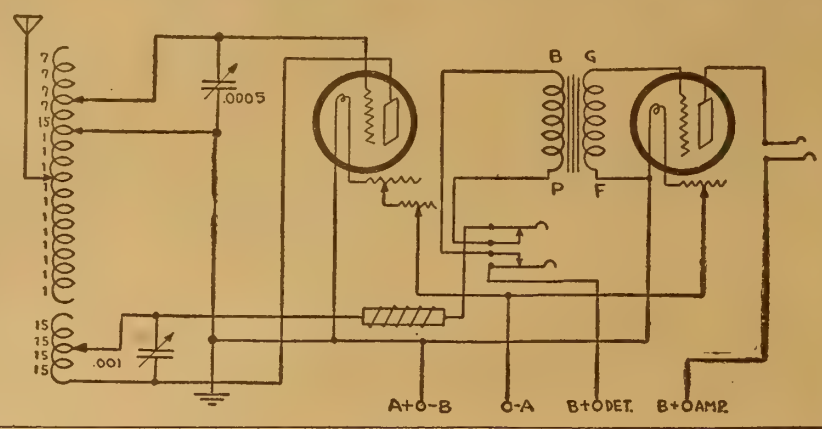
Users of spider web coils will agree that the finer adjustment the better. The mounting here described was designed with that feature in mind and it is equal to a vernier adjustment, requiring about 32 turns of the knob to move the coil 1 inch.

A little study of the illustration will



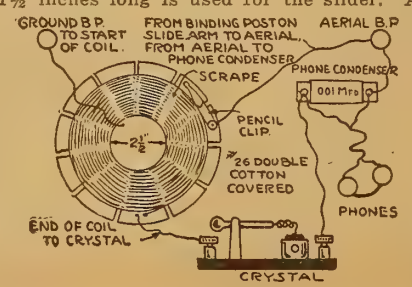
show how the arrangement works, the parts for which can all be secured from your Radio dealer or your scrap box. A slider riding on a length of square brass rod moves by turning the threaded shaft which passes through the nut soldered to the under side of the slider. Most sliders have a small threaded hole for the little knob which can be used to fasten the piece of brass strip which carries the movable coil. A piece of brass strip bolted to the end of the square rod keeps the shaft from pulling out and the knob prevents the movement the other way.—Ralph Miller, Harrisburg, Pa.

CHANGES IN REINARTZ CIRCUIT



Crystal Set Tuner

The tuner for this crystal set is wound spider web style with Number 26 dcc. wire. The insulation is scraped off on one section as shown. An arm made of a piece of flat stock about ¼ inch wide and 1½ inches long is used for the slider. A



fountain pen clasp ball is attached for sliding over the wires.

This 6-inch spider web can be mounted flat on a small board by putting a screw in the center of the coil and a thick washer under the coil to keep it up from the board. This little set is very cheap to build and it is one of the best sets I have used. I hear WGY at Schenectady every night and all local stuff is as loud as a one bulb set.—John J. Earley, Providence, R. I.

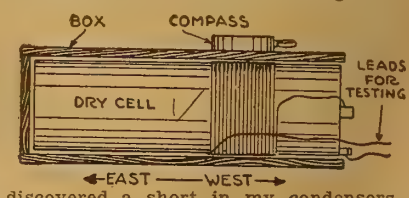
Cat Whiskers

The cat whisker of a crystal set should not be too long. Two inches of steel violin E string is about the proper length and kind. The spring should rest very lightly on the crystal. If the spring is longer than two inches external vibration or jarring will cause the spring to change position and jump off the crystal.

Testing Instrument for Grounds and Shorts

Having trouble with my outfit at first and having nothing to test with for grounds or shorts I made a simple testing set in the following manner: I took an old dry cell too weak to light the filament in my peanut tube and wound about twenty turns of wire around it connecting in series with the cell. I then made a neatly fitting box with one end open for the wires to the leads. I laid this on a flat surface so that it stood in a position of the length east and west and placed a pocket compass on the box directly over the wire.

I found this a first class testing set and



discovered a short in my condensers at once. I am having very good success with this outfit using only one peanut tube and have picked up signals from New York to Florida and Los Angeles with it.—H. W. Davis, Hearst, Ontario.

Long distance stations ordinarily cannot be heard with a crystal detector set.

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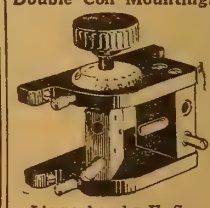

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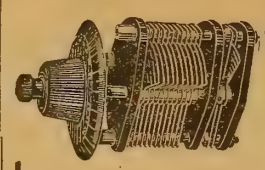

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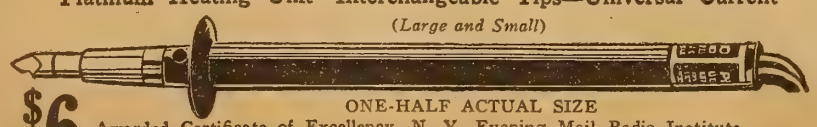

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Characteristics of Some New Vacuum Tubes

Part I—Laboratory Tests Show Interesting Facts

By H. J. Marx

WITH the introduction of so many new types of vacuum tubes on the market, the amateur is at loss in deciding which one to use, how to apply it to his circuit, what special additional apparatus is necessary, the voltage necessary and what to expect of the tubes.

It is not generally known that the characteristics of tubes vary considerably and that this variation is the cause for the inconsistent operation of many cir-

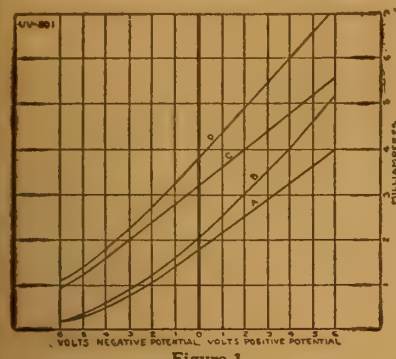

Figure 1

cuits. It is not unusual to find one fan getting good results consistently and another cannot even claim efficient reception of local broadcasts. Many a good circuit and also good receiving set has been condemned when the blame should have been placed on the tubes used, or often on how the fan uses the tube.

This variation in tube efficiency has made it a difficult matter to judge impartially the relative merits of tubes. Where unusual curves were discovered, at least three tubes from average dealer stock were tested. If the curves were fairly consistent the average is given. In case where the variation was considerable the two with maximum and minimum values are illustrated.

Amateur Unprotected

Since the space available is limited, only part of the curves are given, more will be presented in the next issue and as new tubes are placed on the market their curves and descriptions will be given. Unfortunately, efficiency tests of this kind do not always receive the approval of the manufacturer. Of course, by a peculiar combination of circumstances, the tubes tested may be very poor when compared to any selected by the manufacturer. But doesn't the amateur and fan take just this same chance when he buys the tube from the dealer?

The only test that the majority of the dealers offer is to show that the filament lights. Going back still further, the dealer and even the distributor rarely can be assured of even that test. Yet some manufacturers state that defective tubes should be returned for laboratory test. Why wait till the purchaser has taken it home and freed it? Why not show the operation of the tube to the purchaser before he takes it home?

Theory of Operation

It isn't sufficient to know that the filament voltage should be so much and that

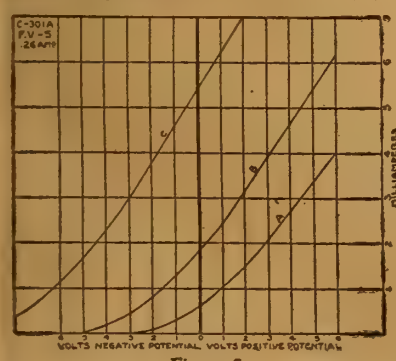

Figure 2

the tube only consumes so many amperes. Some manufacturers state that the plate current is so many milliamperes. As can be seen later, a tube may have a plate flow of 10 milliamperes, another only 5, yet the second not only may save B batteries, but at the same time give considerably more volume.

In order to describe the method of judging the performance of vacuum tubes it will be necessary to refer back to the theory of grid control.

Most fans know that the electrons flow from the filament to the plate and that the grid is the "traffic cop" that controls the passage of these electrons. When the grid becomes positively charged, it helps pull the electrons from the filament to the plate—the greater this positive charge the more is the assistance rendered. When the negative side of the battery is connected to the grid—then the grid becomes negative in charge and starts holding up the amount of traffic between the filament and the plate. This blocking action is increased as the negative charge on the grid is intensified.

In the actual receiving set, the incoming Radio frequency currents are alternating, and their effect is impressed on the grid. If the grid has a neutral charge—that is having no positive or negative condition, it has no effect on the electron flow. This alternating current, when led to the grid makes it positive and negative corresponding to the alternations in the antenna current. The effect of this variation on the electron flow is to vary the milliampere flow in the plate circuit.

Plate Flow for Given Grid Charge

It is this variation in plate current that vibrates the diaphragms of the receivers or loud speaker. Then the greater the variation in plate flow, the stronger will be the volume of reception.

Under actual operation in a receiving set this variation of grid charge, called grid potential, is very small. Obviously, the greater the variation of plate flow for the least change of grid potential or charge, the louder will be the reception from that tube. This helps make it clear that high plate current is valueless unless accompanied with maximum variation through grid control.

Where Large Variation Occurs

It will be found that this maximum plate variation may occur when the grid is positive, neutral or even negative. The effect of the alternating current on either a positively or negatively charged grid, is to increase and decrease this charged condition. The initial potential of a grid in

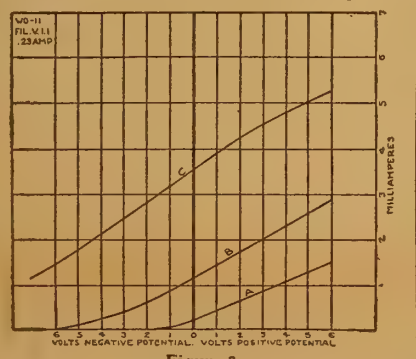

Figure 3

an actual receiving set can be adjusted for the best point of grid efficiency for the particular tube used. This is what a potentiometer is used for, or as is often the case, a C or biasing battery is inserted to give the required initial charge.

Knowing all the details of the tube—then the amateur can adjust his set so the tube will do its best.

In judging a tube, determine the maximum variation for a change of one or two volts grid potential. The potential at which this change is greatest naturally is the best operating point. A quicker determination of efficiency is to discover which tube has the steepest grid potential —plate current curve.

Test of a UV-201

The manufacturers of the UV-201 tube are replacing it with the UV-201A because of the decreased current consumption of the latter. This tube uses the familiar form of 6-ohm rheostat. It is used chiefly as an amplifier tube and lacks sensitivity for use as a good detector.

In Figure 1 the curve A is taken at a filament voltage of 5, current consumption 1.0 ampere and 45 volts plate potential.

Curve C was developed with 67½ volts plate potential.

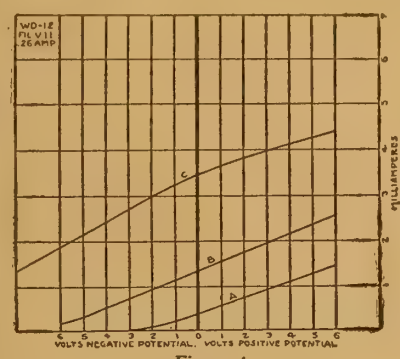

Figure 4

The filament voltage was then increased to 6, the amperage then rose to 1.15, with 45 volts on the plate the curve B was plate. When increased to 67½ the curve D was developed.

Test of C-301-A

This tube is one of the low consumers of battery current. A 20-ohm rheostat is recommended for use in controlling this tube. No form of biasing battery is necessary. Except for tubes of this type having unusual curves, potentiometer control helps but little. See Figure 2.

All three curves were plotted at a filament voltage of 5 as recommended by the manufacturers. The current consumption was found to be .26 amperes. Curve A gives values at 22½ volts plate battery, B at 45 and C at 88 volts.

Test of WD-11

The WD-11 tube is one of the first of the peanut tubes that was put on quantity production. Because of the different base used it requires a special socket or an adapter for use in a standard socket. A dry cell is most convenient for lighting the filament. The usual 6-ohm rheostat is sufficient for controlling the filament current. Figure 3 gives the curves for the WD-11.

All tests on this tube were conducted with the filament voltage at 1.1 as recommended by the manufacturers. The filament current consumption was .23 amperes. Curves A, B and C were plotted with plate potentials of 22½, 45 and 88 volts, respectively.

Test of WD-12

This tube is the same as the WD-11, but manufactured with a standard base, thus eliminating the necessity of a special socket. As with the previous tube (WD-11) no special rheostat is required.

The tests on this tube were conducted under the same conditions as for the WD-11. The current consumption was .26 amperes. In Figure 4 the curves A, B and C were plotted at plate voltages of 22½, 45 and 88, respectively. There is but little variation in the characteristic curves of the two tubes, and this is no more than will be found in any tubes of the same type and manufacture.

(TO BE CONTINUED.)

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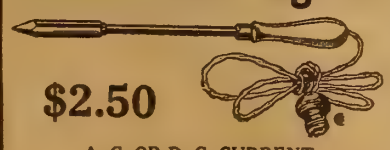

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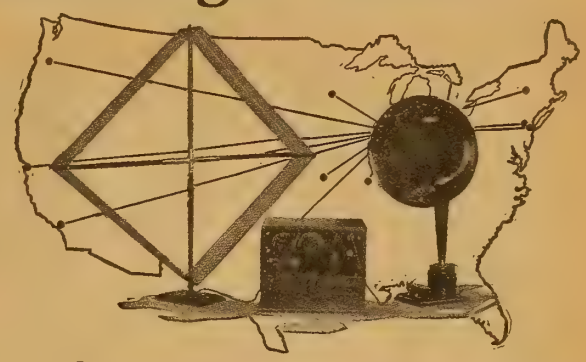

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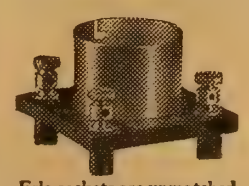

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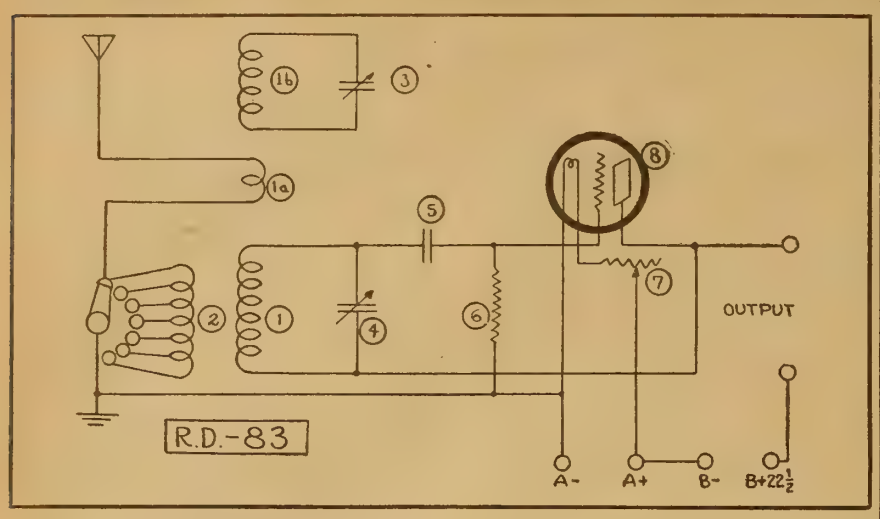


THIS four-circuit is one of the popular ones at the present time. It has exceptionally good selective qualities although the volume is not as good as derived from many of the circuits. Audio frequency amplification can be added in the usual manner following the standard hook-ups.

Care should be taken in constructing the tuning units.

Radio frequency amplification has not been tried out very successfully on this circuit so no data is available. Its good selective properties help make it a long distance receiver provided sufficient audio frequency amplification is added.

The apparatus indicated by numbers in the hook-up diagram can be identified in the detailed list that follows:

1.—This is the tuning unit consisting of three sets of windings on a tube 3¼ inches in diameter and 5¼ inches long. Winding No. 1 consists of 65 turns of No. 18 S.C.C. wound in a single layer about 3 inches long. Then leave a space of ⅛ inch and start the winding No. 1b, which has 34 turns of No. 18 S.C.C. This winding will be just a little over 1½ inches long, leaving about 3/16 inch at each end of the tube uncovered. Winding No. 1a consists of a single turn over the winding No. 1b and can be made with the wire used for leads in connecting the antenna post to the coil No. 2.

2.—This is a winding on a separate tube 3¼ inches in diameter and 1½ inches long, and is not inductively coupled to the other tuning unit. It consists of 43 turns, double bank wound and tapped at the beginning, the 7th, 13th, 21st, 31st and 43rd turns.

3 and 4.—Variable condensers of .0005 mfd. capacity with vernier plates.

5.—Grid condenser, .00025 mfd. capacity.

6.—Grid Leak, 1.5 megohms resistance.

7.—Rheostat, vernier preferred.

8.—Vacuum Tube, soft.

FIRST STEPS IN RADIO

(Continued from page 11)

plate by attraction and repels the positive charge that was formerly combined with the negative to give equilibrium. This is shown by the positive sign and the arrow. When the original positive charge attracted the negative it repelled an equal positive charge and to all intents and purposes the repelled charge acts the same as if the original charge was allowed to flow without a condenser being inserted in the circuit.

But it must be remembered that this repulsion flow takes place only while the left plate is charging, hence with direct current the repulsed flow would only be an instantaneous surge on the closing of the circuit and no more current would flow. However, with Radio frequency current with their high frequencies the plate is being charged thousands of times a second and the current flow is practically constant and the Radio frequency current passes freely through the condenser.

Capacity Action

The capacity of the condenser enters into the problem in that with a larger capacity more current flows at audio frequencies therefore the capacity should be made of such a size as to pass the Radio frequency currents readily but too small to pass an appreciable amount at audio or lower frequencies

It is often desirable to connect several condensers in such a manner as to build up a given capacity. When condensers are connected in parallel or multiple the resulting capacity is the sum of the individual capacities. When equal capacities are connected in series the resultant capacity is equal to the capacity of one condenser divided by the number of condensers in series. In the first case a parallel connection is equivalent to increasing the area of the plates so the capacity increases. In the latter connection is the same as increasing the distance between the plates with a decrease in capacity. When unlike condensers are connected in series we must make use of a formula similar to that used for unlike resistances in parallel, namely:

$$\frac{1}{\frac{1}{C_1}+\frac{1}{C_2}+\frac{1}{C_3}+\frac{1}{C_4}} \text{ etc.}$$

Fixed condensers, or those in which the capacity is not variable, take many forms and for best operation care should be exercised in selecting condensers. There are on the market a host of paper wrapped condensers, that is, made by wrapping tinfoil and paraffine paper around a strip of fiber. These should never be used where the capacity is at all important. The reason for this is that when a charge is impressed upon the plates of the condenser they have a tendency to attract each other and if loosely wrapped they move closer together thus changing the capacity. The better way is to use a condenser in which the conducting plates are rigidly held and cannot move. For that reason a condenser using mica or glass is to be preferred, but highest efficiency is obtained with a condenser using air as the dielectric.

Variable Condensers

There are a number of forms of variable condensers. All possess some advantages and some disadvantages. The most common type is that made with interleaving plates, the variation of capacity being obtained by varying the area of the interleaving plates. When purchasing a variable condenser it is always advisable to buy one made by a reliable house for many of the cheap condensers on the market are but a source of annoyance from plates sagging and shorting or poor contact at the pivots. A vernier attachment on variable condensers is advisable for close tuning.

A much similar type not used to any great extent now has two tubes sliding into each other, a contact being made to each tube. This condenser is limited in capacity and for that reason is suitable only for vernier work.

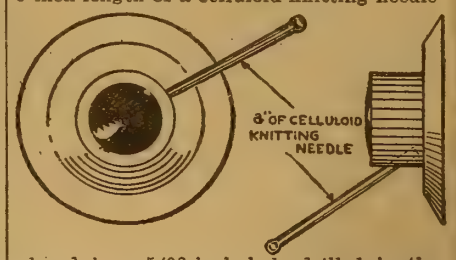
The book type of condenser acts to vary the capacity by bringing the plates close together or spreading them by means of a cam. This type is rugged and efficient but is rather critical near its maximum capacity. This is no disadvantage, however, for it can be overcome by using more inductance as we shall see in the treatment of inductances.

A novel form of variable is now being marketed in which a metal ribbon is wound from a metal drum onto another metal drum covered with a thin insulator. Condensers have changed but little in design since the early days of Radio telegraphy and it is not unlikely that some ingenious radiophan will devise a simpler instrument for the purpose and eliminate many of the evils of the present day condensers.

(TO BE CONTINUED.)

Eliminating Body Capacity

I have eliminated the body capacity effect on my set in tuning by using an 8-inch length of a celluloid knitting needle



placed in a 5/32-inch hole drilled in the knob of my dials in the manner illustrated. It is easy to turn the knob in this manner and there is no body capacity. —John L. Sobey, Highland Park, Ill.

Mounting Vacuum Tubes

Be sure to mount all vacuum tubes upright. Filament wires stretch when heated and if bulbs are mounted horizontal, that is parallel to the base of the set, the wires may sag and short-circuit against the grid.

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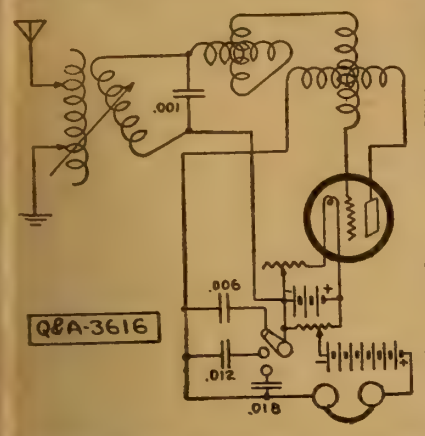
Questions and Answers

Higher Wave Lengths

(3616) J.G., Ft. Smith, Ark.

Find enclosed a hook-up (shown in illustration) of my own invention with which I have heard over ninety-five stations broadcast. From Havana, Cuba, Everett, Washington, and Los Angeles, Calif. Please answer the following questions concerning same. How can I raise the wave length from 250 to about 900 meters? It is now from 150 to 485 meters.

A.—Noting sketch we are advising that circuit shown should have a higher than four hundred and eighty-five meters wave length since it has three inductances in series and a high capacity condenser



across one of them. All that is necessary is the addition of a thirty-five turn honeycomb coil or an equal inductance in the antenna circuit.

Ultra-Reinarts

(3321) W.F.M., Chicago, Ill.

I have made the tuning unit for Ultra Reinartz Receiver, as shown in Radio Digest, March 24, and wish to use same on detector only. Can you give me the hook-up for this set? Is it necessary to mount all instruments on panel as shown in March 31 number? Could they be mounted any way convenient or is there a definite location for each part? When I tin the taps on coils I cannot avoid burning the cotton insulation. This spoils the appearance of the coil, and would like to know if I could use anything to color these parts without injury to insulation.

A.—Answering your inquiry with reference to Ultra Reinartz circuit appearing in Radio Digest, we are advising that it cannot be used with less than one stage of amplification, and we could not furnish diagram requested.

Apparatus may be mounted in any convenient way according to personal taste.

For better appearance of the coil scrape the burnt part off. Orange shellac should cover the effect. With care you should be able to make the coil look very well.

Reinartz Circuit

(2541) W.F.S., Endicott, N. Y

Will you kindly answer the following questions relative to the Reinartz circuit?

Why does my set go dead after connecting on a phone condenser? What can I do to eliminate body interference?

Would it be possible to connect a second Reinartz spider web coil for long distance code work?

Would one stage of amplification help bring in distant stations when using head phones or what could I use for increasing signal strength?

A.—It is indicated that fone condenser is short circuited in that you experience action cited.

Shielding of panel and grounding shield is the only method of eliminating body capacity effect. This consists of lining panel with tinfoil and grounding same. This decreases the efficiency of set to some extent.

Your present coil in the circuit should tune under two hundred meters, which would enable you to receive code signals as desired.

Amplification, as suggested, would increase signal strength of distant stations and is desirable.

RD-65

(2574) AS., Oak Park, Ill.

Kindly publish in your Question and Answer Column the values of all variable and fixed condensers shown in your diagram RD-65, page 14, December 9th, 1922.

A.—Answering your inquiry with reference to RD-65 in December 9 issue of Radio Digest will advise that the antenna series condenser is .001 mfd, primary parallel is .0005 mfd. The two fixed condensers are of .0005 mfd. All others are marked on diagram in question.

RD-78

(3305) AHF, Boston, Mass.

I would appreciate very much the following infromation regarding RD-78. (The simple form of three-tube reflex.)

What is the wave length of such on hook-up? Is it selective? Is it advisable to shield the set and just what parts have to be shielded? In shielding, are the loop terminals soldered on to the copper shield or just what is done?

If a 2-foot loop is used how should it be made? If a 4-foot loop is used how should it be made? Is there any advantage in using an outdoor antenna?

Would a 14-tap variocoupler be suitable for the additional tuning element, and if same is used is it necessary to cut the coil of 42 turns?

Is it best to use all three tubes alike and which tube manufactured today is best. Would WD-11's using a special type of transformer adapted to it be all right?

Should the audio transformers have the same ratio in each? Should the Radio transformers have the same ratio in each? No grid leak is shown. I take it for granted that a grid leak fixed or stationary is not necessary. What distance could be covered under ordinary conditions? Will it work a loud speaker as satisfactory as a regular two-stage audio?

If a crystal (galena) is used of the fixed type for rectification I take it for granted that it can be permanently adjusted.

A.—The wave-length accomplished by circuit in question is from two hundred to six hundred meters. It is a selective circuit. Panel should be shielded by lining back with tin foil and grounding shield for elimination of body capacity effect. No other shielding is required.

A 2-foot loop is rather small. We would advise using a 3-foot square frame with ten turns of wire spaced ½-inch apart. If a 4-foot loop is used eight turns are sufficient. An out-of-door antenna will afford much greater range and volume.

The variocoupler suggested would be necessary if an out-of-door antenna, but would be of no advantage if loop were used.

We would advise the use of standard six volt tubes as WD-11's are not suitable for best results.

Audio frequency transformer should have a ratio of three or four to one. Radio frequency transformers should each have the same ratio and should be shielded. No grid leak is necessary. The range approximates fifteen hundred miles. Loud speaker may be used effectively.

Fixed type of crystal detector or the new Diode tube may be used.

180° Variocoupler

(2298) J. B., Minnesota City, Minn.

I am building a 180 degree variocoupler. The primary winding space is 2 inches long on a tube 4 inches in diameter. I want the instrument to respond to wave lengths from 180 up to 550 meters without a variable condenser. How many turns of wire must be used on the primary and secondary and what size?

Is it necessary to add an extra B battery for each stage of impedance-coupled R. F. amplification? If not give me a hook-up using one stage of amplification.

Is a variable grid condenser an advantage?

How does a variable in the plate circuit produce regeneration?

A.—Answering your inquiries with reference to winding of variocoupler would advise you that fifty turns of number twenty-two C.C. wire on primary, and thirty-six of number twenty-six on the secondary will be sufficient for wave-lengths from one hundred and eighty to five hundred and fifty meters.

It is not necessary to employ an extra B battery for each stage of impedance coupled Radio frequency amplification. Would refer you to page 14 of November 18 issue for the diagram of this circuit.

In this case a variable grid condenser is not of particular advantage. Usually the tube is not critical and will function without noticeable difference with any grid capacity between .00025 and .0006.

A variometer produces regeneration by virtue of resonance established between the plate and grid circuits, causing some of the variation in plate voltage in the plate circuit to be transferred back to grid circuit whereby a greater variation in the potential of the grid produces a greater variation in the voltage of the plate circuit.

Spirola Loud Speaker
IMPROVED—LARGER
famous tuned Rhamstine unit built-in. True cabinet type, beautiful mahogany finish. Great volume, superb tone. Guaranteed. Complete with cord, postpaid (C.O.D.)..$12.50
Spirola Mfg. Co., Box 70, Ann Arbor, Mich.

RITTER LOOP AERIAL $1
All parts supplied; can be assembled in 10 minutes. We guarantee that the Ritter Loop will eliminate lightning troubles. Reduces static, interference and noises from your neighbors' regenerative sets. Come and see the Ritter Loop Assembled. By mail 10c extra.
RITTER RADIO CORP.
232 Canal St., near Centre New York

RUSONITE
CRYSTAL RECTIFIER
MULTIPOINT (Patent Pending)
A Synthetic CRYSTAL DETECTOR sensitive over its entire surface
Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages only. Join the ever increasing Rusonite fans.
Price mounted, Sensitiveness guaranteed..... 50c
RUSONITE CATWHISKER
14 Karat Gold Multiple Contact Super Sensitive..... 25c
Order from your dealer or direct from us.
RUSONITE PRODUCTS CORP.
19 Park Row, N. Y.

SPECIAL
Direct From Manufacturer to Consumer
Save the Difference
LOUD SPEAKER
GENUINE WOOD FIBRE HORN
10-inch Bell with Standard Attachment; Complete. Height 24 inches. Colors, Black, Mahogany and Olive Green.
Price—$5.00
Delivered to any part of the United States and Canada.
Send Money Order
EMIL DECLYNE
15 Park Row Room 1324
NEW YORK CITY
Dept. R. D. Barclay 1753

a Chi-Rad Special!

for W.D. 11 tubes—
Standard, threaded rubber, Willard's specially adapted for use with WD-11 Tubes. Supply current at 2 volts to one WD-11 Tube for 210 hours on a single charge. Rechargeable. Brand new, size 4x5½x7 inches—Chi-Rad guaranteed.
2-Volt Willard Charged...$7.50
2-Volt Willard Dry..... 6.50
These same Willards can be adapted to deliver 8 volts for pure D. C. for C. W. Transmitters. Better than a generator because no filter is necessary. Much less expensive.
In lots of 40 (320 volts).$160.00
(Better prices on larger quantity)
Specify dry or charged when ordering.
Chicago Radio Apparatus Co.
415 S Dearborn St. Chicago Ill

IDEAL CONTROL
ALL TUBES
Especially U. V. 199's and all dry cell tubes, because it is the only instrument permitting accurate and superfine adjustment necessary at critical operating point.

No Discs To Break
Nothing to chip. Resistance element so finely divided further division is impossible.

Best By Test—
Laboratory tests prove the Fil-Ko-Stat to have a fine adjustment area (which means ability to control filament heat and electronic flow) eighteen times greater than that of the wire rheostat and several times that of the next best filament control.

With the Fil-Ko-Stat you bring in the weak stations strong and clear.
The Fil-Ko-Stat will increase your set's range. It will permit you to select other stations on similar wave lengths, tune one in and the other out with a slight turn of the knob without otherwise changing any of the tuning units. It is non-microphonic and operates silently.
The Fil-Ko-Stat is not an adaptation of old methods, of current control. It is distinctly designed to utilize the great tuning possibilities of the vacuum tube. It regulates filament heat and gives absolute control of electronic flow, permitting the finest tuning possible.
The Fil-Ko-Stat's perfect and gradual increase of filament heat insures longer life to your tubes.
Replace your present so-called Filament Controls and rheostats with the new Fil-Ko-Stat and improve your set. Occupies little space on panel. No redrilling necessary.

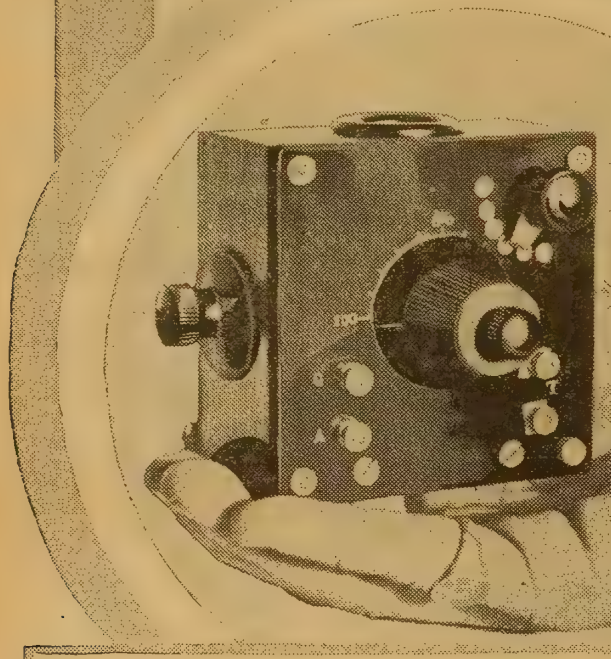
$2.00 at Dealers Everywhere

The filament kontrol of infinite adjustment
FIL-KO-STAT

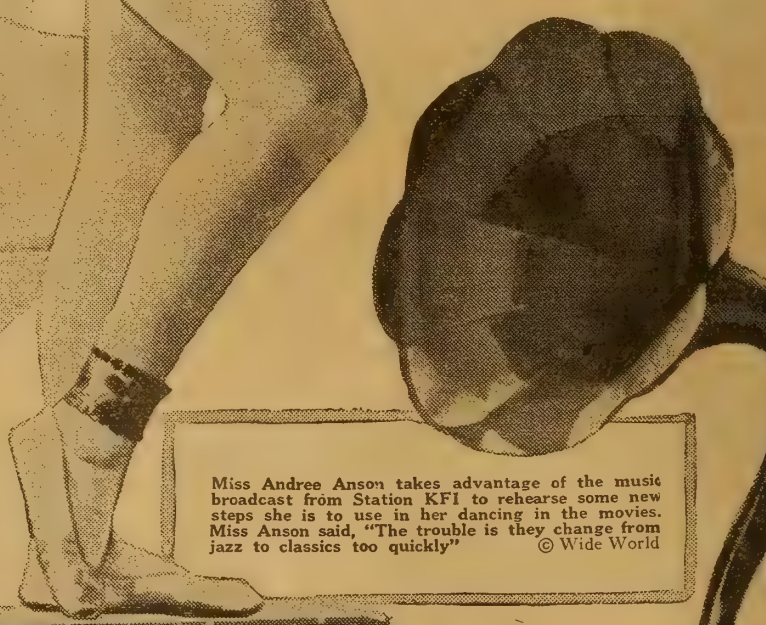
GUARANTEED by the maker that it will be replaced if broken within one year.
DX INSTRUMENT CO. Makers

Say "FIL-KO-STAT" to your dealer today
If he has none in stock, send his name and your remittance direct to
RADIO STORES CORPORATION
Sole International Distributors
Dept. RD62, 218-222 West 34th Street, New York

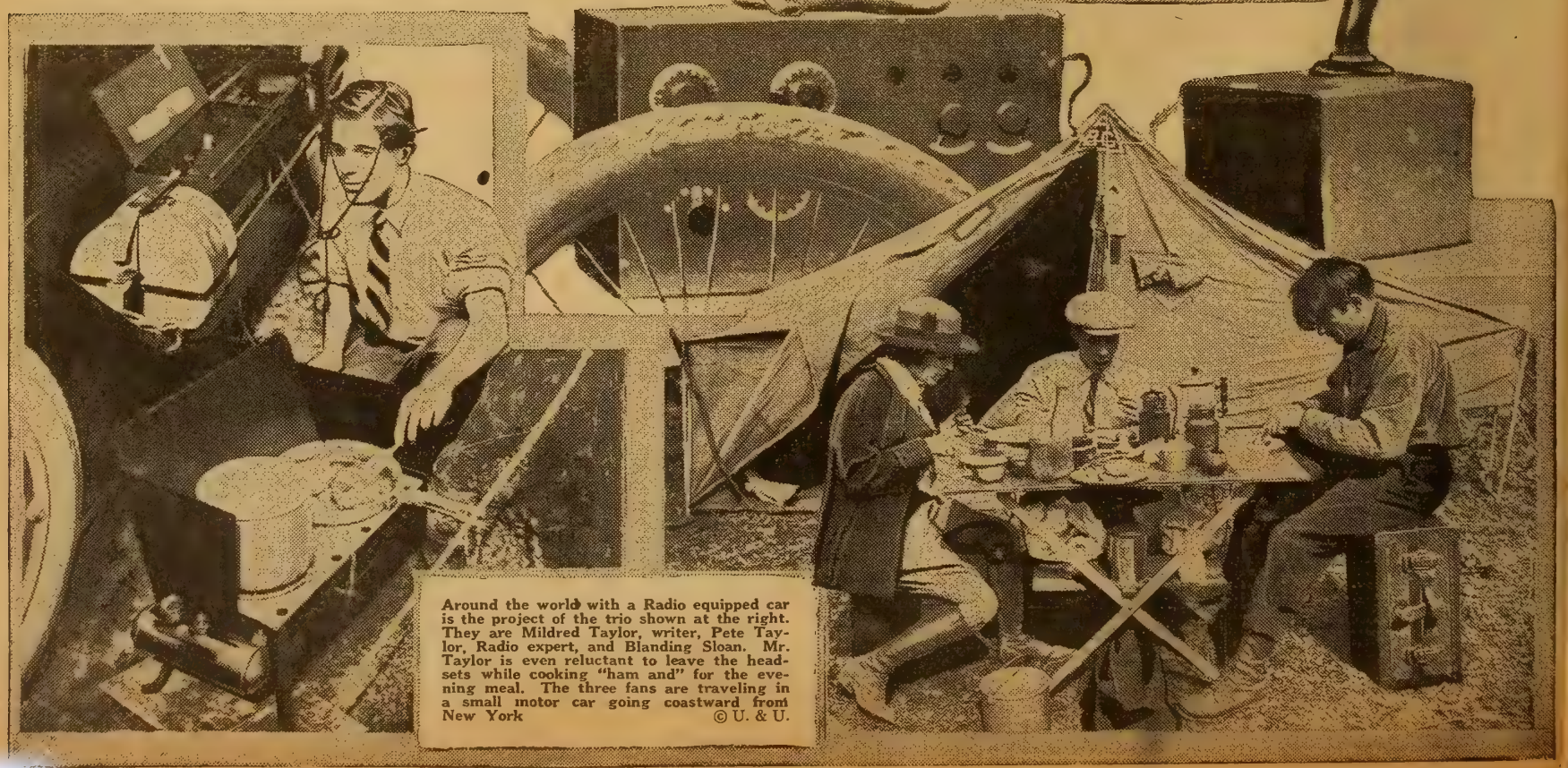
Radio Illustrated



The small regenerative set shown above is another claim to the title, "Smallest Set in the World." It is 3½ by 3¼ inches overall and has picked up stations more than 800 miles away. The set is the work of a Niagara Falls Radiophan, Roslyn Russel. This novelty is equipped with a peanut tube and has dial controls. The rheostat knob on the left of the cabinet is only ⅜ inch in diameter and is homemade. There is a spider web coil in the set made of No. 32 enameled wire with the tickler wound inside of the main inductance. The grid condenser is at the left of the tube. This set has a wave length of from 200 to 600 meters © Int.



Miss Andree Anson takes advantage of the music broadcast from Station KFI to rehearse some new steps she is to use in her dancing in the movies. Miss Anson said, "The trouble is they change from jazz to classics too quickly" © Wide World



Around the world with a Radio equipped car is the project of the trio shown at the right. They are Mildred Taylor, writer, Pete Taylor, Radio expert, and Blanding Sloan. Mr. Taylor is even reluctant to leave the headsets while cooking "ham and" for the evening meal. The three fans are traveling in a small motor car going coastward from New York © U. & U.

C18578433 JUN -7 1923

Portable Set, Reinartz Hook-Ups; Tube Curves

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S PAT. OFF.

Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, JUNE 9, 1923 | No. 9

RADIO PILOTS AIRPLANE

KSD OFFERS OPEN AIR LIGHT OPERAS

TWICE-WEEKLY CONCERT FROM ST. LOUIS

Talented Principals, Musicians and Huge Chorus Present Masterpieces of Great Composers

ST. LOUIS, MO.—Twice-weekly broadcasts of light opera, to be continued through most of the summer season, are being sent out by Station KSD from the huge municipal open air theater at Forest Park, this city.

These operas, which are the work of the most talented composers, are being presented on a scale never before attempted. The principals are highly capable and critics have agreed the immense chorus of one hundred voices is exceptionally well trained. An orchestra of eighty musicians, some of them members of the famed St. Louis symphony orchestra, furnishes the accompaniment. The open air theater has a seating capacity of 10,000.

Monday and Friday night of each week has been chosen for the broadcasts. In the event of unfavorable conditions, however, the selections will be broadcast on Thursday or Sunday evening.

Beginning June 11 the program that has been scheduled will be as follows:

(Continued on page 2)

CYCLONE WIPES OUT HOMES; CALL FOR AID

FORT WORTH, TEX.—For the first time in Texas Radio has been used to appeal for aid for disaster victims. On a stormy night recently a cyclone struck Colorado, Texas. Word was sent to WBAP, Fort Worth, that $50,000 was needed to relieve suffering. WBAP relayed the message to the nation and within a day contributions to care for the victims of the storm were pouring in.

WLW, Class B Now, Bans Canned Tunes

Re-rating of Cincinnati Plant Brings Many Changes

CINCINNATI, O.—WLW is now a Class B broadcasting station. Many changes in the studio and operating room, combined with the installation of a 500-watt transmitter, have resulted in WLW being given the new rating. Of the approximately 600 Radio broadcasting sets in operation, less than two score are included in the B class.

At the recent Radio conference in Washington a 309 meter wave was allocated to WLW, and the change from 360 meters was made several weeks ago by engineers in charge of the Crosley Manufacturing Company station.

Placing of Station WLW in Class B necessitated radical changes in the day concerts. No more "canned" music will be broadcast.

FRENCHMAN'S INVENTION IS BIG WAR AID

Manless Plane Successful

French Air Under Secretary Gives Official Okeh—War Use Visualized

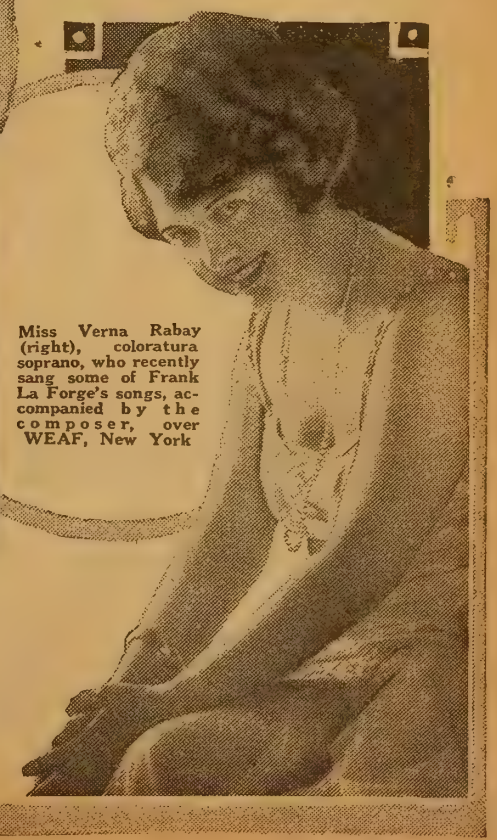
(By Pierre Douchenne, Special Correspondent)

PARIS, FRANCE.—Radio has mastered the air, flying a pilotless plane from take-off to landing! A recent experiment conducted at Villesauvage Aerodrome, near here, proved a complete success. Among the spectators was M. Laurent Eynac, Under Secretary of the Air.

What movements of the airplane were not Radio-controlled, were automatically self-adjusted by gyroscopes and other mechanical stabilizers. It is reported that the Radio-control devices resemble in principle those used aboard the Battleship Iowa, recently sunk in the U. S. Navy maneuvers off Panama Bay.

(Continued on page 5)

Miss Katherine Gorin (left), talented young pianist composer, heard May 6 on WDAP and May 2 on KYW, Chicago. She was also scheduled to microphone June 7 at WMAQ. She plays many of her own compositions, accompanied by Miss Theodora Bleidung, violinist. Right above (guess?) is Bebe Daniels, recently interviewed at the WOR, Newark, N. J., microphone by David A. Balch, Movie Weekly editor



Miss Verna Rabay (right), coloratura soprano, who recently sang some of Frank La Forge's songs, accompanied by the composer, over WEAF, New York

SECOND COUPON IN BIG REWARD OFFER

TO GIVE PARTS FOR COUPONS AND REMITTANCE

Special Offer to Benefit Regular Readers —Many More Standard Parts This Issue

SPECIAL REWARD OFFER
Coupon Number 2

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

As was announced last issue, we inaugurated a Special Reward Offer for the benefit of you regular readers of the paper who have shown such splendid support and interest in the growth of the Digest. With this offer you are given the opportunity of securing desirable standard apparatus at a decided saving by simply clipping the coupons which appear on this page each week in the Digest and sending them to us accompanied by the necessary small remittance. As you will note below many kinds of parts and apparatus dear to the heart of every Radiophan have been included in this special offer.

With this the second week of the special offer many new items have been added to the list.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Electrad Grid Leak (with clip mountings); Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 inch black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser

(Continued on page 5)

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440			11:30-12:30			11:30-12:30	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	10:00-12:00		10:00-12:00		10:00-12:00		9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00		10:00-11:00		9:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00		8:00-12:30	8:00-10:00	
KYW, Chicago, Ill.	345	7:00- 8:30	9:00- 9:30	7:00- 8:30	7:00- 8:30	10:00-12:00	7:00- 8:30	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	476	9:30-10:30	930:-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00-1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	6:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30		7:15- 9:30			
WJY, New York, N. Y.	405		5:30- 9:30		5:30- 9:30	5:30- 9:30		
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:00
WKAQ, San Juan, P. R.	360		6:30- 8:00				6:30- 8:00	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	360	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas	400		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:50-10:00			5:50- 8:10			
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00		6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

Marx Tells What's Wrong and Right about Tubes next issue, concluding his series. "Don't blame the set for all its ills, but blame whoever sells you untested tubes," says he.

First Steps for Radio Beginners, by Thomas W. Benson, will tell you next week how to tune a tuner properly. The title of Chapter IV, "Tuners and How to Tune Your Set," is self-explanatory. A lot of beginners need to read this tuning treatise.

Flewelling Answers—see page 9 this week—edited by E. T. Flewelling, will appear regularly. Send your "flivver" super puzzle to him.

Built That Portable Set Yet? If you haven't, R.D.-85 is a good portable receiver hook-up that you should know. See it next issue.

A Flewelling Variation—Something different you may like. Read about it on page 12 next week.

Part III of the Broadcaster's Telephone Book—accurate as always—with state-city index, is due to appear in the June 16 number. Keep your "Telephone Book" up-to-date and complete.

Read Indigest? Watch for "The Trail of the Kanoofis"—a four part poem alone worth buying the Digest for during the next month.

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TRANSMIT WAVES IN "FLASHLIGHT" BEAM

REPORT IMPORTANT WAY TO CUT INTERFERENCE

Forty Vertical Wires in Parabola Frame Serve as "Mirror" Reflector

WASHINGTON.—F. W. Dunmore and F. H. Engel, Radio experts of the Bureau of Standards, state that for point-to-point Radio communication there are two important ways of reducing interference; that is, to direct the waves radiated from the transmitting stations in a narrow beam toward the receiving station, and to use short wave lengths which are not at present employed.

Experiments have recently been conducted at the Bureau of Standards on transmitting apparatus, employing electron tubes, which transmits a directed beam of Radio waves, and employs waves as short as ten meters. This system offers substantial relief from interference difficulties, and also has the military applications. The apparatus has been used for communication by both Radiotelegraphy and Radiotelephony.

Use Wire Reflector

In the experiments, a reflector used consisting of short parallel vertical wires arranged on a frame shaped like a parabola. This reflector acts much as an ordinary mirror for light waves. The Radio waves are in fact, the same kind of waves as light waves but of considerably longer length. Forty vertical wires were used and the generating set with its small antenna was placed at the focus of the parabola. Each wire was tuned separately to 10 meters by adjusting its length. It was found that about 75 per cent of the radiated energy could be confined within an angle of about 75 degrees.

This apparatus is described in Scientific Paper No. 469 of the Bureau of Standards entitled "Directive Radio Transmission on a Wave Length of Ten Meters," copies of which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for ten cents.

Dreams of Radio Joy for Convicts

Would Be "Missing Link" Between Prisoners and Outside World, Welfare Worker Believes

NEW YORK.—Radio bids fair to become the latest and most important step in prison reform if the dream of Mrs. Maud Ballington Booth, famous leader of the Volunteers of America, is realized.

The much deplored missing link between the long term convict and the outside world would be admirably provided with installation of Radio equipment in every prison in the country, Mrs. Booth said in outlining her plan recently.

Changing Attitude

Society's changing attitude toward those convicted of offending it, is beginning to concede that prisons should be more corrective than penal institutions, Mrs. Booth believes. Instead of the single purpose of punishing the criminal, the new viewpoint calls for treatment of his "mental ailments," she asserts. The new ideal is to return a prisoner to liberty in the community morally reborn at the expiration of his sentence.

Mrs. Booth said Radio has been tried successfully in three prisons so far to her knowledge. These institutions were the Illinois state prison at Joliet, the Dannemora prison and the Allegheny county jail at Pittsburgh, Pa.

WMAQ Receives Aid of WJAZ During Removal to La Salle

CHICAGO.—WMAQ. Daily News — Fair Store plant here is now using the equipment of WJAZ, Zenith-Edgewater Beach Hotel station, by courtesy of the latter. The arrangement will be continued throughout the month of June while WMAQ's equipment is removed to the Hotel La Salle. During the removal afternoon programs will be discontinued.

KSD LIGHT OPERA ON

(Continued from page 1)

June 11, "The Fencing Master", by De Koven; June 18, "The Prince of Pilsen", Luders; June 25, "The Bat", Strauss; July 2, "Sweethearts", Herbert; July 9, "The Gypsy Baron", Strauss; July 16, "The Merry Widow", Lehar; July 23, "Gypsy Love", Lehar, and July 30, "Springmaid", Reinhardt.

Two operas, "Naughty Marietta", by Herbert, and "Wang", by Morse, have already been broadcast.

Seward, Alaska, is conducting a rapid-fire campaign to raise funds for a municipal Radio outfit.

EDEN MAPMAKERS TAKE SETS ON TRIP

ARLINGTON TO TICK OFF CORRECT TIME

Third Expedition to Land of Adam and Eve Recognizes Value of Airwaves as Guide

PEKING, CHINA.—Arlington, Station NAA, will tick off the time for the mapmakers in the Garden of Eden or in what many scientists believe is the original scene of the apple episode.

The third Asiatic expedition is today on its way over the Gobi desert, bound for western Mongolia, where rare fossil finds have already been encouraging enough to lead the scientists to make a determined search for the birthplace of man.

Part of the expedition will go into the southern part of the Gobi about eight or nine hundred miles west and a little north of Peking, to search for fossilized fig leaves or any other thing that will increase knowledge of early animal and possibly human life.

Carry Complete Outfit

This section is carrying an up-to-date Radio receiving set for use in mapmaking. With the set are chronometers that must be occasionally corrected to the fraction of a second, for a slight error in time would mean many yards, even miles.

Consequently the American legation Radio station will receive its time directly from Arlington, and with the aid of a chronometer record and relay it to the expedition in the Gobi.

The other part of the expedition will go 500 miles or so west of Urga, in the wooded hills, to continue the work begun last year. Their discoveries were revolutionary so far as geological theories are concerned and they expect still greater finds.

Find Snakes with Legs

They didn't find Adam or Eve, but they found the mosquitoes fossilized and harmless but perfectly preserved. They found huge reptiles supposed to have existed only in other parts of the world. Among these were reptiles with legs that might have stood upright. They also proved that Mongolia was once a much warmer country, a delightful place to live, which is in itself encouraging, for the present climate is cold, even on summer nights.

The expedition has a fleet of American motor trucks, reinforced by some 50 camels and equipment that insures comfortable if not luxurious living.

Pastorless Churches Reached by Airphone

Birmingham Congregation Fills Pulpit with Ether Set

BIRMINGHAM, ALA.—Is the time coming when there will be preacherless churches along with all the other economical measures which are being adopted? It looks as if Radio is going to aid such a move.

Last Sunday night when a Birmingham church had no preacher, the deacons did not trouble to invite an out-of-town pastor to preach. Instead a loud speaker was cut in on the ether waves from WSY, the congregation went to church as usual and heard a sermon preached from the pulpit of another Baptist church in the city.

About 500 persons were present and officials of the church the next day phoned Dr. J. E. Dillard, pastor of the other church that they "enjoyed his sermon immensely" and took part in the prayers and songs as if they had been present. Dr. Dillard did not know he had been speaking to two audiences, one visible and one invisible.

Whistles in locomotive cabs to signal engineers by Radio waves are being tested on railroads in France.

ASKS DIVORCE; RADIO NAMED "LOVE CHIEF"

NEW YORK.—His Radio set was named as co-respondent by Mrs. Emma E. Mapother recently in a separation suit against George Mapother, wholesale druggist. Mrs. Mapother declared Mapother insisted on sitting up most of the night listening in on concerts and what-not, and keeping her awake the rest of the night quarreling.

JAZZ FALLS BEFORE EDUCATION AT KFDB

SAN FRANCISCO.—Station KFDB has discontinued broadcasting entertainment and reverted to the former policy of putting on the air matter of educational nature only. Under this arrangement the station operates only during mornings and afternoons, the evening hours having been abandoned for the present.

BUFFALOS LIKE BROADCASTS TOO

The miniature portable tube set Miss Ruth Wendt, Merrill, Wisconsin, girl, is holding in the palm of her hand, would just about make one bite for her friend, Mr. Buffalo. His interest in the camp's ether wave receiver, however, prevents him from resorting to such tactics

Texas Governor and Theo. Roberts on WEAY Program

HOUSTON, TEX.—Governor Pat M. Neff of Texas and Governor E. Lee Trinkle of Virginia joined Theodore Roberts, famous actor, in a two-hours Radiophone program recently at The Evening Post studio of WEAY, the Iris theater station.

Val and Earnie Stanton, brothers touring the Interstate circuit, also helped make up the bill with their "English as she is not spoken" a vaudeville act complete.

Want Press Commercial Station

OTTAWA.—Application to the department of marine for a license for a Radio station near St. Margaret's Bay, Halifax, has been made by the American Publishers' Committee on cable and Radio communications. Business is to be entirely press matter which will be relayed to New York, Chicago and other centers.

W. W. Grant Manufacturing Broadcasters' Equipment

CALGARY, ALTA.—W. W. Grant, president of The W. W. Grant Radio, Ltd., at Calgary, owner of broadcasting station CFCN, has now undertaken the manufacture and sale of Radiophone broadcasters.

During the last week he has manufactured and sold broadcasting sets to one firm in Saskatoon, Sask., Olds, Alta., and a large corporation which is installing plants in Mexico and South American cities.

WOAW Becomes Crime Sleuth

OMAHA, NEBR.—Police Commissioner Butler has arranged with the Woodmen of the World to have Station WOAW immediately available for police use in emergency. By this means, description of criminals or suspects will be sent out immediately following a crime.

AROUSES INTEREST IN CITY BY RADIO

BROADCAST SESSION OF POLICE COURT

Mayor of Kansas City Explains Functions of Government—Asks Citizens' Co-operation

KANSAS CITY, MO.—Mayor Frank H. Cromwell has evolved the problem of creating personal interest in the city's government among the citizens.

He's done it by Radio.

Believing the main trouble with city government was that not enough persons understood its workings, the mayor determined upon a publicity campaign.

But there were no funds for advertising.

There were no funds and no stenographers to write personal letters to all the taxpayers.

So the mayor hit upon the idea of using Radio.

Arrangements were made with the Sweeney Electrical and Automotive School broadcasting station, WHB, and now the plant carries a municipal program one evening each week.

Explains Problem to Citizens

First the mayor himself explained some of his problems and asked co-operation of citizens.

Next John B. Pew, city counselor, lectured on municipal problems—told how ordinances are passed, how improvements are determined upon and how taxes are assessed and collected.

Then Charles B. Tucker of the board of public welfare; Charles S. Foreman, assistant engineer of the municipal water system, and other heads of departments followed with explanations of municipal affairs.

The mayor found the plan worked to perfection except that voters still were in ignorance of how courts and commissions proceed at hearings.

Broadcast Proceedings

So the microphone was moved from one municipal organization meeting to another.

The first experience was in broadcasting a session of the police court.

Listeners in heard the judge ask traffic violators why they drove by standing street cars, why they failed to drive on the right side of the street and why they did not observe traffic regulations.

Now the mayor believes the public is more in sympathy with his attempts to give the city a good administration. Police heads believe broadcasting of municipal court sessions helps the public understand the laws.

Mississippi to Have New Broadcaster in College

Station 5YE Awaiting License to Go on Air

NEW ORLEANS, LA.—The first station to broadcast in Mississippi will be 5YE, the new station being installed by the University of Mississippi. The school will make a specialty of broadcasting typical college songs, glee club music and university orchestra programs in addition to athletic news. Regular broadcasting awaits only the obtaining of a license.

Dr. W. L. Kennon will operate the station assisted by five student operators. The university hopes to arouse interest among "Ole Miss" alumni in southern cities who, it is believed, will thrill anew to their favorite glees resounding through the ether in the voices of their sons.

KGB Celebrates First Birthday

TACOMA, WASH.—KGB, the Tacoma Ledger-William A. Mullins Electric Company broadcasting station, celebrated its first birthday recently. The Ledger station presented a special anniversary program, duplicating insofar as possible the original program given at the station on its opening night a year ago.

THE ANTENNA BROTHERS — Spir L. and Lew P. — No Doubt 'Twas WSB

The Week's Advance Broadcast Programs

Tuesday, June 5

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, Star Orchestra; "Gunga Din" Thomas Pyburn, reader; "My Dreams", W. Woods, cornetist. "Premier Amour", Star Orchestra; "Kissing Cup's Race"; Thomas Pyburn, reader; Cornet selections, W. Woods; "Spanish Serenade" Star Orchestra; "The Cremation of Sam McGee", Thomas Pyburn, reader.

KHJ (Pacific, 400), 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Concert and musical specialties furnished by Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Alice LeTarte, pianist; Martin Nelson, Lewis Meehan, tenors; Bernice Solomon, reader; Mrs. E. C. Kuss, Carl Linner, accompanists; Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Hotel Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:02-1:00 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Talk, "Affairs of the Heart", Besty Logan; 7:30-7:55 P. M., Dream daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Concert, Jessie McKee's Orchestra; 11:00-12:00 P. M., Musical program under auspices of Sanger Bros.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00-3:30 P. M., Song and piano recital; 3:30 P. M., Strawbridge and Clothier Male Quartet; 6:30-7:00 P. M., Safety talk by Stanley Cowman of the United States Fidelity and Guarantee Company; 8:00-8:30 P. M., Boy scout period; 8:30-10:30 P. M., Musical program; 10:30-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales", Uncle David; 8:30 P. M., Babson report; Selections by Mrs. Annie L. Heiser, soprano, and pupils; Tufts College lecture; Playlet, "A Cyclone for a Cent", Amrad Players; Mrs. Annie L. Heiser, soprano.

WGY (Eastern, 380) 1:00 P. M., Music and address, "The Moscow Art Theater", Mrs. A. B. McKenzie, Schenectady Woman's Club; 7:35 P. M., Address, "The Saratoga Cure", John G. Jones, Supt. Saratoga Springs Commission; 7:45 P. M., Radio drama, "Happiness", WGY Players.

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Trio; Babson's Radio Release.

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Short talk; 3:00-4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner music program; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00-10:10 P. M., Recital; 10:10 P. M.; Dance music, Charlie Kerr's L'Aiglon Orchestra.

WJAX (Eastern, 390), 7:30 P. M., Concert furnished by Cleveland News.

WLW (Eastern 309), 10:00 P. M., Musical program, Alma L. Goldstine, pianist; "The Great Awakening", "Give a Man a Horse He Can Ride", Theodore Niedzielski, baritone; Schweuker's "Mazurka in E Flat Minor", "In the Roses", Ruth S. Arnold, harpist; Mary Green, soprano, Ruth S. Arnold, harpist; Playlet, "Sweet and Twenty"; "Star Eyes", "The Banjo Song", Theodore Niedzielski; "Dance Fantastique", Ruth S. Arnold; Santuzza's Aria from Cavalleria Rusticana; "Believe Me If All Those Endearing Young Charms", Ruth S. Arnold; Alma L. Goldstine; "The Singer", "Su Mirada", Mary Green, soprano.

WMAQ (Central, Daylight Saving, 447), 9:15 P. M., Musical program, Mixed Quartet from Lyceum Arts Conservatory.

WMC (Central, 500), 8:30 P. M., Concert, Hotel Gayoso Orchestra, Gaspar Pappalardo, director; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Educational talk, A. G. Hinrichs.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon Music, Tea Room Orchestra; 4:45-5:00 P. M., Organ.

WWJ (Eastern, 580), 8:30 P. M., Concert, The News Orchestra; The Town Crier; Emily Zampella Duff, soprano; E. M. Murray, baritone; Evalyn Karr, coloratura-soprano.

Wednesday, June 6

CFCA (Eastern, Daylight Saving, 400), 8:00 P. M., Overture, "Masaniello", Star Orchestra; "That Night", Elcho Fiddes, tenor; "Serenade", Star Orchestra; "Tambourin Chinois", Harry Adaskin, violinist; "Sound the Pibroch", Elcho Fiddes, tenor; "Skaters' Waltz", Star Orchestra; "From the Land of the Sky-Blue Waters", Harry Adaskin, violinist; Suite, "From the Country-Side", Star Orchestra; "Inter Nes", Echo Fiddes, tenor; "Through Battle to Victory", Star Orchestra.

KHJ (Pacific, 400), 6:45-7:30 P. M., Children's Hour, "Uncle John"; 8:00-10:00 P. M., Program arranged by South Pasadena Chamber of Commerce.

KSD (Central, 546), 8:00 P. M., Concert, Standard Oil Band of Wood River, Ill.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Grace King Granston, soprano; S. R. Sjoberg, accompanist; Dixie Fields, soprano; Wendell W. Hall; George Cranston, tenor; Kellers Orchestra; 9:25 P. M., "Twenty Minutes of Good Reading", Rev. C. J. Pernin, Loyola University.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Banjo Orchestra from Butcher School of Music.

WDAR (Eastern, Daylight Saving, 395), 1:30-2:00 P. M., Organ recital; Stanley Theater; Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Solos; Talk, "Affairs of the Heart", by Betsy Logan; 7:30-7:55 P. M., Bedtime stories, Dream Daddy. 8:00 P. M., Short talks and musical program.

WFAA (Central, 476), 12:30-1:00 P. M., Musical program, Melba Theater talent.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis' Bellevue Stratford Orchestra; 3:00-4:00 P. M., Musical program, 4:00 P. M., Song recital; 6:30-7:00 P. M., Children's own half hour, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales", Uncle David; 8:15 P. M., Girls' Hour, Eunice L. Randall; "Pung Chow and Stories of China", Marion A. Hewlett; Musical program, Uncle Eddie.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Accordeon solo, Salvatore Ercolino; Songs for children, Hilda Kaufman; Comedian, Sam Ward; Zither duets, Ruth and Charles Hohe; Children's story, "Epaminandas" Hilda Kaufman; Zither duet; Banjo, mandolin and guitar selections, Al Zeps and Sons; "Poems for Children", R. C. O'Donnell; Concert, Choir of Grace M. E. Church of Norwood; "Day Is Dying in the West", Choir; "God Shall Wipe Away All Tears", Naomi Earhart; "Savior, Thy Children Keep", Choir; Ralph House, cellist; "Hark, Hark My Soul", "Quartet; Talk, "The Road to Greatness", Dr. J. J. Richards; "Love's Old Sweet Song", "Sweet and Low", Choir; Alma House, soprano; "Jubilate", Choir.

WMAQ (Central, Daylight Saving, 447), 7:00-7:30 P. M., Babson report; 7:30-8:00 P. M., Talk on Infant Welfare Society; Burdette Cleveland, soprano; 9:15-10:00 P. M., Maurice G. Ivins, baritone.

WOC (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk; 8:00 P. M., Organ recital, Erwin Swindell, organist; 10:00 P. M., Musical program, Galva Military Band, of Galva, Ill.; Address, Mayor Howard Mellow, of Galva, Ill.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon Music, Tea Room Orchestra; 4:45-5:00 P. M., Organ; 7:45-8:30 P. M., Song recital; 8:30-10:55 P. M., Dance music, Hotel Adelphia Orchestra, A. Candelori, director.

WWJ (Eastern, 580), 8:30 P. M., Concert News Orchestra; Town Crier; Vocal selections, pupils of George Carr.

Thursday, June 7

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selections "High Jinks" Star Orchestra; "First Movement from Mozart Sonata in G Major", Sarah Gelman, pianist; "Melody in F", H. Saunders, cellist; "Rosaura" Star Orchestra; "Sherzor in E Minor", Sarah Gelman, pianist; "Gold and Silver", Star Orchestra; "The Evening Star", H. Saunders, cellist; "Etude in F Sharp", Sarah Gelman, pianist; Suite "Country Sketches", Star Orchestra.

KHJ (Pacific, 400), 6:45-7:30 P. M., Children's Hour, "Uncle John"; 8:00-10:00 P. M., De Luxe program.

WBAP (Central, 476), 9:30-10:45 P. M., Negro spirituals and folk songs, Mount Pisgah Negro Baptist Church.

WDAR (Eastern, Daylight Saving, 395), 11:30-12:50 P. M., Musical program, Stanley Organ, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical selections and short talks; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Simple Civic Duties", Judge Rosser Thomas; 8:30-9:30 P. M., Musical program, J. A. Fite, bazoo, assisting musicians; 11:00-12:00 P. M., Musical program, under the auspices of D. L. Whittle Music Co.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Song recital; 6:30-7:00 P. M., Children's Own Half Hour, Cousin Sue; 7:00 P. M., Short talk; 8:00-10:30 P. M., Musical program; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales", Uncle David; 8:30 P. M., Dean Winslow Hanscom, tenor; "Budgets", I. E. Dierdorff; Grace R. Olin; Musical program.

WGY (Eastern, 380), 1:00 P. M., Music and address, "Foods for Growth—Cereals", Mary G. McCormick, Supervisor of Nutrition, N. Y. Dept. of Health; 7:30-8:00 P. M., Program of National Elec. Light Ass'n., Carnegie Hall, N. Y.; 8:15 P. M., Address, Julius H. Barnes, President of U. S. Chamber of Commerce; 8:45 P. M., Anna Case, soprano.

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Short talk; 3:00-4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00-9:00 P. M., Musical program; 9:00-9:30 P. M., Karl Bonawitx, organist.

WJAX (Eastern, 390), 8:00 P. M., Concert; "Beneath Thy Window", "Deep in the Mine", Wendall Phillips; Gavotte from "Iphigenie In Aulis", Caprice from "Alceste", Mrs. Lester L. Askue; Scotch ditties and monologues, Phil Barker, "The Harry Lauder of Cleveland"; Recitative air from "Nadeschda", "My Heart is Weary", Marie Simmelink; "Meditation" from "Thais", "Liebesfreud", Diana Miller, violinist; Accordion selections, S. R. Rinn; "A Dream", "Sweet Miss Mary", Wendall Phillips; Scotch songs, Phil Barker; "Romance and Trabesque", "Jest in Vienna", Mrs. Lester L. Askue; "Thy Beaming Eyes", "Pleading", "All For You", Marie Simmelink; "The

(Continued on page 9)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

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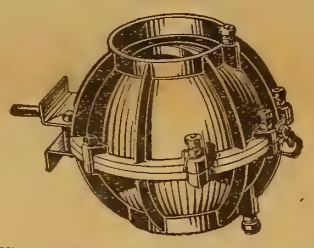

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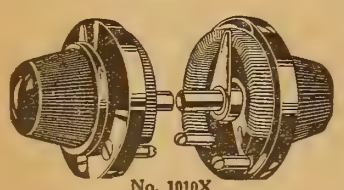

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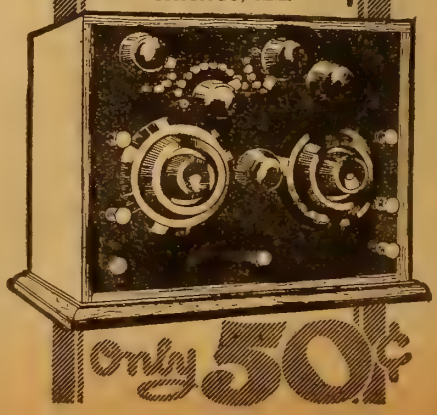
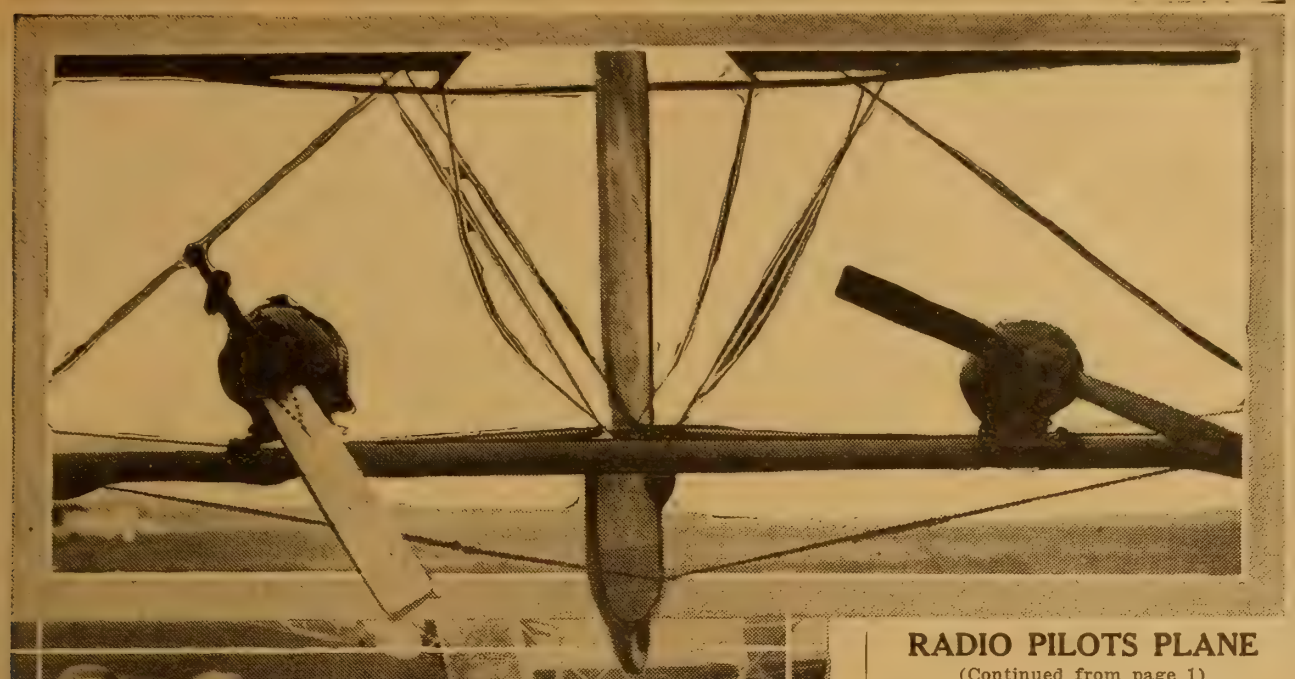


PILOTLESS FRENCH PLANE PROVES SUCCESS



Top photo, two gyroscopes which kept plane on even keel. Center photo, party in charge of experiment, left to right: Capt. Boncher, M. Pescheron, M. DeMarcay, M. Laurent Eynac, Capt. Arbanere. Bottom left, plane in flight
Photos by Topical Press, London

RADIO PILOTS PLANE

(Continued from page 1)

M. Pescheron, engineer in charge, and Capt. Arbanere, the pilot, were passengers in the plane during the flight, but were there only to observe the control and land the ship in case something should go wrong. The success, however, proved so great that they did not touch a control during the take-off, flight, or landing.

The builder and inventor of the plane is M. De Marcay, famous French aeronautical and Radio engineer. He is said to have negotiated the sale of his invention with the French government.

Description of Flight

The machine has been made almost automatic, a button on the ground controlling by Radio only the ascent, the descent and turning movements. Everything else was automatic.

Stability was obtained by gyroscopes connected with auxiliary motors by means of cogs. In landing, the machine when ten feet from the ground, automatically righted itself and shut off the motor.

After it had touched the earth the engine started again and the machine ran along the ground. The aeroplane after leaving the ground flew over the aerodrome exactly like one driven by a human pilot, and landed without mishap amid the cheers of the spectators.

War Use Visualized

War use of the pilotless, Radio-controlled plane unfolds unlimited possibilities. Photographic record could be made of the entire enemy front without endangering a pilot's life, or if the pilot were wounded, the Radio-control would bring the plane and pilot back behind the lines in safety.

Bombing expeditions could be carried to the limit with the new invention. Tons of explosives might be dropped on enemy ground while one pilot at the Radio control key, on the ground, could direct the entire squadron on the bombing expedition.

Amateurs experimenting with Radio sets should never tinker with house lighting circuits or other high voltage systems.

SPECIAL OFFER LIST

(Continued from page 2)

(5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.).

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80) the following will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Democal Variable Condenser 11-Plate; Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.).

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.).

WJAX Gives Condensed News

CLEVELAND, OHIO. — WJAX the boadcasting station of the Union Trust Co. here has augmented its regular program of financial and stock reports with a condensed report of all important news of general interest. The reports will be furnished by the Cleveland News.

Sunday Evening Club Suspends

CHICAGO.—Concluding services of the Sunday Evening club prior to the summer adjournment were broadcast from Orchestra hall by Station KYW Sunday. The services will be resumed October 7.

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-door photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago.

SMUGGLES SET TO HIS BEDSIDE IN HOSPITAL

Patient, Suddenly Taken Ill, Determines to Hear Wife Sing

BOSTON, MASS.—Stephen O'Neill of Dorchester is the most envied patient at the Boson City Hospital. He is the only one in that institution to have a Radio set to while away his time while undergoing treatment. Although the hospital authorities now know tnat his Radio has been installed, it was not for several days after it came in that they discovered it. The set is now enjoyed by all the patients in the ward from time to time.

O'Neill had a special reason for having the set brought in to him and quietly connected up, for he wanted to listen to his wife's singing broadcast from the Shepard Stores station, WNAC, recently. She and her husband were recently scheduled for a musical program at WNAC in connection with the Young Men's Catholic Association Glee Club, but just before the event Mr. O'Neill was taken seriously sick and rushed to the City Hospital for an operation. Not to be beaten by sickness, he decided to hear the program at all costs, and with the assistance of friends secured the set and secretly installed it near his bed.

The Mystery Circuit

The trick is in the Coil
NO STORAGE BATTERY REQUIRED
No Radio Frequency Transformer used. Not Super but DOUBLE Reflex Regeneration. Works local without antenna or ground, and brings in the "FAR AWAY ONES" with more volume than you ever thought one tube could deliver.
Money Order for 25 cts. brings easy to read diagrams and all information. Address:
JACK PRATT
508 Railway Exchange Bldg., Chicago, Ill.
P. S.: Its Radio Golf Record is 119,000 miles.
First Trial Picked Up Havana from New York

Book of HOOK-UPS for One Dollar
Reinartz Flewelling Reflex

many others, simple and elaborate, fully diagrammed and explained. Used continuously by thousands of Radio fans, both amateurs and professionals. The greatest book ever published for experimenting. Keep this valuable little book before you at all times. Send your check or money-order for one dollar and the book will be mailed to you. Forty-seven hook-ups, all different. Send your order today. The edition is limited.

Book of Hook-ups, $1.00

E L S RADIO COMPANY
Randolph Building
CHICAGO, ILL.
Special Offer to Dealers

PREMIER
"MICROMETER" VARIOCOUPLERS
Cure the New Wave Length Troubles

$5.00 COMPLETE WITH DIAL.

A HIGHLY SELECTIVE VARIOCOUPLER having 180-degree orientation and 20 Antenna taps which facilitate very sharp tuning. Wound with No. 21 single silk or black enameled pure copper wire. Eighty turns on stator—fifty-five on rotor. Wave lengths range from 150 to 750 meters. All metal parts brass—contacts positive—stays "Put" at any angle. Adaptable for either single circuit or loose coupled tuned plate hook-ups. Bakelite button on each tap wire permitting easy and safe soldering.

Our Complete Parts Bulletin on request.

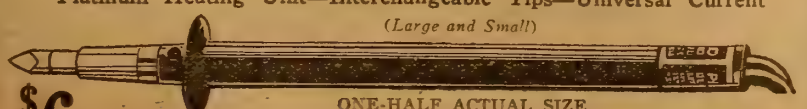
DISTRIBUTORS—We make a most complete line of Radio parts. Some territory open for live, responsible concerns.

PREMIER ELECTRIC COMPANY
Manufacturers Est. 1905.
3810 Ravenswood Avenue, CHICAGO, ILL.

Delicate Soldering

Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.

THE POST SOLDERING IRON
Platinum Heating Unit—Interchangeable Tips—Universal Current
(Large and Small)



ONE-HALF ACTUAL SIZE

$6 Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute

From your Dealer, or write

POST ELECTRIC COMPANY (Dept. 509), 30 E. 42nd St., New York

ZENITH 1R DETECTOR AND 2M AMPLIFIER

HOW TO OPERATE UNITS CLEARLY EXPLAINED

Apparatus Comprises Regenerative Feed-Back Detector and Two-Stage Amplifier—Selective and Sensitive

See Photo Diagram on Facing Page

The standard receiving set illustrated on page seven is a Zenith 1-R Receiver and 2-M Amplifier, manufactured by the Chicago Radio Laboratory, Chicago. It comprises a three-circuit regenerative feed-back tuner and detector combined with two stages of audio frequency amplification. Some of its features are: Total elimination of body capacity by proper concentration of electro-static and electro-magnetic fields without the use of metal shields or screens; reduction of high frequency resistance to a minimum and consequent increase in signal strength and efficiency; unusual selectivity and distance range achieved by radical departures from customary methods of construction.

Battery Connections to Set

In the photo diagram the first photo shows the front view of the set and its controls. The lower view illustrates the panels with the mounted apparatus as moved from the cabinet. When inserted in the cabinet the binding posts project from the back through holes in the base. The antenna and battery connections are made to these posts.

The detector plate battery and likewise the amplifier plate and biasing batteries are incorporated in the interior of the cabinet. These then do not have to be added to the external connections but are shown for clearness and simplicity.

The photo diagram illustrates the method of making the connections between the I-R receiver and the 2-M amplifier. It is particularly important that the positive pole on the storage battery be connected as shown on the diagram. The positive pole is usually marked "Pos," "P" or "x" and is frequently painted red. The negative is marked "Neg," "N" or "—" and is frequently painted black. This applies to the B batteries also, where the positive lead is red and the negative lead is black.

Loud Speaker Use

Whenever a loud speaker is used in connection with the 2-M amplifier, extra B battery should be connected to posts No. 5 and No. 6. This extra B battery should be not less than 67½ volts, and preferably should be 90 volts. It may consist of three or four 22½ volt B batteries connected in series (i.e., positive of one to the negative of the next, and so on), or may be two of the 45 volt or one of the 90 volt B batteries on the market, whichever is best available. Positive should connect to No. 5 and negative to No. 6.

When using a loud speaker in connection with the 2-M amplifier, never connect it to posts No. 5 and No. 6 in series with the extra B battery, as is sometimes done with other types of amplifiers. Always connect the loud speaker terminals to a telephone plug and insert this plug in whichever step of the amplifier is required for the strength desired.

Instructions for Operation

When the installation has been completed insert the three vacuum tubes in their respective sockets inside the instruments. It is better to begin operating the instruments by using the head phones rather than by attempting to use the loud speaker at first. Never use the loud speaker for tuning, but tune using head phones only, switching to loud speaker when tuning is completed and station is heard clearly in phones.

The detector rheostat should be set between points 8 and 9 and the amplifier rheostats a little further advanced. If either UV-201A or C-301A tubes are used all rheostats are set between 0 and 1.

Place the head telephone plug in jack No. 2 in the amplifier, turn the battery switch to the "on" position, and with the pointer of secondary tuner knob on graduation 2 turn the pointer of the tickler knob very gradually to the right. It is better when adjusting these two pointers to use the small knobs for making these adjustments. As the pointer is gradually moved to the right you will notice a faint "scratchy hiss" in the telephone and you will note that as the first pointer is changed to a different position this "hiss" in the telephones is also secured at a different position on the tickler pointer. If this pointer is turned too far to the right you may hear a loud, unpleasant "howl" in the head telephones. This "howl" is an indication that pointer is turned too far to the right.

With one hand on the left small knob and the other on the center small knob, keeping tickler pointer at all times far enough to the right so that the hiss continues, revolve secondary tuner pointer over the portion of the scale between 1 and 5. A series of clear flute-like whistles will be heard, provided broadcasting stations are in operation within your range. It will be noticed that when you locate one of these whistles, that as you move the secondary pointer the whistle is first of very high pitch, and as the movement of the pointer is continued the pitch becomes lower, and finally the sound is lost entirely; and as the movement of the pointer is still continued the whistle is again heard low in pitch, and on further movement increases higher and higher until lost again. The center of this whistle, or the silent point, is the exact setting for the station transmitting. Once such a whistle is located and a silent point found, gradually turn tickler pointer to the left. This requires again an adjustment of the first pointer to keep at the silent point. Then tickler is turned slightly further to the left, and secondary again adjusted. This operation is continued until the hissing sound in the telephone stops, and the station should then be heard clearly. The operator should learn to adjust these two simultaneously and not first move one and then the other.

It will be found, usually, that on one or two points on lower switch the operator will be unable to secure the hissing sound by turning tickler pointer. These "dead" points should thereafter be avoided. They are, usually, depending on the antenna used, points 3 and 4, 4 and 5, or 5 and 6. Should there be more than two of these "dead" points, it is good evidence that there are exceptional losses in the antenna, and a better antenna should be provided.

After the "dead" points have been located, set the lower switch on the contact just below the dead points and adjust pointers secondary and tickler until you hear clearly and loudly a fairly distant station, selecting your time for this when a local or nearby station is not transmitting.

Supposing the "dead" points in this case are 5 and 6, set lower switch on point 4 and adjust till you hear the station clearly. If point 3 is better than point 4, try point 2. After you secure the best point on lower switch, try movement of upper switch until you find the best point on it for that particular station. It is possible that when you desire to hear a particular station and have adjusted both as above indicated, there will be some undesired interference which prevents you hearing the station clearly. In such a case, still assuming that points 5 and 6 are found to be dead, try point 7, again adjusting secondary and tickler until the station is heard, then 8 and 9 on both, and lastly the various points on upper switch, until you have found the best point above the "dead" points. This procedure often gives equally good receiving conditions and does away with the interference.

In case it is desired to tune out a nearby broadcasting station and receive distant stations, quite satisfactory results are usually obtained by either setting lower switch on point 1 or 2, and varying upper switch till the best point is found where the distant station comes in clearly and the local station is not heard. Sometimes the local station can be eliminated by using the lower switch on points 9 and 10. This especially applies when the local station is operating on 360 meters, and the distant station is operating on 400 meters.

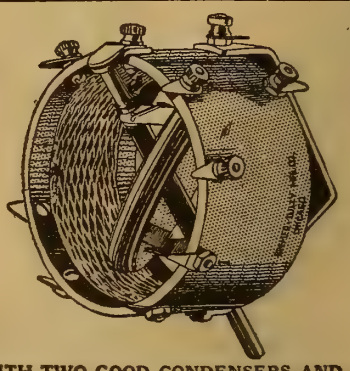
For Radiophone reception, the small knob and pointer at the bottom to the right should be left on point 2, although under certain conditions the longer or 400 meter broadcasting stations will be received quite clearly when this switch is set on point 3, but with corresponding change in position of the secondary pointer, which will then be found to be somewhere nearer the lower end of the scale.

It will be noted from the instructions given that for ordinary conditions all but two of the adjustments provided are left fixed, once found. After these have been found the operator confines his efforts to the secondary and regeneration controls, using the small knobs to manipulate them.

HERE'S YOUR CHANCE TO LEARN MONGOLIAN

SHEFFIELD, ENG.—A Radio experiment of great interest is to be made here soon. General Ferrie, Director-General of Radio Services to the French Government, has agreed to broadcast to three Sheffield schools, each fitted with sets, a fable and a poem in French. The experiment, it is believed, will lead to students in all countries getting a first-hand grasp of foreign languages by listening in to the teaching in native schools.

Meters, measuring the time during which persons are listening in on a radio concert, is the suggestion coming from South America. Actual use was made of such an arrangement recently in Belgrano, a suburb of Buenos Aires.



WITH TWO GOOD CONDENSERS AND A

B-T VERNIER TUNER

you can hook up the latest circuits with absolute vernier control and greatly superior results.

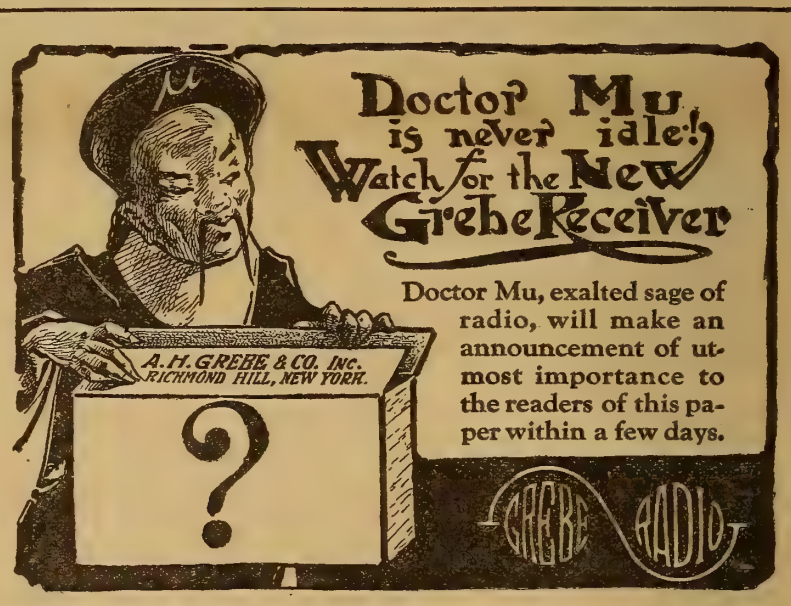
Detailed diagrams furnished. 180-750 meters. Price $5.00

BREMER-TULLY MFG. CO.
532 S. Canal St Chicago

RITTER LOOP AERIAL $1

All parts supplied; can be assembled in 10 minutes. We guarantee that the Ritter Loop will eliminate lightning troubles. Reduces static, interference and noises from your neighbors' regenerative sets. Come and see the Ritter Loop Assembled. By mail 10c extra.

RITTER RADIO CORP.
232 Canal St., near Centre New York



DON'T PASS THIS-BUY

Every World User Is a Booster

WRITTEN 2 YEAR GUARANTEE

Because you deal direct with a manufacturer who is responsible for the performance and quality of the Battery.

World-Radio-Batteries

6 Volts—40 Amps., $8.50	6 Volts—80 Amps., $12.50
6 Volts—60 Amps., $10.00	6 Volts—100 Amps., $14.50

6 Volts $16.00 120 Amps.

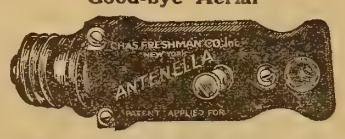
Full Rating Guaranteed

MAIL YOUR ORDER TODAY. WE SHIP EXPRESS C. O. D., SUBJECT TO INSPECTION, OR WILL ALLOW 5% FOR CASH WITH ORDER. ALL ORDERS SHIPPED SAME DAY AS RECEIVED.

WORLD BATTERY COMPANY,
60 E. Roosevelt Rd., Dept. L, Chicago, Ill.

Summer Static Overcome

"Good-bye Aerial"



ANTENELLA

No aerial or antenna needed

All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.

Merely plug Antenella in any light socket and you can enjoy all Radio pleasures in any room in your home, apartment or hotel. No current consumed.

New Improved

ANTENELLA

NOW ONLY $1.25 formerly $2.00

At your dealer's—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE, NEW YORK

BARGAINS THAT SATISFY

VARIOMETERS	
Raysol (Kiln-dried parts)	$2.00
VARIOCOUPLERS	
Eastern Green Silk Wound	1.60
Queens (180 degree)	2.30
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Eastern Long Wave (150-3200 meters)	5.50
Cockaday Coils	2.35
CONDENSERS	
Regal, 43 Plates, .001 Mfd. Cap.	2.25
Regal, 11 Plates, .00025 Mfd. Cap.	1.65
American Bell, 43 Plates with Vernier	3.95
American Bell, 23 Plates with Vernier	3.65
Arrow, 23 Plates with Vernier	3.50
Phone By-pass, A. J. M.	.35
RHEOSTATS	
Regal (High quality, 8 ohm)	.70
Klosner Vernier	.55
Paragon	.30
Roberts 6 Ohm Standard	.60
Bradleystats	1.30
Resistances	
SOCKETS	
Moulded	.35
Rameco	.35
Turney (All Metal)	.25
TRANSFORMERS (Radio Frequency)	
Tricoil (of Subway Reception Fame)	1.35
Radio Laboratory RT-1	2.50
Murad T-11	2.20
Baldwin	1.55
DIALS	
Kesco 3½-inch Moulded	.30
Kesco 3-inch Moulded	.25
Kesco 2-inch Moulded	.25
American Hard Rubber, 3-inch	.50
American Hard Rubber, 4-inch	$0.55
Electrose, 4-inch Fada Knob	.55
Emeloid 3-inch Unbreakable	.30
Emeloid 2-inch Unbreakable	.20
Vernier Dial Adjustment	.20
HEAD TELEPHONES	
Royal Phones	3.75
Telephone Connectors, Regal, for 3 Pair Phones	.90
Phonograph Attachment "Y" Shape	1.00
Radiophone Adapter (Rubber Moulded)	1.35
TUBES	
Meyers High-Mu (Last Lot)	4.35
BATTERIES ("B" Only)	
Volton 22½ V., Small Size	.90
Volton 22½ V. Medium Size	1.14
Volton 22½ V. Large Size	1.55
Volton 45 V., Medium Size	1.98
Volton 45 V. Large Size	2.50
MISCELLANEOUS	
Single Circuit Jacks	.25
Double Closed Circuit Jacks	.35
Telephone Plugs	.65
Bus Bar Wire, per foot	.015
Spaghetti (any color), per length	.07
Single Coil Mounting	.35
Double Coil Mounting	2.00
Triple Coil Mounting	2.50

All Atwater-Kent, Radio Corporation of America, Fada, DeForest, Dubilier, General Radio and Brach merchandise—Special prices on inquiry.

We also carry in stock at all times all parts for Flewelling, Reinartz, Reflex, Cockaday, Hazeltine-Neutrodyne, Mawhinney and Armstrong Super-Regenerative Circuits.

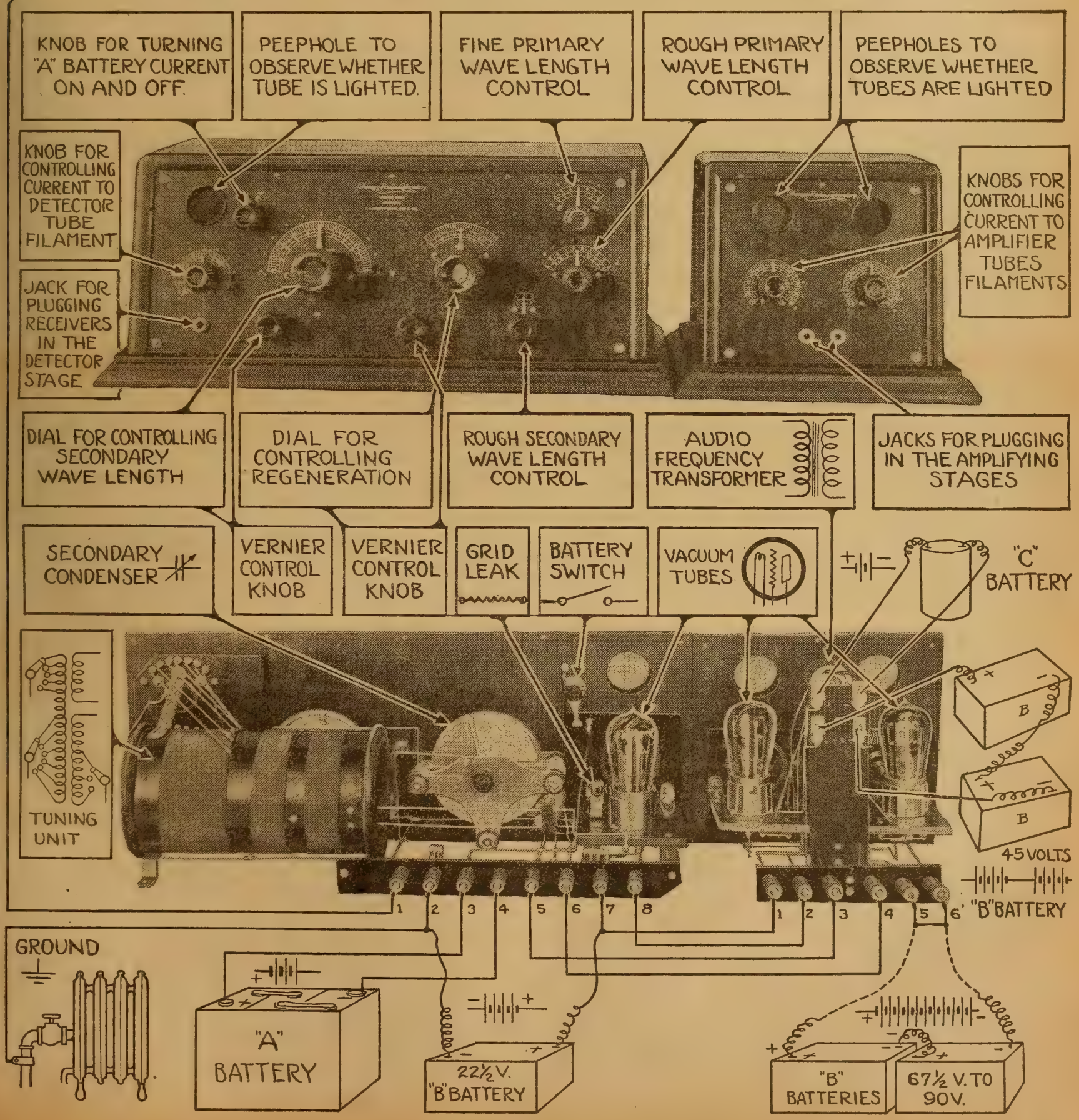
All merchandise guaranteed by both the manufacturer and ourselves. Will be shipped upon receipt of purchase price, including postage.

Radio & Mechanical Trading Corporation
23 WARREN STREET, NEW YORK CITY

Radio Receiving Sets

Zenith 1-R Receiver and 2-M Amplifier

As another of the series of standard receiving sets, Radio Digest presents herewith the photo diagram of the Zenith 1-R Receiver and 2-M Amplifier, manufactured by the Chicago Radio Laboratory, Chicago. The set uses a three-circuit regenerative feed-back tuner, licensed under Armstrong patent No. 1,113,149. This is combined with a two-stage audio frequency amplifier. The set has great selectivity and range, achieved by unusual departures in design. Operating instructions and description will be found on page six. Although the reader may not own a Zenith, points of similarity in standard receivers will repay him for studying the diagram.



Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the last part, together with the city-station index will appear next week.)

KYW, Chicago, Ill. 345 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central, Daylight Saving.

KZM, Oakland, Calif. 360 meters. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 360 meters. 1,000 mi. Desert News. Slogan, "The Center of Scenic America." Daily ex Sun, 8-9:30 pm, music, news, bedtime stories, etc. Mountain.

KZV, Wenatchee, Wash. 360 meters. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 435 meters. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3 (Tues. only), Dept. Interior: 3:25-4:40, 5:05-5:20, markets, weather 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 meters. 1,500 mi. International Tel. & Teleg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAAB, New Orleans, La. 268 meters. Valdemar Jensen.

WAAC, New Orleans, La. 360 meters. Tulane Univ. Mechanics Inst. No regular schedule.

WAAD, Cincinnati, O. 360 meters. 200 mi. Ohio Mechanics Inst. No regular schedule. Central.

WAAF, Chicago, Ill. 485 also. 300 mi. Chicago Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Sat, same ex no program at 3 and 4:30 pm. Central, Daylight Saving.

WAAH, St. Paul, Minn. 360 meters. 500 mi. Commonwealth Elec. Co. Slogan, "From the Land of Ten Thousand Lakes." Temporarily discontinued.

WAAK, Milwaukee, Wis. 280 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 11 am-2 pm, 8-10:30, music. Eastern.

WAAN, Columbia, Mo. 360 meters. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAQ, Greenwich, Conn. 360 meters. New England Motor Sales Co. Temporarily discontinued.

WAAS, Decatur, Ga. 360 meters. Georgia Radio Co.

WAAW, Omaha, Neb. 278 meters. 500 Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 8, market reports; 8:15-9 pm, music. Central.

WAAY, Youngstown, O. 360 meters. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABA, Lake Forest, Ill. 266 meters. Lake Forest College.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABC, Anderson, Ind. 229 meters. Fulwider-Grimes Battery Co.

WABD, Dayton, O. 283 meters. Parker High School.

WABE, Washington, D. C. 283 meters. Y. M. C. A.

WABF, Mt. Vernon, Ill. 234 meters. Mt. Vernon Register-News Co.

WABG, Jacksonville, Fla. 248 meters. 50 mi. Arnold Edwards Piano Co. Thurs, 8-10 pm, concert. Eastern.

WABH, Sandusky, O. 240 meters. Lake Shore Tire Co.

WAI, Dayton, O. McCook Field, U. S. Army.

WAJT, Marshall, Mo. 360 meters. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. 360 meters. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Mon, Fri, 7:15-7:30 pm, educational lecture. Central.

WBAD, Minneapolis, Minn. 360 meters. Sterling Elec. Co.

WBAF, Moorestown, N. J. 360 meters. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. Slogan, "The Silk City of America." 244 meters. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9-11:30 am, 12:30-5:30 pm. Sat morn, only. Sun, 10-12 am, 2-5 pm, 7:30-10:30. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram Club, "Radio Truth League." Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 3:45-4, markets; 5:30-5:45, 6:30-6:45, 8, sports. Daily ex Sat, Sun, 9:30-10:30 pm, concerts. Sat, 7-7:20 pm, bible lesson. Sun, 11 am-12:15 pm, church; 3:30-4:30, concert. Central.

WBAU, Hamilton, O. 258 meters. Republican Pub. Co. Temporarily discontinued.

WBAV, Columbus, O. 390 meters. 500 mi. The Ernor Hopkins Co. Slogan, "We Broadcast a Variety." Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. 360 meters. Marietta College. Temporarily discontinued.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBBA, Newark, O. 240 meters. Newark Radio Lab.

WBBC, Sterling, Ill. 229 meters. Sterling Radio Equipment Co.

WBL, Anthony, Kans. 261 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun, 10:30-11 am, music; 1-1:15 pm, reports; 2:15-2:30 pm, music, reports. Mon, Thurs, Sat, 7:30-8:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Slogan, "Queen City of the South." Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 360 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. 360 meters. Temporarily discontinued.

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 326 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 360 meters. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thurs, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 286 meters. 500 mi. Entrekin Elec. Co. Slogan, "The Heart of Ohio." Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Slogan, "Where Eighteen Railroads Meet the Sea." Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. 360 meters. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20. Mon, Wed, 8-9 pm. Eastern.

WCAR, San Antonio, Tex. 360 meters. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 360 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Mon, 9:30-11 pm, music, lectures. Mon, Wed, Thurs, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 240 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 286 meters. 500 mi. Dur-reports, music. Tues, Fri, 7:30-8 pm, concert. Sun, 10:55 am, church services. Eastern Daylight Saving.

WCAV, Little Rock, Ark. 360 meters. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 360 meters. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. 360 meters. Univ. of Vt.

WCAY, Milwaukee, Wis. 273 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Tues, 10:30-11:30 pm, dance music. Sun, 7:30-9 pm, church services. Central.

WCAZ, Carthage, Ill. 360 meters. Carthage College.

WCBB, Greenville, O. 240 meters. K. & K. Radio Supply Co.

WCE, Minneapolis, Minn. 360 meters. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. 360 meters. Univ. of Tex.

WCN, Worcester, Mass. 360 meters. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program, irregular. Eastern.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Daily ex Sun, 10:35 am, WCX Woman's Club; 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert; 7-8:30 pm, week starting Dec. 18 and alternate weeks thereafter, concert. Sun, 2:30 pm, 4 pm, church services. Central.

WDAC, Springfield, Ill. 360 meters. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. 263 meters. J. Laurance Martin. No regular schedule.

WDAH, El Paso, Tex. 360 meters. Trinity Methodist Church South.

WDAI, Syracuse, N. Y. 234 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert. Eastern.

WDAJ, College Park, Ga. 360 meters. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 360 meters. 150 mi. Hartford. Courant. Sat 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex., 360 meters. 300 mi. Automotive Elec. Co. Daily, 1-1:30 pm, 7:15-8. Central.

WDAP, Chicago, Ill. 390 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central Daylight Saving.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros. Club, "Good Morning Glory." Daily ex Sun, 12-12:55 pm, music; 2-3 pm, 4:30-6, music, talks; 7:30-8 pm, Dream Daddy. Mon, Wed, 8-11 pm, entertainment. Fri, 8-10:50 entertainment; 1 am, Club. Eastern Daylight Saving.

WDAS, Worcester, Mass. 360 meters. Samuel A. Waite

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern Daylight Saving.

WDAX, Centerville, Iowa. 360 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 244 meters. 300 mi. Fargo Radio Electric Co. Daily ex Sun, 9:30 am, weather. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church service; 4-5 pm, music. Central.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, Stapleton, N. Y. 405 meters. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 278 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm. Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. 360 meters. 200 mi. Fallain & Lathrop. Slogan, "The Vehicle City." No definite schedule.

WEAB, Fort Dodge, Ia. 360 meters. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8 music; 8:35 markets; 9:45, weather. Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAD, Atwood, Kan. 268 meters. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. 360 meters. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Daily ex Sun, 4:30-5:30 pm, Mon, Wed, Thur, Sat, 7:30-10 pm. Tues, Fri, 7:30-8 pm. Sun, 3:15 pm, 5:15, 7:15-10. Eastern Daylight Saving.

WEAG, Edgewood, R. I. 360 meters. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 360 meters. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. 286 meters. Cornell Univ.

WEAJ, Vermilion, S. D. 360 meters. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Daily ex Sun, 5:15-6 pm. Central.

WEAM, North Plainfield, N. J. 252 meters. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 360 meters. 50 mi. The Shepard Co. Daily ex Sun, Mon, 12-1 pm; 4-5, 6-8, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern Daylight Saving.

WEAO, Columbus, O. 360 meters. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 360 meters. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAT, Tampa, Fla. 360 meters. John J. Fogarty.

WEAV, Rushville, Nebr. 360 meters. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm, concert, news, etc. Mountain.

WEAX, Little Rock, Ark. 360 meters. T. J. M. Daly. Bros. Co. Daily ex Sun, 10 am, 11, 2, 5 pm, reports, markets, news. Mon, Wed, Fri, 8 pm, concert. Sun, 7 pm, church service. Central.

WEAY, Houston, Tex. 360 meters. 1,500 mi. Will Horwitz (Iris Theater.) Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm, Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 360 meters. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WEY, Wichita, Kan. 360 meters. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Daily, 10 am, reports; 12:30-1 pm, address; 6:15-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 234 meters. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 360 meters. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAF, Poughkeepsie, N. Y. 273 meters. H. C. Spratley Radio Co. Temporarily discontinued.

WFAG, Waterford, N. Y. 360 meters. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 360 meters. 300 mi. Hutchinson Elec. Service Co. Slogan, "The Gateway to the Ten Thousand Lakes of Minn." Daily, 11:57-12:20, time, weather. Tues, Wed, 8:30 pm, concert. Sun, 2:30 pm. Central.

WFAQ, Cameron, Mo. 360 meters. 300 mi. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri 11 pm, concert. Central.

WFAU, Boston, Mass. 360 meters. 300 mi. Edwin C. Lewis.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10:00 am, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAZ, Charleston, S. C. 360 meters. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3:30-4:30, concert; 6:30-7, children's hour. Wed, Sat, evening, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital; 7:30 church services. Eastern Daylight Saving.

WGAD, Ensenada, Porto Rico, 360 meters. 250 mi. Escuela Hispano Americana de Radio Telegrafia, Inc. Sat and Sun eve.

WGAF, Tulsa, Okla. 360 meters. Goller Radio Service.

WGAH, New Haven, Conn. 360 meters. New Haven Elec. Co.

WGAJ, Shenandoah, Ia. 360 meters. 100 mi. W. H. Gass. Mon, Thur, 7:30-8 pm. Central.

WGAL, Lancaster, Pa. 248 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of U. S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 360 meters. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. 360 meters. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. 360 meters. Southwest America.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. 360 meters. Ernest C. Albright.

WGAX, Washington C. H., O. 360 meters. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 360 meters. Register and Tribune. Slogan, "The Convention City." Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Daily, 5-6:45 pm, Children's Hour, reports codes. Tues, Sat, 8:30-10 pm, concert. Wed, 6:45-8:30 pm. Thurs, Fri, 9:30-11 pm, concert. Tues, Fri, 2 pm, Amrad Women's Club. Sun, 4-5 pm, 830, church services; 9, concert. Eastern.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern Daylight Saving.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm; organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 319 meters, 1,000 mi. Federal Tel. & Telg. Co. Slogan, "The City of Opportunity." Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern Daylight Saving.

WGV, New Orleans, La. 350 meters. 400 mi. Interstate Elec. Co. Slogan, "Where the Mighty Mississippi Makes a Crescent Near the Gulf." Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 11:30-12 m, 5, 10, reports, time, sports. Mon, Tues, Thur, Fri, 1-1:30 pm, 7:45 concert. Sat, 8 pm, special. Fri, 10:30 pm, special. Sun, 9:30 am, 3 pm, 6:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Daily ex Sat, Sun, 7 pm, lectures, news. Mon, Thurs, 7:30 pm, agriograms, concerts, sports. Sat, 12:15-1 pm, music, codes. Sun, 1:30-2:30 am, concert. Central.

WHAA, Iowa City, Ia. 263 meters. 200 mi. Univ. of Iowa. No regular schedule. Central.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 360 meters. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 222 meters. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 360 meters. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. 360 meters. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 248 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. 360 meters. Univ. of Rochester.

WHAO, Savannah, Ga. 360 meters. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 360 meters. 100 mi. Otto & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 360 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. 360 meters. Paramount Radio & Elec. Co.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 730-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the State." No definite schedule.

WHAW, Tampa, Fla. 360 meters. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 360 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m-12:30, weather, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Staion Located at the Oldest School of Engineering." Club, R. P. I. Mon, 9-10:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Tractor School. Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 390 meters. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Associated Broadcasters, Inc. Slogan, Station of the Sunrise Trail." Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 360 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 360 meters. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 360 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 360 meters. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 360 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Sun, 10:45-12 m, church services. Central.

WIAI, Springfield, Mo. 360 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. 360 meters. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 453 meters. 200 mi. School of Engineering. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. 360 meters. Chronicle Pub. Co. Evening Sun. Slogan, "Howdy Folks, This is WIAR, a real Live Wiar." Daily 5-6 pm, sports. Central.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. 360 meters. Leon T. Noel.

WIAU, Le Mars, Ia. 360 meters. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. 360 meters. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 224 meters. 200 mi. Woodward & Lothrop. Daily ex Sun, 10-11 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Mon, Sat, 8-10 pm, concert.

WIK, McKeesport, Pa. 360 meters. 500 mi. K. & L. Elec. Co. Daily ex Sun, 630-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 360 meters. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm., music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. Daily ex Sun, 6-6:30 pm. Daily, 2-3 pm, 7-7:30 pm. Tues, 7-12 pm. Sat, 10:10-12 m. Sun, am, church service. Eastern Daylight Saving.

WIZ, Cincinnati, O. 360 meters. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

WJAJ, Dayton, O. 360 meters. Y. M. C. A.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Daily ex Sun, 10:30-10:50 am, music; 11:05-11:20, reports, news; 6-6:30 music, news. Wed, 8-9 pm, concert. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 360 meters. 50 mi. D. M. Perham. Mon, Wed, Fri, 7-8 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAP, Duluth, Minn. 360 meters. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 360 meters. 200 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

(The third and last part of the station schedules will appear next week. With this will appear the city-station index.)

ADVANCE PROGRAMS

(Continued from page 4)

Old Refrain", "Valse Bluette", Diana Miller; Accordion selections, S. R. Rinn.

WLW (Eastern, 309), 10:00 P. M., Musical program, Collegian Dance Orchestra; "Japanese Lullaby", "He Was Be Your Man", Blanche Noel, soprano; Chopin group, David E. Lenhart, pianist; "Concerto", Edith Miller, violinist; "Moonlight Sonata", David E. Lenhart; Violin group, Edith Miller; "Scenes from Childhood", David E. Lenhart; "Sonata", Edith Miller; Farce, "Come's Careless Convert", Radarians; Collegian Dance Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-7:30 P. M., Talk on Auto Trails, Rockwell Stephens, automobile editor of "The Daily News; Talk, "Yankee Laws", Clarence R. Hansen, Chicago attorney; 7:30-8:00 P. M., Chief Golden Voice, Iroquois Indian baritone; 9:15-10:00 P. M., Katherine Gorin, pianist; Theodora Bluestung, violinist.

WMC (Central, 500), 8:30 P. M., Program furnished by local post of American Legion; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman's visit; 6:50 P. M., Baseball scores.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital.

WWJ (Eastern, 580), 8:30 P. M., Concert, News Orchestra; Town Crier; Vocal selections, pupils of Clyde A. Nichols; 11:00 P. M., News Orchestra; Clyde A. Nichols pupils.

Friday, June 8

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., "The Chocolate Soldier", Star Orchestra; "O Love, from Thy Love", May Taylor, contralto; Cornet solo, W. Woods; "Carnival Venetian", Star Orchestra; "She Is Far From the Land", May Taylor; Intermezzo from "Cavalleria Rusticana", Star Orchestra; Cornet solo, W. Woods; "Happy Song", May Taylor; "Passepied", Star Orchestra.

CFCN (Mountain, 440), 10:30-12:00 M., Dance program, Plaza Cabaret Imperial Orcestra.

KHJ (Pacific, 400), 6:45-7:30 P. M., Children's Hour, "Uncle John"; 8:00-10:00 P. M., Program arranged by West Hollywood Chamber of Commerce.

KSD (Central, 546), 8:00 P. M., Opera, "Wang", from Municipal Opera Theater, St. Louis.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Margaret M. Dillon, soprano; James Perkinson, tenor; Amanda C. Burhop, pianist; Mrs. J. E. Laporte, J. Lee Roth, accompanists; Jessie R. Landis, reader; Wendell W. Hall; 9:25 P. M., Book review, Llewellyn Jones.

WBAP (Central, 476), 9:30-10:45 P. M., Organ recital, Will Foster of the First Methodist Church.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:50 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:00-6:00 P. M., Song recital and short talks; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00-10:10 P. M., Musical program; 10:10 P. M., Dance music, Howard Lanin's Arcadia Cafe Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Nehemiah, the Bold Builder", Dr. Robert Hyer, Southern Methodist Univ.; 8:30-9:30 P. M., Concert, Band from Ennis, Tex.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis' Bellevue Stratford Orchestra; 3:00 P. M., Song recital; 3.45 P. M., Musical program; 6:30-7:00 P. M., Children's own half hour, Cousin Sue.

WGI (Eastern, Daylight, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales", Uncle David; 8:30 P. M., "The Silversmith Series", David M. Cheney; Concert under direction of Charles L. H. Wagner.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Our American", "Vacation Time", WGY Orchestra, "Carmena", Elizabeth S. Primmer, soprano; "Where Dreams Come True", "Our Little Home", Orchestra; "Thora", Elizabeth S. Primmer; "The World Is a Song", Orchestra; Topics of the Day; Violin and 'cello duet, "Little Girl of Long Ago", Edward Rice, Ernest Burleigh; "One Little Smile", Orchestra; "Until the End of Time", Elizabeth S. Primmer; "A Rose Garden", Orchestra; 10:30 P. M., Concert; "Quartet," Opus 18, No. 4, Rice String Quartet; "Thy Beaming Eyes", "The Bellman", Charles Bradish, baritone; "Modo Antico", Quartet; "Hear Me Ye Winds and Waves", Charles Bradish; "Zapateado", Tom DeStefano, violinist; "Menuett", Quartet; "Sea Fever", "Cargoes", Charles Bradish; "Quartet in C", Quartet.

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Short talk; 3:00-4:30 P. M., Song recital; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 447), 7:00-7:30 P. M., Children's program, under direction of Mrs. Frances Ford, editor of "Wide Awake" page, Daily News; 7:30-8:00 P. M., Musical lecture, Mrs. Marx E. Oberndorfer; 9:15-10:00 P. M., Marimba selections, M. L. Jones; Frank B. Greif, tenor.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman's visit; 6:50 P. M., Baseball scores.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital; 7:45-9:45 P. M., WOO Orchestra, Robert E. Golden, director; 9:45-10:55 P. M., Organ recital, Clarence Bawden.

WWJ (Eastern, 580), 8:30 P. M., Concert, News Orchestra; Town Crier; Mrs. Marshall Pitney, contralto; Mrs. Louise Dougherty, soprano.

Saturday, June 9

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., "The Gondoliers", Star Orchestra; W. R. Curry, bass; "Nocturne", Harry Adaskin, violinist; "Air de Ballet", Star Orchestra; "The Two Grenadiers", W. R. Curry, bass; "Caprice Viennois", Harry Adaskin, violinist; "Wine, Woman and Song", Star Orchestra; W. R. Curry, bass; "Lorraine", Star Orchestra.

CFCN (Mountain, 440), 10:30-12:00 M., Dance program, Plaza Cabaret Imperial Orchestra.

KHJ (Pacific, 400), 6:45 -7:30 P. M., Children's Hour, "Uncle John"; 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Musical program from Missouri Theater.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Classical program, courtesy of William Lester; Wendell W. Hall, KYW's Music Maker; 9:25 P. M., "Under the Evening Lamp" Youth's Companion.

WBAP (Central, 476), 7:00-7:20 P. M., Radio Bible Class, Mrs. W. F. Barnum, First Methodist Church.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:50 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks; 4:30-5:55 P. M., Musical program; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comment", Prof. Clyde Eagleton, Southern Methodist Univ.; 8:30-9:30 P. M., Musical program, Belcanto Male Quartet; 11:00-12:00 P. M., Musical program, Leland Johnston, pianist; Mrs. Clyde Magee, reader.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Musical program; 6:00-6:30 P. M., Meyer Davis Orchestra 6:30 P. M., Safety talk by Stanley Cowman; 8:00 P. M., Short talks and musical program; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk on New England Problems, Arthur R. Curnick; Music; Playlet, "The Submarine Shell", Amrad Players.

WHK (Eastern, 860), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, Daylight Saving, 509), 3:00-4:30 P. M., Concert; 6:00-6:30 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Musical program; 10:10-12:00 P. M., Dance music, Charlie Kerr's L'Aiglon Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Concert, "Campus Maroons" Dance Orchestra; 9:15-10:00 P. M., The Northland Trio.

WMC (Central, 500), 8:30 P. M., Musical program, C. H. Van Hooser, baritone; Marguerite Storch, contralto.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 9:30-10:00 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital.

Sunday, June 10

WBAP (Central, 476), 11:00-12:15 P. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor; Will Foster, organist.

WFAA (Central, 476), 2:30-3:30 P. M., Radio Bible Class, Dr. William M. Anderson, Jr., teacher; 9:30-10:00 P. M., Concert, Orchestra from East Dallas Presbyterian Church; Dr. W. C. Rice, director; Harry M. Gibney, tenor; 11:00-12:00 P. M., Concert, Britling's Dallas Cafeteria Orchestra; Lou Goldberg, director.

WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Church services, sermon by a Philadelphia minister; 7:30 P. M., Services, Arch Street Presbyterian Church; Rev. Edward C. Macartney, minister; Alton K. Dougherty, organist.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., Twilight program; William Fowler, harpist; Mrs. Maude Dunnam, reader; Concert, Alicia Starratt and pupils; "Adventure Hour", Youth's Companion; 8:30 P. M., Federation Church services and musical; 9:00 P. M., Musical program.

WIP (Eastern, Daylight Saving, 509), 11:00 A. M., Church services, Holy Trinity Memorial Chapel; B. Janney Rudderow, minister, Ernest Felix Potter, organist; 2:00-3:30 P. M., Musical program.

WWJ (Eastern, 580), 11:00 A. M., Church services, St. Paul's Cathedral; 4:00 P. M., News Orchestra.

Monday, June 11

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Shrine Band.

WDAR (Eastern, Daylight Saving, 395), 12:02-1:00 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Short talks and song recital; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00-10:10 P. M., Song recital; 10:10 P. M., Dance music, Howard Lanin's Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis' Bellevue Stratford Orchestra; 3:00 P. M., Song recital; 3:45 P. M., Musical program; 6:20-7:30 P. M., Meyer Davis Bellevue Stratford Orchestra.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., piano and song solos; 6:00-6:45 P. M., Dinner music, 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMC (Central, 500), 8:30 P. M., Concert, Washington Syncopators, H. H. Guinett, director.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital; 7:45 P. M., Concert, J. W. C. I. Military Band; 9:30 P. M., Organ recital, Clarence Bawden.

When building your set it is advisable to put it up in sections such as tuner, detector and amplifiers. In this way one can do a lot of experimenting.

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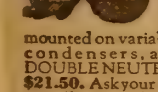

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PORTABLE RECORDS? SEND 'EM IN—

By the Contest Editor

TO keep pace with the fast growing popularity of portable receiving sets and the use of them in the automobile, camp, on the beach, fishing trips and elsewhere, a new type of receiving record contest has been devised. Only portable sets will be eligible and these will be divided into three classes:

Three tubes or less using a loop aerial, single tube sets, and crystal detector receivers.

Every station listed in the Radiophone Broadcasting Directory, page 8, will be eligible to be turned in as a record but all records must be for distances of 300 miles or over and the listener in submitting the record must state which class of the above his set falls in. Mileages must also be measured and turned in else the records will not be considered.

It is possible that one or more of the sets making the best records will be described in detail in the midsummer issues of the Digest. It is a popular superstition that Radio broadcasting is not a summer sport. Nothing could be more erroneous. One of the ideas behind the new portable set receiving record contest is to prove that much entertainment and service can be afforded the vacationist who troubles himself to take along a small Radio outfit.

Now that we have unfolded the big idea let's start off. The rules are given below, revised for the purposes of the new contest:

Portable Set Contest Rules

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 300 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records. These must be made with a portable set and when records are submitted, the contest class it falls in must be told. These three contest classes are: single tube receivers, sets using a loop aerial and having three tubes or less, and crystal sets.

2. Distances must be measured AIRLINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication, using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of Radio Digest.

1500 Miles On One Tube Set

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FLEWELLING ANSWERS

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Connections to "A" Battery

(Submitted by R. C. O., Detroit, Mich.)

Question.—In reviewing and following your description in Part IV—Panel Layout and Wiring, issue of May 26, I note that the wiring diagram shows the rheostat in the positive side of the filament circuit while the negative is directly connected to the negative side of the B battery and the filament terminal. Is this not an error which should be corrected in a coming issue? It seems to me the reverse should be the case, that is, the negative A battery should be connected to rheostat, thence to the filament terminal on the the tube socket and the positive A battery should be connected direct to the filament terminal on the tube socket, then to the negative B battery connection made directly to positive side of the A battery.

Answer.—This question seems to have arisen in quite a number of instances, and for this reason it is chosen as this week's question. In the Flewelling Super Circuit the polarity of the A battery has no bearing on the action of the set; neither has the negative return of the B battery. The set will work just as well whichever way you may care to arrange the polarities. Of course, when the set, as in the case of the single condenser super, is switched over to be used as a straight regenerative hook-up, then for the best results the A battery polarity and the B battery return should be arranged in the usual manner. Rheostat control is of very minor value in the Flewelling hook-up.

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Brown Single (4,000 Ohm Pr.)	4.95	.09
Royal 2,200 Ohm	3.75	.12
COUPLERS		
Atwater Kent	6.80	.14
Freed Eiseman (180 Degree)	2.45	.09
All Wave (Genuine Capitol)	6.95	.18
VARIOMETERS		
Dayton	4.85	.12
VARIABLE CONDENSERS		
U. S. Tool 46-Plate Vernier	4.45	.24
U. S. Tool 24-Plate Vernier	4.10	.20
3 Plate Vernier	.95	.08
23 Plate Vernier	2.95	.14
43 Plate Vernier	3.45	.18
TRANSFORMERS (Audio Frequency)		
Acme	3.45	.14
TRANSFORMERS (Radio Frequency)		
Acme	3.45	.14
Cotoco	2.95	.12
Owl	.95	.10
Sleeper	1.95	.10
MISCELLANEOUS		
Hydrometers	.49	.08
Electric Soldering Iron	2.50	.15
Wave Trap	5.95	.20
Double Phonograph Attachment	.65	.06
SETS		
Westinghouse, Jr.	6.95	.40
Westinghouse R. C.	79.50	1.80
De Forest Reflex D. T. A.	112.00	1.80
Aerex Crystal Set	7.95	.15
Victor Single Tube, completely assembled	12.50	.45
RHEOSTATS		
Klosner Vernier	1.25	.14
Bradleystat	1.49	.10
SOCKETS		
Bell V. T. & W. D. 11	.89	.10
V. T. Bakelite	.50	.10
LOUD SPEAKERS		
King Amplitone Horn	4.95	.28
Pathe	17.50	.50
Reflex	9.85	.30
TUBES		
Welch Peanut Tube	2.00	.10
U.V.-200	4.95	.15
U.V.-199	6.50	.15
U.V.-201-A	6.50	.15
W.D.-11	6.50	.15
Sterling 1½ V.	3.95	.15
Margo 1½ V. (2 Element)	1.00	.15
De Forest D. V. 6A	6.00	.15
CABINETS (In White)		
7x10	1.45	.20
7x12	1.65	.25
7x14	1.85	.30
7x18	2.15	.40
7x21	2.45	.45
7x24	2.95	.50
LIGHTNING ARRESTERS		
Argus, Outdoor or Indoor	.95	.12
DIALS		
2-inch (Bakelite)	.25	.06
3-inch (Bakelite)	.35	.08

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, June 9, 1923 No. 9

Build Your Own Set

Learn the Why With Simple Apparatus

THERE is no reason for buying an expensive set to start with and, in fact, it is much better to begin by buying parts and assembling them. In this way one learns the why and wherefore of each part and its relation to the others. It is much more pleasant to rig a simple outfit and to get results than to fuss with a complicated set and get no results.

Radio work offers to the younger mind a tremendously valuable developer of logical analytical thinking more effective than school-book methods because this object is accomplished while affording entertainment.

After one has become able to operate his set and get good results from it, he can then entertain the rest of the family and even his friends. On account of so many stations broadcasting one can just about choose his programs, once he has them in advance.

Range of Receiving Set

Reception Due to Local Conditions

WHEN consideration is given to the distance a transmitting station will radiate signals or to the operating radius of the receiving set it is important to make a distinction between the reliable range and the variable or occasional range.

The range of a receiving set depends in a large measure upon the local conditions, whether it is located in an open country with but few interposing obstacles to absorb the Radio waves or whether it is surrounded by lofty buildings constructed with framework of steel.

The simple, well-constructed receiver employing a crystal detector and using a single wire outdoor antenna approximately 100 feet in length elevated at least 20 feet above the ground has a daytime range of about 25 miles while at night signals from much greater distances are easily received.

If the crystal detector is replaced by a vacuum tube detector the reliable operating radius of the set is increased to approximately 75 miles and there is considerable improvement in the receiving qualities due to the sensitive properties and amplifying action of the tube which secures louder music or speech. A simple regenerative receiver using an outdoor antenna will cover a distance of approximately 100 miles.

Better Equipment for Summer

Distance Reception Proving Good This Year

MANY people will be able to obtain more real enjoyment and benefit from Radio this summer when, of course, they have more spare time, and on their vacations than in the winter months. Thousands of sets will be taken on vacation trips. Radio today is far different than it was a year ago and the Radiophan will find more things in his favor this summer than last.

Last year few persons would believe that the voice could be transmitted four or five thousand miles. Today they are entering on a new field of Radio and sets are being made that will receive from stations thousands of miles distant, while a few hundred miles was the limit of a year ago.

Then several hundred dollars was paid for sets that could not be sure of receiving broadcasts over five hundred miles. Now, less money will buy better sets able to reach from coast to coast.

The receivers used a year ago would pick up everything in the air for a short distance and would not tune out interference. Sets are now procurable that will single out almost any station while scores of other stations are broadcasting. Then again, the new wave allocations put into effect May 15, have aided the solution of the interference problem.

Any person who has a chosen set in his mind and is waiting until next fall before making the purchase, is sure going to lose many interesting hours of real enjoyment this summer. But those with keener judgment will first make inquiry about what now may be expected in range and clearness of reception of broadcasting with a properly constructed set during the summer months. A keen interest is bound to continue throughout the summer.

RADIO INDI-GEST

INDIGEST BROADCAST PLANT SOON BEGINS TO START TO COMMENCE

WALLA WALLA.—The handsome and sanitary new broadcasting station owned by INDIGEST is now ready for operation and will soon be heard on the set wave length of 99 2 3 feet. This new quick-service free air station will be operated on a cut-rate policy and will give broadcasting service day or night. It is located on the picturesque little island of Walla Walla (the natives liked the place so well they named it twice), a tropical land that lies in the midst of the great damp Pacific ocean.

The new plant is the most modern to be erected in a radius, as the crow flies in circles, of 7,000 miles and as there is no other station within 9,000 miles there will be no interference. The powerful transmitting apparatus has a range of 3,000 cubic miles. The closest habitation to Walla Walla is 10,000 miles so it should be easily heard by those that tune to the proper wave length.

A unique plan is to be put in effect to enable the listeners to tune in properly before the regular weekly programs are broadcast nightly once each month. For five minutes before the station's generator is started or the antenna is raised the announcer will commence to scream, "Help!——Fire!!——Murder!!! If you hear these frantic cries for succor do not become dismayed or alarmed for it is merely Indigest's method of letting you tune in before the station begins operation.

Above Photo Is Flashlight of Our New Station

The first of the series of weekly programs will be put on the ozone promptly at 11:93 (Walla Walla time) Wednesday, June 31. Remember that Walla Walla time differs from ours as they have a nineteen-hour day and the time can be reckoned as being the square root of Central time divided by 0.711443_2, or just exactly three days, twenty-three hours, fifty-nine minutes and sixty seconds behind or ahead of Central-Pacific time, daylight saving, 3% interest plan.

The program to be given Wednesday, June 31, will appear in Indigest next week.

A PROBLEM IN SELECTIVITY

Jack Spratt installed a Radio,
Connected up his phones,
And listened in with wife and kids
To hear the Broadcasts tones.

But Mrs. Spratt likes Classic Themes,
The kids, a bedtime yarn;
While Jack himself likes Jazzy Stuff;
"The rest ain't worth a darn."

They can't agree on what is what
But live in constant wrangle;
Ain't this a doggone problem
For Hoover to untangle? —*Eazy Lane.*

Read Indi and You'll Find Out

Dear Indi: Here's one I lamped in WOC's program sheet—"A listener in had a sleepy-looking parrot which he kept as a pet in the same room with his set. One day while the receiver was tuned in on a station he was called out of the room to answer the telephone. A few seconds after he had left the loud speaker broke forth in a clear tone, 'Hello!' This was repeated several times, the parrot paying not the slightest attention. At the final 'Hello!' the bird opened one eye, gazed at the set, and snapped out, 'H—l, man, the line's busy!'"

P. S.—Do I get in with this one? —POLLY W.

LEM STEBBINS DEGENERATIVE SET VICTORS GET $000,000,000,000.19

The great Indigest $000,000,000,000.19 Cash Copper Contest was officially closed at midnight sharp one noon some days ago. The prize winners were selected and each has been mailed their checks to cover the amount awarded them. Lillian G. was selected as having the best all around paper and was awarded the first prize. Ezra Hecht won second. Polly W. nabbed third honors and Alagonquin Tonsils III came in fourth. Fifth, sixth and seventh prizes were awarded to Spider Webb, who sneaked in three separate papers.

This will serve to notify the prize winners that they are requested to hold the checks sent them until such time that we notify them we have enough money in the bank to cover same. Lem Stebbins is overmodulated with the novel methods of obtaining his sooper effect, and has immediately taken out patent papers on all the circuits which the contest brought in.

Here lies Sammie
James Henry DeFinn,
Two lovers were talking
——— he listened in.

My Yes! They Plant It by the R. R. Tracks

Indi: I garnered this from Station WOC:
"———F. W. E. signing off in the state where the tall corn grows at exactly 8:22 P. M."
Is the corn on a schedule, too? —LE MOQUEUR

You Should Call Him to Time

Dear Mr. Gest: I gotta friend who is regular jazz hound. Personally, I like grand opera once in a while, and am particularly fond of the "Dance of the Hours," from La Gioconda. I told this J. H. to look out for it, so last night he says, "C'mere, I just tuned in one of your 'Dances of the Hours.' I put on the fones and whaddya think I heard? 'Three O'clock in the Morning'"!

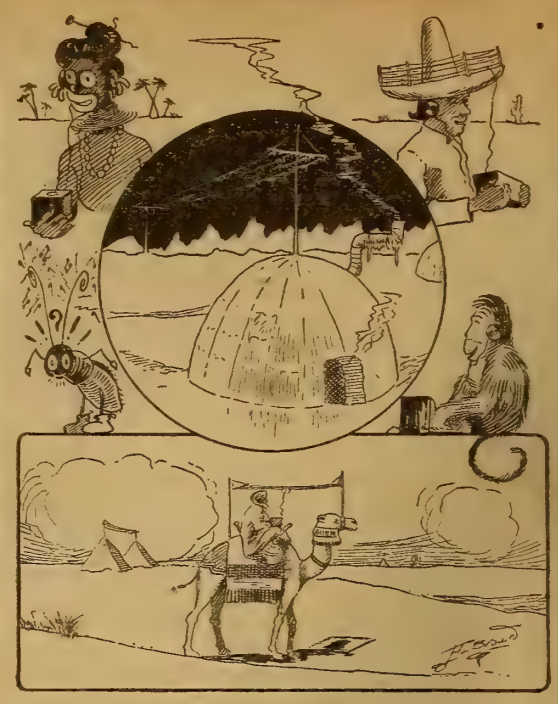
Come to think it over, he was sorta right at that. ——— but———.

Well, you know these Jazz hounds. Yours disrespectfully
—ELLIS BROAKLEWSE

Looking Ahead

In Next Week's Issue of Indigest Will Start "The Quest of the Kanoofis." This beautiful poem is filled with pathos and melodrama to the point that it is overrunning with tears. If you want a good cry for a dime, get Indigest from your most gorgeous newsdealer—10c.

Around the World with Radio



Condensed

By DIELECTRIC

Outside antennae are still the vogue among thousands of Radio fans and it is doubtful if the indoor loop will supplant them altogether. Where an aerial is strung in a position to be easily destroyed by a vengeful and irate landlord, he may do it—but look out for judges like Judge Schwaba of Chicago. His conception of home appurtenances places aerials within the safety zone, so far as malicious destruction subject to punishment is concerned. Score one!

We all have had a chance to try out the new broadcasting plan by this time. It remains now to hear from the bugs as to their opinion of it. Some I have heard complain that there are still too many broadcasting stations and that these should be reduced to say two large ones in a district, one for the highbrows and one for the—netherbrows. The rest of us are very much enthused with the distinct gain on noninterference. When one large station was sending out its program (which it did from morn 'til night), no other station on the same wave length could be heard nor distant ones on any wave. Now we can hear them when desired and cut them at will. Thanks be for this!

I had lost hope of finding any excuse to mention opera again until next fall, but behold what has taken place in the studio of Station KPO! From their transmitter has come the first broadcast of an entire opera along the whole of the Pacific coast. It was a distinctively domestic product as both librettist and composer are native Californians; however, the audience was most cosmopolitan including listeners in all parts of the country. It was well worth hearing, too.

The Canadian amateurs had a little hard luck recently when they first tried for a relay across the continent during the three-day test. QRM was right on the job in what is thought to be the form of the aurora borealis. This famous phenomenon has been known to serve in that capacity before now. It is just the chance of running afoul of QRM that makes the sport so fascinating. You never know when you'll accomplish what you set out to do.

We may detest Germany with all our hearts—and they have proven themselves worthy of it as a nation—yet it is a fact that among them are some very clever scientists. A recent witness to this is the reported discovery of a means of forcing airplanes to light by employing Radio waves of certain characteristics. The French are much disturbed at the news. We managed to find out the secrets of quite a few German inventions during the World War. We may get this one.

You know there are some folks who think it a crime to go to the circus or a prize fight, so they lead their small boys there to show them how awful these things are. Since the coming of Radio has permitted members of this class to listen to the jazziest jazz, the vodevillian's jests and the exciting descriptions of prize fights in the seclusion of their own homes, they feel much better. They were all listening to the Jess Willard and Firpo bouts I'll wager a new call. Folks were discussing the fight within ten minutes after the finish in towns miles away from the arena. Radio does that.

Not all of the distance records were made during the winter months when conditions were thought to be the most favorable. An amateur station in Connecticut was sending through the ether a short time ago and his message was picked up about one hundred miles from Ceylon, India. That is pretty good for a record, about 11,000 miles.

First Steps for Beginners in Radio

Chapter IV, Part II—About Condensers and Inductances

By Thomas W. Benson, A. M. I. R. E.

AN INDUCTANCE is characterized by its ability to produce currents by induction within itself or self induction. All current carrying conductors possess self induction due to the fact that all currents are surrounded by a magnetic field of force. Any variation in the strength of the field will induce a current in any conductor in that field. A straight wire will be found to have self induction due to the fact that any variation in the field around that wire while carrying a current will induce current in the wire since it lays in the field of the magnetic lines.

Inductive Effect

When the wire is wound into a coil the inductive effect resulting from a change in the lines of force is increased many fold and we then have what is termed an

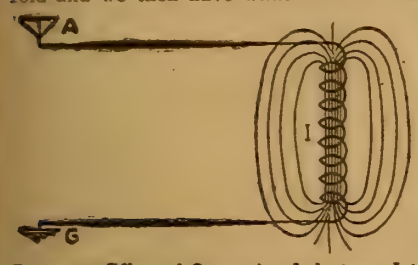


Figure 19—Effect of Connecting Inductance Into a Circuit

inductance. And to understand how an inductance tunes a Radio circuit we must have a knowledge of what takes place in the inductance.

Let us then consider Figure 19 which shows an inductance I connected to an aerial A and ground G, the latter two forming a condenser as described previously. Let us assume that a Radio wave induces a positive charge on the aerial and current starts to flow. As the current starts through the coil it begins to build up a magnetic field. As this field takes form it cuts some of the turns of the coil. We have learned that when a magnetic field cuts or passes over a conductor it induces a current, hence, a current will be induced in the turns of the coil during the formation of the field around it. However, it will be found that the induced cur-

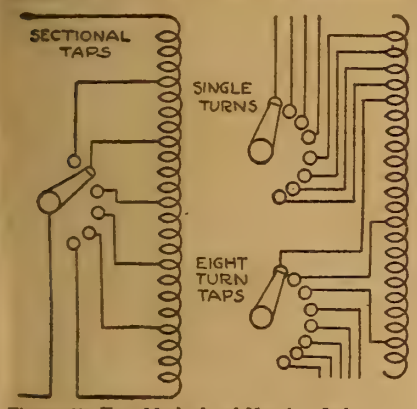


Figure 20—Two Methods of Varying Inductances with Taps

rent opposes the current in the circuit and thus delays it reaching its full value immediately.

Now let us assume that the charge induced on the aerial has finally all flowed through the inductance to ground. The magnetic field will then begin to collapse and the movement of the lines will cut the turns of the coil again and another current will be induced. However, the latter current will be in a direction similar to that from the aerial and will tend to prolong the current flow.

Oscillating Circuit

The effect of this last current surge due to the self induction of the coil is to overdischarge the aerial-ground condenser and the current will start to flow in the reverse direction. The above action of first holding back the current and then helping it along will be repeated and an overdischarge results again but to not as great an extent. In this way the current will flow back and forth and the circuit is said to be oscillating.

It is quite apparent that the time it takes for the current to reach its full value after starting to flow and the time the current flow is prolonged by the self induction will depend upon the amount of this self induction. This in turn will depend upon the number of turns in the coil cut by the rising and falling of the magnetic field. We see then that increasing the turns increases the self induction in the circuit and thus it takes longer for one complete cycle of charging and discharging of the condenser.

Tuned Circuit

Now going back a little. We considered that a wave induced a positive charge on the aerial and this flowed through the inductance and the aerial became over discharged and a negative charge was built up on the aerial. Now if the incoming waves are of such a lengtl that they tend to put a negative charge on the aerial at the same instant that the currents due to self induction does, the total current will be increased and each succeeding oscillation of the circuit will be in time with the incoming waves and we say the circuit is tuned to that wave.

Were we to add inductance the time for one discharge of the aerial would be increased and before it was entirely discharged the waves would have induced a negative charge on the aerial which would neutralize the positive current still present and the current flow reduced. The circuit is then out of tune. Reducing the inductance would have a similar effect only the aerial would have discharged once and started to oscillate back again before the wave had a chance to put the negative charge on the aerial and the current would never reach its maximum value because the circuit is out of tune with the wave length. Thus we see how the inductance tunes a circuit but this will be taken up more in detail in the next chapter.

Measuring the Inductance

To measure this self induction we use the unit called the henry. A circuit has an inductance of one henry when one volt

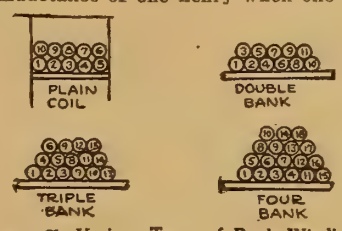


Figure 21—Various Types of Bank Windings

is induced in it by a current change of one ampere per second. Here again we have a unit too large for practical purposes so use is made of the millihenry or one thousandth of a henry. A smaller unit is also in common use, the centimeter or as it is abbreviated cm, which is the one-millionth part of a millihenry.

Forms of Inductance

Inductances take many forms and it is advisable to be acquainted with the various forms they take and their suitability for a given purpose. The simplest form of inductance is a single layer of wire wound on an insulating form, usually a tube. This form of construction is entirely suitable for short wave lengths but in order to vary the amount of inductance in the circuit taps are taken from the winding.

There are two methods of tapping, one being to take taps evenly spaced over the length of the coil for rough tuning and relying on a variable condenser to get sharp tuning as shown in Figure 20. The condenser may be connected in parallel or series to get the fine variation. Another method of tapping is to tap single turns for 8 or 10 turns and then tap in sets of 8 or ten turns for 7 or 9 sets, respectively. With this arrangement rough tuning is done with the 8 or 10-turn switch and fine tuning with the single turn switch to get intermediate values. As a rule a variable condenser is unnecessary when a single turn tap switch is used in tuning.

Windings on a Coil

For the sake of compactness it is often desirable to make the inductance smaller and a number of methods are employed to accomplish this without adding distributed capacity to the coil. We have learned in the preceding part that two conductors with a difference of potential form a condenser.

Were we to wind a coil as shown in Figure 21 with the turns wound as numbered there would be an appreciable voltage difference between say turns 1 and 10 resulting in a capacity being formed that will by-pass some of the current and reduce the strength of the magnetic field of the coil. To overcome this and reduce

(Continued on page 14)

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The articles yet to appear are:

Chapter V—Tuners and How to Tune Your Set.
Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

A LARGE TWO COLOR MAP

Size 25x38 inches, showing the location of all the broadcasting stations of United States and Canada, their wave lengths, exact geographical position, change of time area, amateur radio districts, etc., etc. Also a complete list of call letters (listed alphabetically) of all the broadcasting stations, bound in a separate cover.

(Mailed on the Receipt of 25 Cents in Coin or Stamps)

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New CARTER Vernier Control RHEOSTAT

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Code 1-C, 20 ohm, for U. V. 201-A tube.. 1.75 ea.
Code 1-D, 30-ohm, for U. V. 199 tube.... 1.75 ea.
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SHEETS TUBES RODS
RADIO PANELS
POLISHED BLACK FINISH
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1/32"	THICK	1/2¢	PER SQ. INCH
1/16"	THICK	3/4¢	PER SQ. INCH
3/32"	THICK	1¢	PER SQ. INCH
1/8"	THICK	1 1/2¢	PER SQ. INCH
3/16"	THICK	2¢	PER SQ. INCH
1/4"	THICK	2 1/2¢	PER SQ. INCH
3/8"	THICK	4¢	PER SQ. INCH
1/2"	THICK	5 1/4¢	PER SQ. INCH

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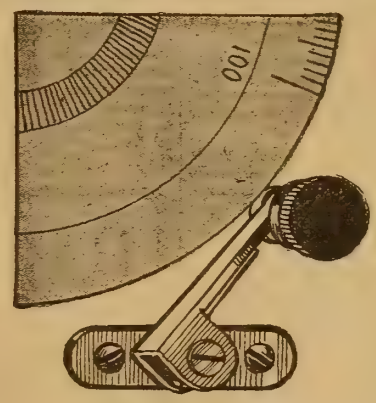

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Michigan Split-Hair Vernier Dial Adjuster

The Key to Selective Tuning—The Secret of "Michigan" Supremacy

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When you write, give us the name of your favorite Radio Dealer, as we want to tell him about our *Exclusive M. R. C. Franchise* which will put him in *control* of the whole Radio Situation in his territory.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

Long Distance Single Tube Receiver

Connections Similar to the Ultra Audion

The accompanying hook-up is one which has given excellent results. The variable condenser is connected in series with the inductance, plate and filament circuits somewhat like the ultra audion. I have heard local stations on a horn with just one tube. In colder weather I have copied KFI and KHJ, both 1,900 miles away on an aerial 65 feet long and only 20 feet high.

After adjustments are made, tuning can be accomplished with either the rotor or condenser. The rotary side of the variable condenser should be connected to the ground to eliminate body capacity.—J. W. Mayfield, Cincinnati, Ohio.

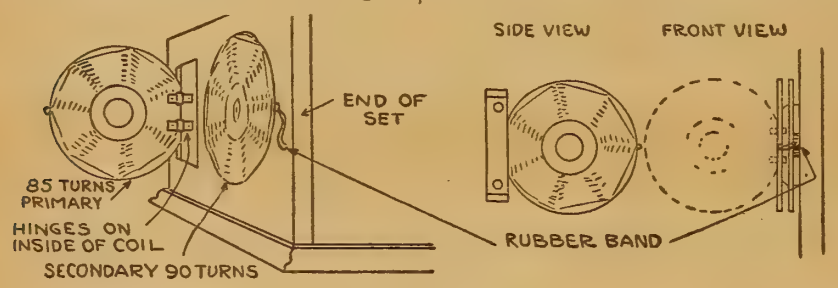
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

Spider Web Coils on Cabinet Ends

Spider web coils are shown mounted on the end of a cabinet. One of the coils is mounted with hinges attached on the cabinet. The other is fastened to the edge of a square piece of wood so that the hinges are at right angles to the cabinet.



Both of the coils fold against the cabinet and a rubber band fastened to the cabinet slips over a stud on the outer coil and it holds them flat against the cabinet end.

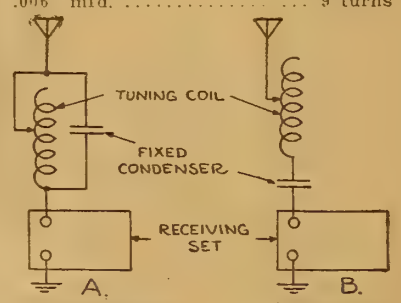
This set of coils cost me 45 cents with hinges and they have given me an efficient tuning set.—C. W. Woodside, Calgary, Canada.

Measuring Condensers

Wishing to measure the capacity of some condensers which were unmarked with the capacity when I bought them I happened to think of connecting a tuning coil into a wave trap, as shown in the circuit A. This is a circuit usually recommended for a wave trap. With ten coils on a 4-inch tube it took .00025 mfd. capacity. I next connected in a .0005 mfd. condenser when it took two or three coils.

As two or three coils was not sufficiently sensitive I thought of the scheme as shown in B. This was better and the relative capacities and number of turns on a 4-inch tube were as follows:

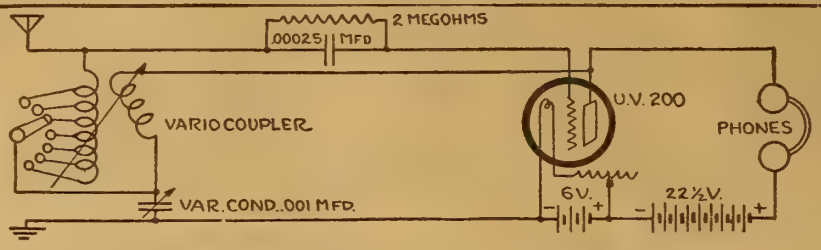
.0001 mfd.	54 turns
.0005 mfd.	25 turns
.005 mfd.	10 turns
.006 mfd.	9 turns



The broadcasting came in just as clearly through this series wave trap as it did through the parallel one except with the .0001 condenser. This would show that a 50-turn honeycomb coil with a 23-plate condenser in series with it would make a splendid wave trap. It would also be much more effective than the parallel or shunt type on account of having more coils or inductance to hold back the waves wanted.

It is necessary to have one condenser whose capacity is known. Having obtained the constant you can use it to measure an unknown one. N^2C = constant (approximately). This formula was used to measure the condensers. N = number of coils. C= capacity.—D. W. Starkey, Chicago, Ill.

SERIES CONNECTION OF CONDENSER



Beginners' Aids

To obtain the most out of a newly-purchased receiving set, it is necessary to learn a few rudimentary principles of operation. What to do and what not to do should be memorized.

If you have a crystal detector, keep the fingers off the mineral. Handling it leaves a greasy surface and it is more apt to collect dust. It is best to keep it covered and if you must handle the crystal, do so with a pair of tweezers.

Don't attempt to find out what is inside of your head receivers. Many poor results can be traced to the fact that the individual was too inquisitive and opened the receivers by unscrewing the caps. In doing so, you will bend the diaphragms and almost surely ruin the phones. The diaphragms are made of very thin metal and are easily bent if handled. You may also injure the winding, as it is wound with wire as fine as hair.

If you have purchased a complete set, don't handle it roughly, as you may loosen a connection inside the cabinet.

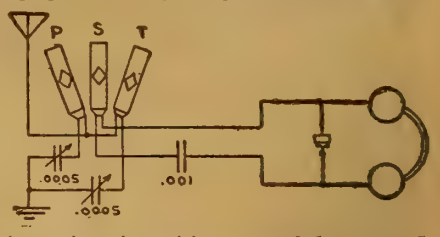
Don't try to change any of the wiring if you are unfamiliar with the working of it.

Shielding Panels

In the shielding of a panel it is only necessary to shield the parts of the panel that house the tuning controls, such as the variometer, variocouplers or tuners. The detector and amplifying units do not have to be shielded. In some of the commercial sets the units are shielded separately. There is a separate shield for each variometer, tuner and condenser.

Three Honeycomb Coils Used on a Crystal Set

The accompanying diagram shows a hook-up which I have recently developed. It is far superior to any other crystal hook-up I have ever tried. In this hook-up spider web or honeycomb coils are used in conjunction with a crystal detector. I had been troubled with interference until I found that this hook-up eliminates it quite well.—Leo Schechter, St. Louis, Mo.



Testing for Open Circuit

The windings of the amplifying transformers may be tested for open circuits by means of a telephone and a single dry cell. The absence of a click or a very faint click when breaking the circuit indicates that the winding is open.

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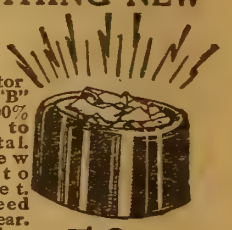

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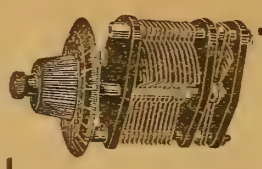

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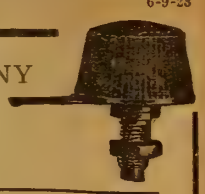

REINARTZ CIRCUIT EVERY PART COMPLETE

1 Reinartz wound coil, 1 tube socket, 1 rheostat, 1 23-plate .0005 MFD. variable condenser, 1-13-plate .00025 MFD. variable condenser, 3 inductance switches, 16 switch points and nuts, 4 switch stops and nuts, 8 binding posts, 2 3" dials, 1 variable grid leak, 1 .002 MFD. phone condenser, 23 feet bus bar wire, 1 high-grade panel ALREADY DRILLED AS PER DIAGRAM and complete instructions..... $10.00

Two-Stage Audio Frequency Amplifier—Parts complete in every detail for this Circuit—$11.00

CONDENSERS

3 Plate	Variable; value, $1.75	$1.05
13 Plate	Variable; value, $2.50	1.20
23 Plate	Variable; value, $3.50	1.35
43 Plate	Variable; value, $4.50	1.85
13 Plate	VERNIER; value, $5.50	3.75
23 Plate	VERNIER; value, $6.00	4.00
43 Plate	VERNIER; value, $6.50	4.25

Honeycomb Coils, 50 turns mounted $0.95
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EVERY PART COMPLETE

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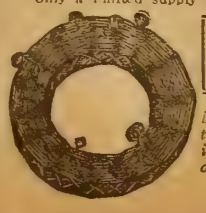

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Characteristics of Some New Vacuum Tubes

Part II—Tube Advice; UV-199, DV-6 and Philips Tube

By H. J. Marx

AMONG the multitude of letters received from fans working with the Reflex De Luxe is one that states: "Have constructed your Reflex De Luxe. The reception on a loud speaker is the

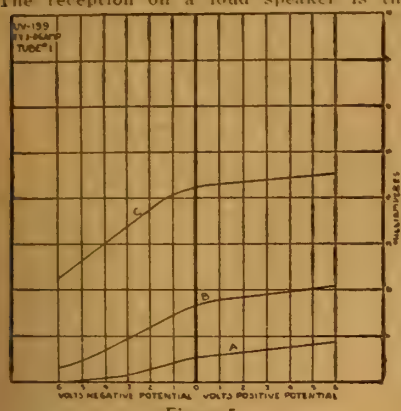

Figure 5

clearest and best in tone value ever heard. But I have the rheostats barely turned on. If I increase the current, the reception turns to howls and growls. Undoubtedly there is even greater volume in the set but I can't get it." This statement clearly indicates that the source of trouble lies in the tubes, inasmuch as the same experience was encountered by the author.

Tubes on Reflex Circuit

Especially in the reflex type—there is required a certain percentage of operating efficiency, if this is lacking in the tubes used, no amount of development or alteration of the circuit will remedy the situation. Reflexing with but a single tube does not present the difficulties that multi-tube reflex circuits do. The demand on that single tube is usually within the functioning limits.

Portable Set Tubes

The question of portability of receiving sets has developed a decided demand for a good dry cell tube. Unfortunately most dry cell tubes are either too microphonic, sensitive to mechanical vibrations of any sort, or their efficiency is doubtful. If it was not for the cost the best solution would be to purchase ten tubes of the type decided on and then test them for the selection of the three best. Dry cell tubes should always be cushion mounted, that is supported on either a rubber or felt pad to take up any shocks, bumps, or knocks, as much as possible.

Sockets and Rheostats

In order to be on the safe side it is best to use standard sockets and if neces-

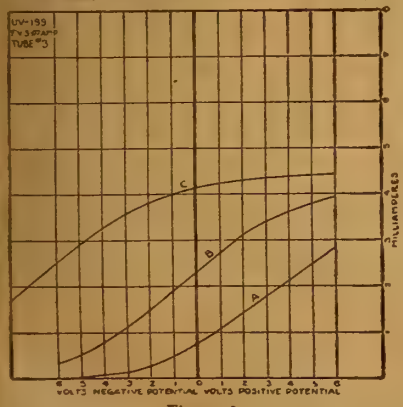

Figure 6

sary use adapters—then if a better tube is produced the chances are no socket changes will be necessary.

The subject of rheostats can also be easily taken care of. Manufacturers are now producing small unit resistances that can be added in series in the filament circuit, building up to any particular resistance value best adapted for the tube used, and enabling the use of the popular 6-ohm type of rheostat with which most sets are equipped. Rheostats are also being produced now that have a total of 30 ohms' resistance but are so constructed that they can be used in the same way as that of the 6-ohm type.

UV-199 Characteristics

This tube is rated at a filament voltage of three. The current consumption is exceptionally low, only .06 amperes. This permits its use with dry cells. A special socket is required, with a standard type of socket an adapter is necessary. The variable resistance in series in the filament circuit is recommended as 30 ohms. If a 6-ohm rheostat is used, a 25-ohm resistance unit should be added in series.

The plate-grid potential curves taken on three of these tubes were so far different from what was taken that more were tested, the two extreme sets of curves as taken are given in Figures 5 and 6. Curves A are taken at a plate voltage of 21, B at 45 and C at 80 volts.

It is easily seen, that as the plate voltage is increased a more negative grid potential is required.

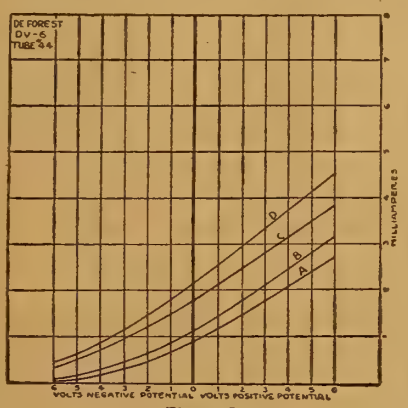

Figure 7

In the De Forest DV-6 tube considerable variation was found, but due to lack of space only the average set of curves are given (Figure 7.) On a few of these tubes exceptionally good values were discovered while others didn't come up to the standards shown.

The tube is rated at 3 to 5 volts. Results at three volts were negligible so only the curves at 4 and 5 volts filament are shown. Although rated at 5 amperes the current consumption at 4 volts was found to run from .7 to .75 amperes while at 5 volts it varied between .8 to .85 amperes.

The tube has a standard socket base. The usual 6-ohm rheostat can be used. The curves, although indicating no exceptional values, are fairly consistent. In fact, they are more so than many tubes that indicate relatively higher efficiency. The tube is small and saves space for compact arrangements.

The rated plate voltage recommended is 40 to 60. In Figure 7 the curves A and C are taken at 4 volts filament and 45 and 67½ volts on the plate, respectively, while B and D are taken with 5 volts filament and the same respective potential on the plate.

Philips Detector Type IV

For the purpose of comparing a few of the foreign type of tubes with American manufacture, tests were made on a few of these also. Many of the foreign tubes that are made for the American market are rather poor in quality due to the necessity of keeping costs low in order to overcome the rather high duty imposed on this type of apparatus. Where this cheaper production method has been avoided some very high efficiency values have resulted. Due to a lack of some of these higher grade tubes, the tests made were very limited in number. One of these, the curves of which are given in Figure 8, is a Dutch tube known as the Philips Detector Type IV. This tube has a standard base and can be used on either dry cells or a storage battery in conjunction with the standard 6-ohm rheostat. The filament voltage recommended is 3.5 while the current consumption is .51 amperes.

The curve A, Figure 8, was developed with the plate potential at 16½ volts, when this was increased to 22½ the curve shown as B was developed. Curve C shows the variation when the plate was

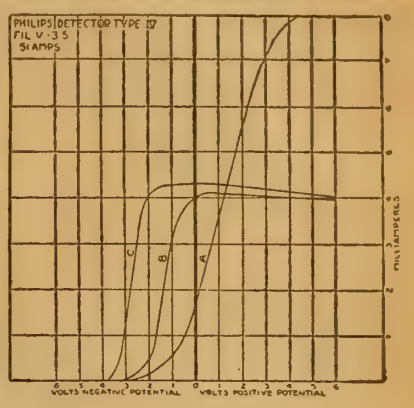

Figure 8

changed to 25½ volts. It is evident that this tube will give a very high efficiency value, but the adjustment of a proper grid potential is necessary. For this reason the use of a potentiometer connected across the A battery, with the grid return connected to the center terminal of the potentiometer, is advisable.

(TO BE CONCLUDED)

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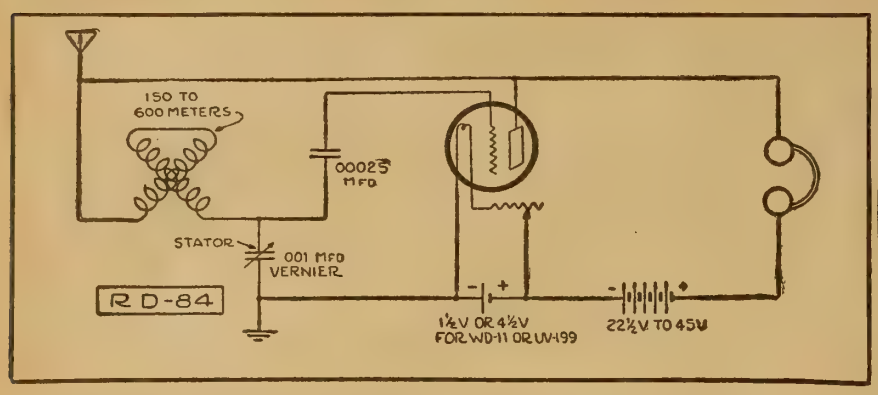

FOR the fan who contemplates building a very compact portable set the hook-up shown as R.D.-84 is recommended. Any of the tubes with low current consumption can be used. Naturally the proper rheostat to be used will depend on the tube and the source of filament current.

The antenna circuit includes a variometer and a .001 mfd. veriner variable condenser in series. These two controls of wave length will permit extreme selectivity. The regenerative feature of the circuit guarantees plenty of volume in reception. The circuit is an adaption of the Colpitts transmitting circuit named the "Gibbons."

If desired audio frequency amplification can be added in the usual manner. The plate voltage need not be more than 45 and in fact 22½ volts will do in most cases. This depends on the tube.

Since maximum results are expected, good apparatus should be used and care taken in assembly and wiring. Soldering joints should be properly made. Spaghetti insulation should be used in all compact sets thus reducing the possibility of short circuits to a minimum.

As a portable set, U.V.-199 or W.D.-11 tubes are convenient. The latter can be lighted by a single dry cell and the former needs only a large, tubular flashlight cell (yielding 4½ volts). The tube sockets should be mounted on sponge rubber or heavy felt batting to eliminate vibrations that breaks the filament, and microphonic tube noises when the set is in use. Short flexible leads to the socket and thence to the regular bus bar wiring will also aid in stopping these shocks.

FIRST STEPS IN RADIO

(Continued from page 11)

the potential between adjacent turns use is made of bank winding.

In a 2-bank winding the turns are laid on as numbered in the illustration. Two turns are first put on the tube, the third jumps back on top as shown, the fourth turn coming back to the tube and the fifth goes back alongside the third and so on. A 3-bank and a 4-bank are also shown. By this means the distributed capacity is reduced to a minimum and a compact coil results.

Since this type of winding is not suitable to machine (or even hand!) winding the honeycomb and duo-lateral coil was devised. In this winding the turns are spaced some distance apart and cross each other at an angle. Since adjacent turns are well separated and the layers cross at an angle the distributed capacity is effectively kept down while a large inductance is obtained in a small space.

Spider Web Winding

Instead of winding the turns of an inductance alongside of each other an attempt to wind them on top of one another in a flat spiral resulted in the spider web or staggered coil. Originally this form of winding consisted of a round wood form in which was inserted an uneven number of wood pegs or sticks. The wire was woven around the sticks to form a thin flat winding very suitable for use in tuners using a tickler coil inductively coupled to the secondary of a receiving set. The more modern spider web differs only in that a slotted form is used as a form for winding.

Another form of winding that is seldom used but possesses many advantages is the torroidal coil. In this form of inductance the coil is wound on a doughnut-

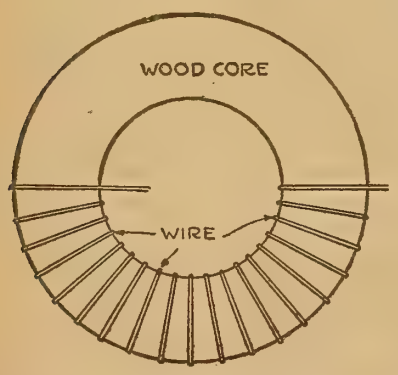

Figure 22—Showing How Torroidal Coils Are Wound

like form cut from wood as shown in Figure 22. It will be seen that the magnetic field is completed within the coil and such a coil will not act inductively upon another winding. This is a great advantage in some cases particularly where feedbacks in a set causes trouble. Thus this winding would be suitable for tuned Radio frequency amplifiers or for single circuit circuit tuners where inductive feed-back is not employed.

Variometer Effect

So far we have considered industries that are variable only by tapping the winding at fixed places. In the variometer, however, we have an inductance that can be varied in minute steps. The principle of this instrument is shown in Figure 23. The rotor and stator are represented by straight tubes for the sake of clearness. When the windings are connected in series the same current flows through both coils.

In a properly designed variometer the magnetic fields of the stator and rotor are of equal strength. When the rotor is in such a position that its poles are similar to those of the stator (or so their fields

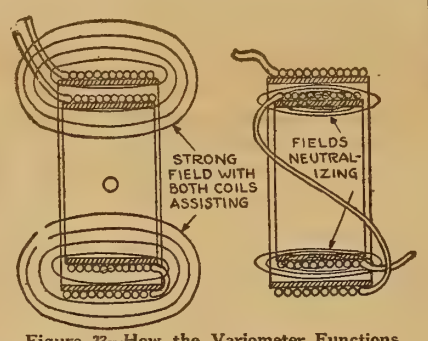

Figure 23—How the Variometer Functions

assist each other) the inductance value is at a maximum as will be seen from the illustration where the two fields act together.

As the rotor is turned its field does not coincide with the stator field and the mutual inductance is decreased, reducing the total inductance proportionately. When a full half turn is made the fields from the two coils are in opposition and neutralize each other thus reducing the inductance to a minimum. Therefore, it is possible to vary the inductance very gradually for fine tuning.

In order to obtain a wide range of tuning it is necessary to have the minimum value of inductance as near zero as possible. For this reason the stator winding should come very close to the rotor so that the neutralization of the fields will be more nearly complete. In practice, about the greatest range is to reduce the inductance value to one-fifth of maximum value.

In the next chapter, "Tuners and How to Tune Your Set," we will take up the application of these inductances in the various tuning circuits.

(TO BE CONTINUED.)

To thoroughly understand the workings of triode tubes, the beginner should read a book on the subject.

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Triple Coil Mounting.....$5.00 List
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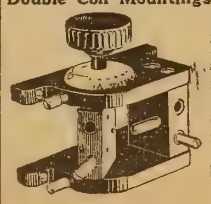

A patented feature locks the coil in place and prevents the coil from being thrown out of adjustment once station is tuned in. Equipped with a silver finished calibrated dial.

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Review of Books

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Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz., Jr., E. E. This is a De Luxe edition of this famous circuit. Profusedly illustrated and fully explained. Fifty-two pages. Price, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Ideas for the Radio Experimenter's Laboratory. By M. B. Sleeper. This book tells in a simple way the how and why of Radio apparatus. Comprehensive data is given on such necessary laboratory instruments as the oscillator, wavemeter, direction finder, Radio compass, vacuum tube characteristic measuring set and detailed advice given on the winding of various kinds of standard inductance coils. Price, 75 cents.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

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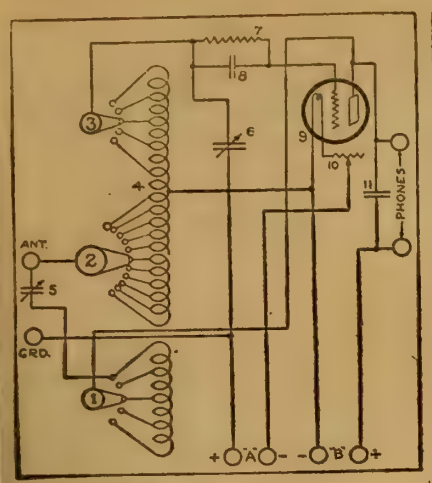
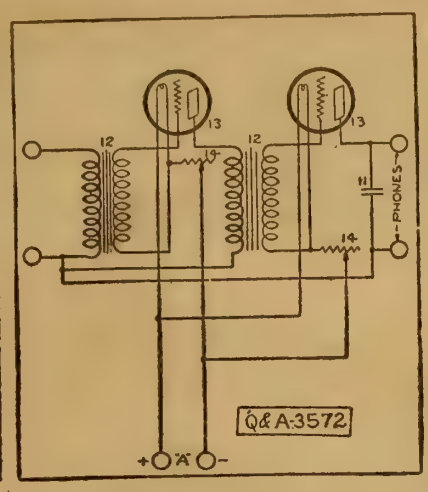
Questions and Answers





Reinartz Panel Set

(3572) WJM, Rensselaer, N. Y.

I believe it would prove advantageous to many of your readers as well as many who never saw them to reprint the drawing of the Reinartz circuit that appeared in your paper November 25. I lent my copy to a friend but it has never been returned and I am very desirous of getting another.

I built my Reinartz through the aid of your specifications and it is my favorite set. It has proven very selective, which is desired by most owners, for it brings in the distant broadcasting stations exceptionally well. Often it is very poor on local stations and only last night I could not tune in a concert which was being sent out only about two miles away but could get WGR at Buffalo fine at the same time by a mere turn of the vernier condenser.

I have the detector with one stage and attempted to add a second stage but with no success. No better than one stage, although I have gone over wiring and all details without finding anything amiss. Some drawings show a plus to secondary of transformer, others a minus. Have tried both but no better. I am well pleased but would like to add the other stage so could use a loud speaker. I can get broadcasting from 4 p. m. until 4 a. m. nearly every day if I care to tune in. The farthest point reached is Omaha, Nebraska. This is no record but I am trying to improve my set to establish a record. I desire to get the Pacific stations. I would like a drawing showing how to hook on the second stage of amplification showing the variations to make. Also data on choke coil and advantage and how to make and whether battery is used when the rheostats are turned off.

What I actually want to know is, if it is sufficient to turn rheostats of A battery off when not in use in order to not use either A or B battery or must the wires be taken from the binding posts of the A and B battery.

It seems peculiar that I cannot get my second stage to function. I have used the same wiring plan as the first on which I have, in my estimation, good results. I have tried using separate B batteries of 45 volts for the one stand second stage, also have tried making all connections on one B battery. I am using jacks so if you should publish a diagram make jack connections plain.

A.—Answering your inquiry with reference to difficulty encountered in adding amplification to otherwise satisfactory functioning Reinartz circuit we are advising that it is our opinion that you have a faulty amplifying transformer. It might be, however, due simply to the fact that tube is not making a good contact in socket. Attention to these details should remove the limitation experienced.

In the matter of connecting transformer, secondary must go to the negative side of A battery.

Battery current is not consumed when rheostat is turned off.

We are directing your attention to page thirteen of March 3 issue of Radio Digest for a diagram of circuit in question showing method of adding two stages of amplification with jacks for plugging 'phones in on detector.

As per your suggestion we are repeating the hook-up illustration that appeared in the November 25 issue.

Loop Aerial

(3444) FHG, Seward, Nebr.

What size loop do you recommend to work with a single tube reflex circuit, as shown on page 14 of the March 17 issue of Radio Digest? Also will it receive Radiophone messages and music?

"Good Luck" to "Logwood," and same to you. You publish a good, clean, clear paper and I look forward to it each week.

A.—Answering your inquiry, we are advising that an effective loop aerial is accomplished with ten turns of wire, paced one-half inch apart, on a three-foot square frame.

Frankly, we would not admit that a loop aerial will afford the satisfaction of an out-of-door aerial construction. The reflex circuit is effective and affords a reasonable degree of gratification in operation.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

TWO SUPERSENSITIVE CIRCUITS
(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.
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for W.D.11 tubes—

Standard, threaded rubber, Willard's specially adapted for use with WD-11 Tubes. Supply current at 2 volts to one WD-11 Tube for 210 hours on a single charge. Rechargeable. Brand new, size 4x5½x7 inches—Chi-Rad guaranteed.

2-Volt Willard Charged...$7.50
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These same Willards can be adapted to deliver 8 volts for pure D. C. for C. W. Transmitters. Better than a generator because no filter is necessary. Much less expensive.

In lots of 40 (320 volts).$160.00
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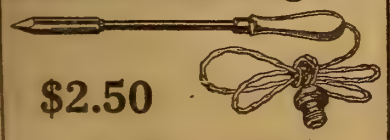
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—the essential features necessary to make an audio frequency transformer a good one—
1. *High Amplification.*
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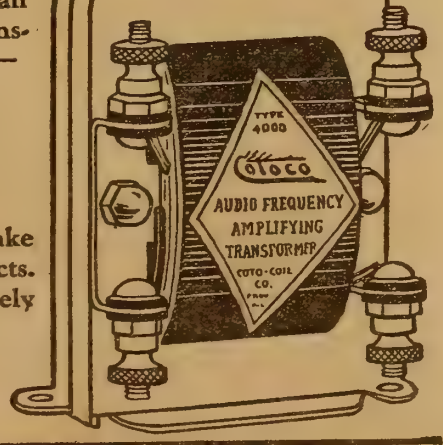
Cotoco transformers make these ideal features facts. And the finish will surely please you.



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	List	Our Price
EVEREADY—No. 763—22½ Volts...	$1.75	$1.45
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BRIGHT STAR—No. 15-50—22½ V..	1.75	1.10
BRIGHT STAR—No. 15-03-6—22½ V.	2.25	1.45
BRIGHT STAR—No. 30-90—45 Volts.	5.00	3.50
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FRANCO—No. 3045V—45 Volts.....	5.75	3.95

PANELS—3/16" Thick

	Hard Rubber	Bakelite		Hard Rubber	Bakelite
7x18	$1.65	$2.45	7x10	$0.95	1.35
7x21	1.85	2.75	7x12	1.25	1.60
7x24	2.15	3.25	7x14	1.40	1.95

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7x10	$2.75	7x18	$3.50
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Complete parts for this remarkable set. FREE DIAGRAM..... $9.95

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Phones. None better made. List $12.00. Our price..... $7.95

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$18.00 List—2 Amp. Special $14.95
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QUEENS 180° BAKELITE COUPLER. Silk Wound. List $5.00. Our Price $2.45

Complete Parts for 2 STEP AMPLIFIER, including Panel, 1 10 to 1 Ratio Transformer, 1 5 to 1 Ratio Transformer $13.50
"All American" Transformer used.

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Perfection Quality. Completely made, ready to use—Guaranteed $11.95

TUBES UV-199..... UV-201A..... WD-11..... $6.50

V. T. 2 TUBES
Genuine Western Electric Tubes. The Best Amplifying Tubes Made..... $6.75

CROSLEY
One tube Regenerative Set. Will receive over 1000 miles..... $19.00

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2 Step Amplifier to match above, Mahogany Cabinet $17.00

CROSLEY
2 Step Amplifier to match above (same size Mahogany Cabinet) complete with two Deforest DV-6 Tubes. Special.... $21.50

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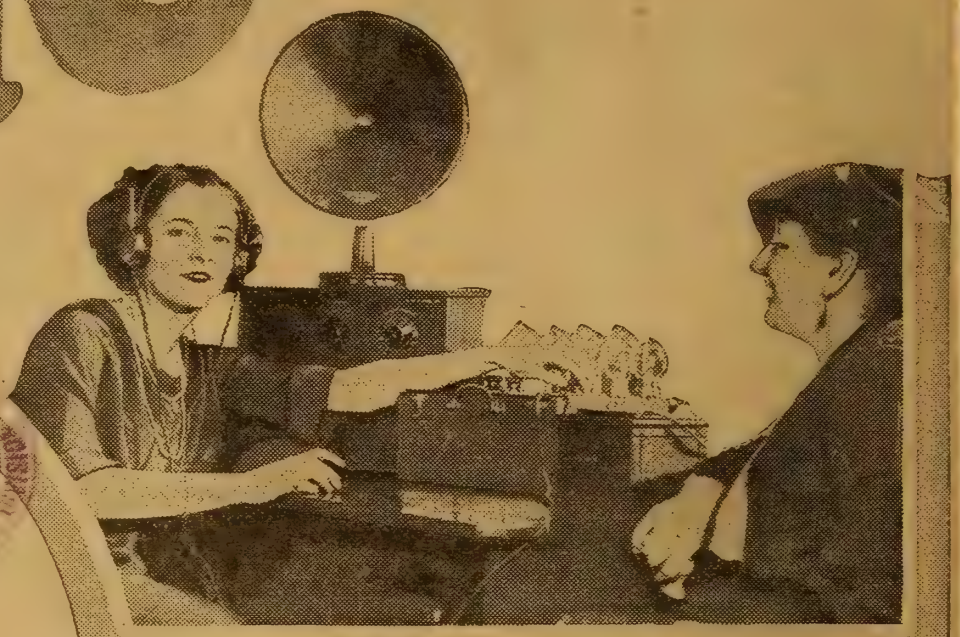
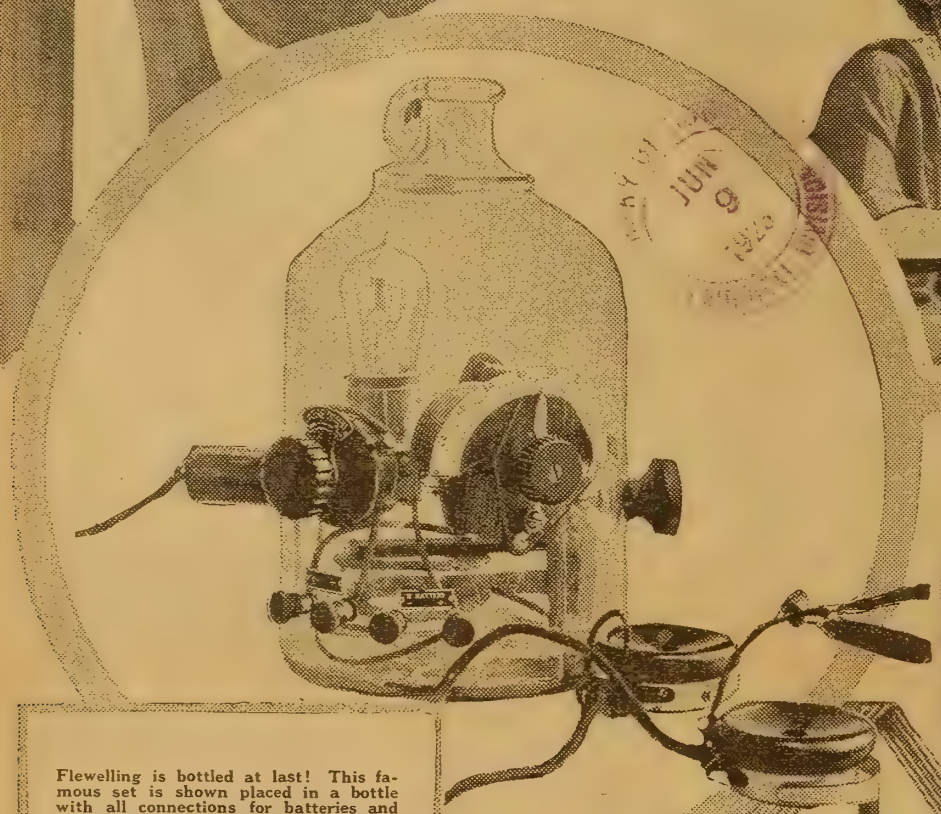
Radio Illustrated

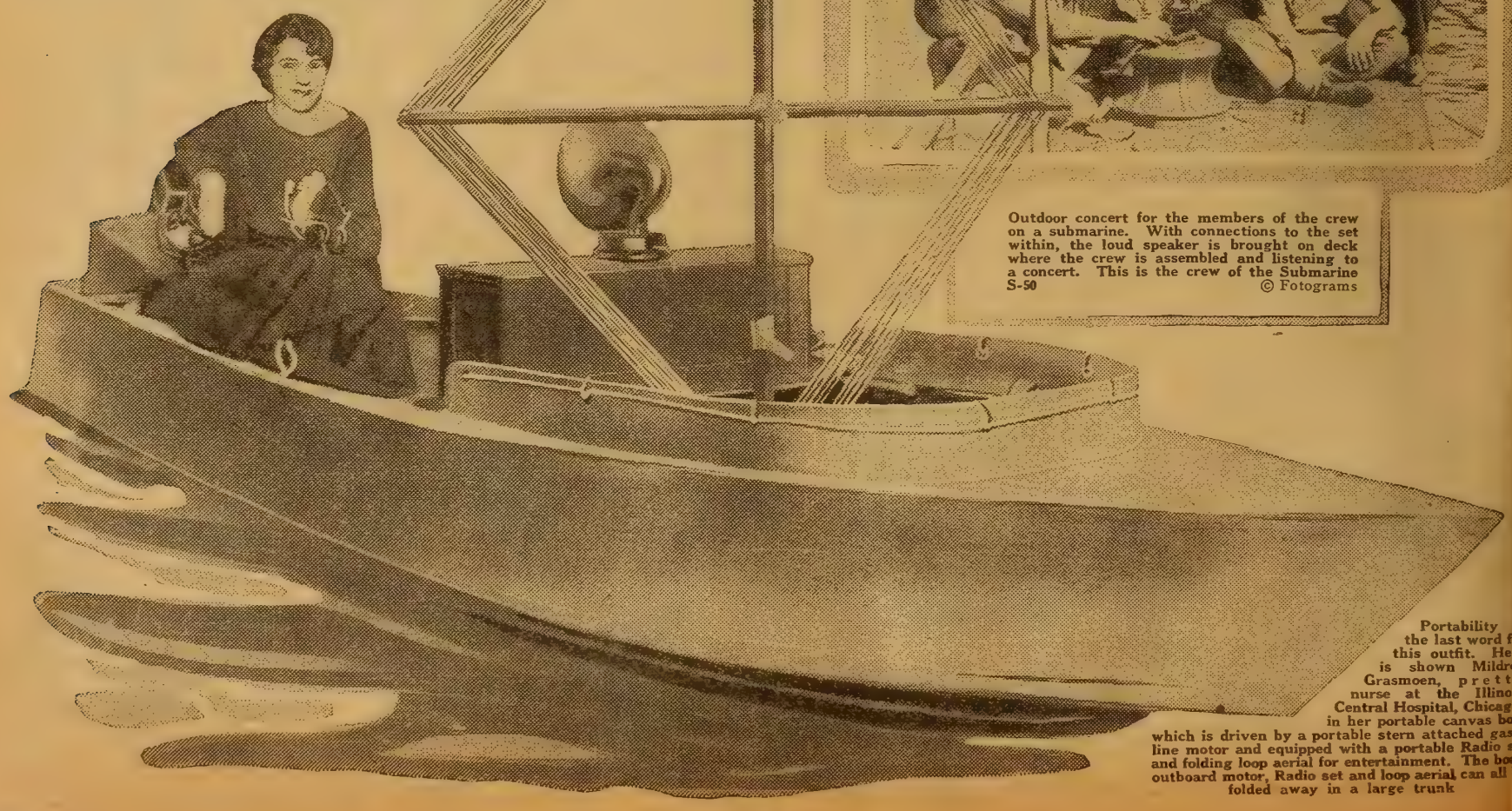


Miss Elsie Janis, known to every doughboy who served in the A. E. F., and her mother in their Paris apartment listening to a selection being rendered on the Wanamaker organ in Philadelphia by Marcel Dupre, organist at Notre Dame in Paris © Wide World



Flewelling is bottled at last! This famous set is shown placed in a bottle with all connections for batteries and phones coming through the glass sides. The builder of the set, Mr. Albert P. Langlois, claims to have picked up signals with this bottle set while speeding in an automobile and using a wire dragging along behind for an aerial

Outdoor concert for the members of the crew on a submarine. With connections to the set within, the loud speaker is brought on deck where the crew is assembled and listening to a concert. This is the crew of the Submarine S-50 © Fotograms



Portability is the last word for this outfit. Here is shown Mildred Grasmoen, pretty nurse at the Illinois Central Hospital, Chicago, in her portable canvas boat which is driven by a portable stern attached gasoline motor and equipped with a portable Radio set and folding loop aerial for entertainment. The boat, outboard motor, Radio set and loop aerial can all be folded away in a large trunk

©C18579203

Tuning for Beginners—Flewelling—Portable Set

Radio Digest Illustrated

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AIR USED TO AID REDS

DENY AIR SERMONS HURTING CHURCHES

'AWAKEN CARELESS SOULS' —BOSTON CLERGY

Opinion Crosses Opposition Stand Taken by Minneapolis, Minn., and Newark, N. J., Ministers

BOSTON, MASS.—Boston clergymen differ with Rev. Phillips E. Osgood of Minneapolis, Minn., and Bishop Wilson R. Stearly of Newark, N. J., regarding Radio and the Church. According to these three clergymen, Rev. Arthur T. Brooks of the Dudley Street Baptist Church, Boston, Rev. A. Z. Conrad of the Park Street Church, Boston, Dean Rousmaniere of the Cathedral of St. Paul, Episcopal, and others, attendance at church has not decreased in the slightest as a result of the Radiophone broadcasts of church services.

Many are of opinion, on the other hand, that it has actually increased interest in the church, because it has awakened many careless souls who had grown somewhat lax in their church attendance.

Top photo is Belle Bart, astrologist, who has foretold accurately many important events, heard every Monday evening at 9:15 Eastern Standard Time on WOR, the L. Bamberger station, Newark, N. J. Readers who would like to have their horoscopes read can have this done by writing care of WOR, giving their date of birth and three initials, and three questions they desire answered. In the canoe below Miss Bart is Irma Faas of Minneapolis, one of the season's early portable Radiophans. Note the loop aerial Miss Faas has strung on her parasol

Lower Photo © Keystone

AGENTS FIND PROPAGANDA BROADCASTER

Private Plants Radical

Citizens' Complaints Cause Investigation—Believe Soviet Russia Behind Move

By W. E. Johnson

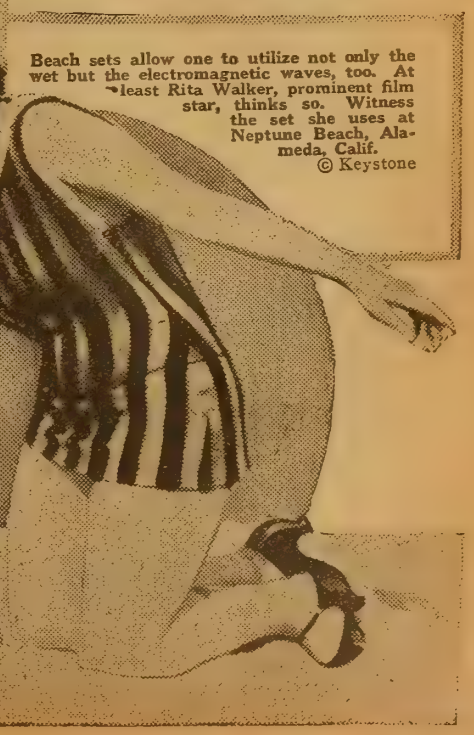
PHILADELPHIA.—Federal agents and city police authorities are investigating the reports of the practice of private broadcasting stations in this city in spreading radical propaganda. The situation is such that hundreds of citizens have sent letters of protest to the federal authorities complaining against the disloyal messages that have been sent out.

Joseph McDevitt, a Department of Justice agent, has conferred with Director James Cortelyou, of the police department, in the hope that steps will be taken to suppress the radical program.

Russian Backing Seen.

Russian backing is seen in the Reds' new enterprise. The most violent attack against the government was made on Sunday, May 20, through a Philadelphia station, William F. Forster, chief of the Department of Justice agents in this city declared. He would not, however, reveal the exact location of the station, although admitting it had been under investigation for some

(Continued on page 2)



Beach sets allow one to utilize not only the wet but the electromagnetic waves, too. At least Rita Walker, prominent film star, thinks so. Witness the set she uses at Neptune Beach, Alameda, Calif.

© Keystone

ALL DETROIT'S BLIND WILL GET RECEIVERS

DETROIT.—Every blind person here is to be furnished with a receiving set. The Detroit Welfare League, under the direction of Grace D. Davis, has undertaken this task and announces that many afflicted persons already have been supplied. "No one can realize what a blessing Radio is to persons without sight," Miss Davis says.

First Broadcasts from Mexico

MEXICO CITY.—The first Radiophone broadcasting station ever successfully operated in Mexico now is sending out programs from the Regional Exposition of Nuevo Leon. The station uses a wave length of 400 meters.

FANS LIKE IDEA OF BIG REWARD OFFER

ONE TELLS HOW HE HAS FRIENDS SAVE COUPONS

Much Valuable Standard Apparatus Available to Radiophans By Saving Consecutive Coupons

SPECIAL REWARD OFFER
Coupon Number 3

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

The Special Reward Offer announced in the June 2 issue has been received with enthusiasm by the regular readers of the Digest. One fan writes:

"Just the opportunity I have been waiting for. There have been many pieces of apparatus I have wanted but the old pocketbook wouldn't stand for my getting them. Now with the Special Reward Coupons (I have taken your paper regularly since the first number) I am clipping them every week and will soon have two or three pieces of apparatus I have wanted for some time, and at practically no expense."

"Notice quite a few things I want among those you are offering," writes another subscriber. "I have asked several of my friends who take your paper to save their coupons for me. Great stuff Digest; I'm for you."

Many realize that all that is necessary to secure the valuable, standard pieces of apparatus listed below is to clip the coupon appearing on page two of the Digest each week and mail them together with the necessary remittance to the office. There is no limit to the number of coupon series that can be sent in for apparatus.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Electrad Grid Leak (with clip mountings); Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3 16, ¼, or 5/16 inch black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts;

(Continued on page 6)

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440			11:30-12:30			11:30-12:30	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	10:00-12:00		10:00-12:00		10:00-12:00		9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00		10:00-11:00		9:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00		8:00-12:30	8:00-10:00	
KYW, Chicago, Ill.	345	7:00- 8:30	9:00- 9:30	7:00- 8:30	7:00- 8:30	10:00-12:00	7:00- 8:30	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 8:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00-1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30		7:15- 9:30			
WJY, New York, N. Y.	405		5:30- 9:30		5:30- 9:30	5:30- 9:30		
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:00
WKAQ, San Juan, P. R.	360		6:30- 8:00				6:30- 8:00	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas	400		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00				6:00- 9:00		
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

Portable Sets Galore for the Summer Radiophan—Next issue is the Portable Set Number of Radio Digest. You hot weather airphone fans, get next week's copy early so you can begin building a compact receiver for the beach, camp, automobile, or whatever good use you may have in mind. There will be lots to take your choice from. For instance—

A Flewelling Cigar Box Portable—Costs little and hears 'em all on a short length of wire for an aerial. Read about it next week.

The World's Smallest Regenerative Set—Three and one half by three and one quarter inches only, and has picked up stations over 800 miles away. It was built by Roslyn Russel of Niagara Falls, N. Y., and will be explained in detail June 23.

A Camper's Set Complete—Designed by H. J. Marx. A dandy outfit for the lover of the out-of-doors. Another feature in the Digest next week.

R.D.-86 Hook-Up Diagram—A wonder for the fan who desires a simple, sure-fire set for the beach. See page 14 issue of June 23.

Even Q. & A. Next Week Will Be Portably Inclined—that is, hand picked so that they will be of most benefit to those contemplating the use of a small set this summer.

Have a Copy with You on Your Vacation
WHEN YOU WANT
Radio Digest
YOU WANT IT!
BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....
Address .....
City ..... State .....

U. S. REDS USE RADIO

(Continued from page 1)

weeks. All of the messages, he said, were in the guise of an appeal on behalf of the working class, but like all radical propaganda, the main parts of the talks embraced attempts to belittle the existing form of government. This new form of propaganda, federal agents believe, is being paid for by the Russian soviet government.

A question arises as to whether legal methods can be found to close up such stations that broadcast radical propaganda, and a conference will be held soon with officials in Washington concerning such a move.

They Took It Good-Naturedly

CHILLICOTHE, OHIO.—Local Kiwanians recently thought they were dancing to Radio music and were so pleased by the novelty that they girated till midnight, when it was disclosed to them the music was furnished by a phonograph connected with tube amplifying set.

The Mystery Circuit

The trick is in the Coil
NO STORAGE BATTERY REQUIRED
No Radio Frequency Transformer used. Not Super but DOUBLE Reflex Regeneration. Works local without antenna or ground, and brings in the "FAR AWAY ONES" with more volume than you ever thought one tube could deliver.
Money Order for 25 cts. brings easy to read diagrams and all information. Address:
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A REAL RADIO MAP
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16 page Index gives call letters, names and addresses of Broadcasting Stations, Kilocycles, Meters, space for Dial Adjustments and Supplementary List. Permanent and graphic record of stations received made on map and index by use of small colored signals, furnished with map in two sizes and three colors. These take place of colored headed pins that are both destructive and expensive.
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IF OURS IS BETTER MAIL US 30 CENTS
NOT Return it at Our Expense
ZOBEL-STEIN LABORATORIES
322 9TH ST. BROOKLYN, N.Y. SOUTH 2650

CALIFORNIA TO GET MAMMOTH STATION

GENERAL ELECTRIC PLANS DUPLICATE OF WGY

Oakland to Get New 1000-Watt Plant—Reserve Power for Tests—Building Now

By C. H. Huntley

SCHENECTADY, N. Y.—Faith in the permanence of Radio broadcasting is demonstrated by the recent announcement of the General Electric Company that the first plant to be constructed exclusively for popular broadcasting will be erected in Oakland, Calif., to house the large Pacific coast station of that company.

Work will be started this month on a two-story studio building, the antenna towers and the power house. Workmen are already assembling the Radio equipment. It is expected that the new station will be in the air within six months.

The station will be located on East 14th Street, Oakland. The site was selected after a thorough inspection of available properties in San Francisco and vicinity. The Oakland plot was chosen because of its technical advantages, the availability of musical talent and the proximity of the site to San Francisco, the great commercial center of the Pacific coast.

Two Story Brick Structure

The plans provide for a two-story brick structure. On the first floor will be the office of the studio manager, a general correspondence room, a reception room for artists and quarters for motor-generator sets and storage batteries. There will be two studios on the second floor, the main studio large enough to accommodate large bodies of musicians such as a band or symphony orchestra, and a smaller studio from which solo numbers and addresses may be broadcast. The use of two studios will make possible continuous broadcasting. The Radio control room will be on the second floor.

One thousand feet back of studio building will be the power house and antenna system. The antenna will be multiple-tuned and strung between two steel towers, each 150 feet high and placed 260 feet apart. Beneath the antenna proper will be the counterpoise consisting of a network of wires, fourteen feet above the ground, covering an area of 150 by 300 feet. In addition to the power house, which will be one story high, 71 by 32 feet, there will be a small building for the tuning apparatus at the end of the multiple-tuned antenna.

Transmitter Similar to WGY

The transmitter will be similar to that which is now used almost daily at WGY. Many developments which have brought this station a reputation for exceptional transmission quality will be part of the Pacific coast station equipment.

The new station will be operated with 1000 watts in the antenna but the equipment will be designed in excess of that power for test purposes.

Every part of the equipment in the power house and in the control room will be in duplicate, assuring uninterrupted service. If one outfit or part of an outfit breaks down during the operation period another part will be ready to be brought into the circuit.

It is probable that an auxiliary studio, connected with the transmitting equipment of the station by telephone lines, will be located in San Francisco.

The Pacific coast station of the General Electric Company will utilize remote control to broadcast church services and musical entertainments from San Francisco and Oakland. The Pacific Telegraph & Telephone Company has offered to provide land wire connections for this service.

WHK Starts Cop Program

CLEVELAND, OHIO.—WHK, the broadcasting station of the Radiovox Company, has made special arrangements with the Police Department of the City of Cleveland, by which special bulletins of public interest will be broadcast at 6:00 P. M. each evening.

TUNES IN FOR MUSIC; GETS STATION H——L

COLUMBUS, OHIO.—Alex Harris tuned his set one night recently with the intention of listening to a concert from RSVP or some other place but for a time he thought he had Station H——L. He was called away from his set and while he was gone a droplight wire became entangled with the set. The result was a fire.

LISTEN TO BIRTHDAY PARTY FOR ALFONSO

NEW YORK.—Many Radiophans in the United States as well as in the South American republics listened with interest on an evening recently to the broadcasting by Station PWX Havana, Cuba, of speeches and music from the Spanish Casino there in honor of the birthday of King Alfonso, of Spain.

"OLD RELIABLE" PIANIST POPULAR

Miss Jeanne Wynne, one of the best known Radiophone entertainers in the country. She is a pianist of widely recognized ability and is an exclusive star at WGM, "Old Reliable," the Atlanta Constitution, Atlanta, Ga.

STREET LOUD SPEAKER SILENCED BY OLD LAW

City's Police Chief Holds Horns Are "Nuisances"

ELIZABETH, N. J.—Years ago the local board of works passed an ordinance prohibiting peddlers and others from making noises on the streets. This ordinance was invoked only recently to stop the use of large loud speaking horns in front of stores of Radio dealers. Chief of Police Mulcahy says use of these horns violates the ordinance as a "nuisance."

The dealers argue that the ordinance was passed before Radio was thought of, but the Chief was obdurate and said the use of such horns will have to end. The dealers indicated they will fight the police ruling.

Omaha Citizens' Club Meets

OMAHA, NEBR.—The Citizens Radio club of Omaha held its initial meeting recently. All present members are also members of the American Radio Relay league.

VOYAGERS ENJOY SHIP-TO-SHIY TALK

VOICES FROM ONE VESSEL CARRY TO SECOND

Pacific Coast Ships in Epochal "Stateroom Radiophone Confab" Unique Experiments

By Strachan McMillan

LOS ANGELES, CALIF.—For the first time in the history of shipping on the Pacific Coast, if not in the entire world, passengers while enroute on two liners, more than a thousand miles apart, were able to carry on telephone conversations with each other from their private staterooms. This was revealed recently at Los Angeles Harbor with the arrival of the liner H. F. Alexander from San Francisco.

Passengers who arrived on the liner, stated that on Thursday evening, just as the ship was nearing Los Angeles Harbor, Radiophone communication was established with the S. S. Dorothy Alexander, of the same line, just as that vessel was pulling into the Puget Sound.

Equipped with Radio Switchboards

The two ships, together with the S. S. Matsonia, were equipped with Radio switchboards a short time ago, but this was the first time that the instruments were experimented with to any degree of success. Both liners, which belong to the Pacific Steamship Company, were equipped with phones for the use of interstateroom communication. The installation of the Radio switchboard is stated to be inexpensive and mechanically simple, and permits the plugging of any stateroom of the ship onto the ether line.

Capt. A. P. Bartlett in command of the S. S. H. F. Alexander stated that he expected, on account of the success of the recent experiment, that all ships will be so equipped and that it will be only a short time until then. "And," continued the captain, "if telephone companies on shore will install Radio switchboards, it will permit of anyone ashore to get into instant communication by telephone with almost any ship at sea."

Avalon, Santa Catalina Island, is now equipped with Radio switchboards, and persons who are on the mainland may secure telephonic communication with the island from an ordinary telephone.

Wave Bath World's Latest in Wonders

But, Dear Reader, This Radio Dip Is Medicinal—Not Your Saturday Night Favorite

NEW YORK.—The Radio bath is now added to the long list of ether wonders.

Two physicians, after months of experiment, declare they have perfected a process of providing an electric bath by Radio.

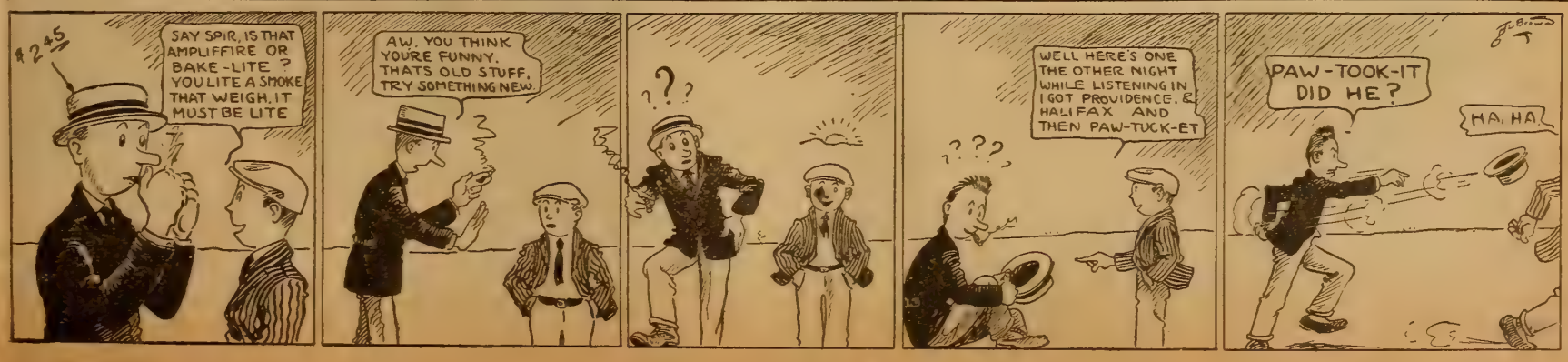
But this bath is medicinal, not the ordinary Saturday night favorite, and those who joyfully conceived the idea of bath broadcasting stations, fitted to throw a bath about one while walking on the street, or working in the office, are doomed to disappointment.

Cures Nervous Afflictions

The process, invented by Dr. W. S. Benson and F. B. Schanne, both of Newark, N. J., consists of baking or sweating patients in strong electromagnetic waves diffused over the entire body. A cabinet is used for the purpose. The ailments which it is declared to treat with success are rheumatism, neuritis, pneumonia and nervous afflictions.

At no time during the treatment, according to the physicians, is the patient in direct contact with an electric primary circuit. So powerful are the waves inside the cabinet that a disconnected electric light bulb, held within the field of the waves, will glow with light. The waves penetrate every cell and tissue of the human body, energizing cells and exercising muscles.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Aw That's Tube-Bad



A.R.R.L. DON'T LIKE "SILENCE" PEROIDS

CUTS OUT AMATEUR AID IN EMERGENCIES

Relay League Thinks That Enforcement Would Destroy Co-operation with Commerce Department

WASHINGTON, D. C.—Enforcement of a quiet period for amateur Radio operators between 7:30 and 10:30 P. M., as proposed by the department of commerce, would prevent the valuable assistance of amateur stations in emergencies, such as storms, floods and wrecks arising during those hours, according to the American Radio Relay league board of direction which has submitted recommendations to the department through its secretary.

A special meeting of the league was held in New York recently to consider amateur regulations originally discussed by its representatives and the chief supervisor of Radio.

Now Voluntarily Observed

Since the period of quiet hours between 7:30 and 10 P. M. now is being adhered to voluntarily by amateur operators throughout the country and has been extended in some instances to the hours between 7:30 and 10:30 P. M., through a definite local agreement, the board considers it unnecessary for the department to enforce this regulation.

"It is our conviction," the recommendations state, "that if transmission is prohibited between certain hours, it will destroy rather than create amateur cooperation with the department; whereas if voluntary quiet hours are permitted, the past records show that we can count on nearly perfect observance of the plan."

Want Wave Band Subdivided

The board went on record as being in favor of a virtual subdivision of the amateur wave band between 150 and 220 meters, recommending that this band be available for special license continuous wave transmitters, that wave lengths between 150 and 200 meters be open to continuous wave general transmitters, that all modulated services, including spark, AC tone, CW, ICW, unfiltered CW and phone, be restricted to the band from 176 to 200 meters, and that all types of transmitters be permitted "to operate at will on any wave length within the band to which that type is eligible."

SPRAY SERVICE TO SAVE FRUIT CROPS

WMAK Furnishes Daily Advice of Specialists to Eastern Growers

LOCKPORT, N. Y.—Station WMAK of this city, located in the heart of the Niagara fruit belt, has inaugurated a Radio spray service for farmers and fruit growers. A fruit specialist makes the announcements relative to spraying daily at 11 A. M. Eastern time. It is estimated that fruit growers in western New York have lost thousands of dollars worth of apples and peaches in past years because they were not familiar with the opportune time to spray and what chemicals to employ. It is expected that the Radio Service will not only improve the quality but also the quantity of the 1923 harvest.

Club Makes Fan Directory

TIFFIN, OHIO.—A Radio directory giving the names of owners of receiving sets and description of their apparatus, is being compiled in this city by the Tiffin Radio club.

RUSONITE
CRYSTAL RECTIFIER
MULTIPOINT (Patent Pending)
A Synthetic CRYSTAL DETECTOR sensitive over its entire surface
Eliminates all detector troubles. Extraordinary clearness and volume. Endorsed by Radio experts and press. Sold in Sealed Packages only. Join the ever increasing Rusonite fans.
Price mounted, Sensitiveness guaranteed..... 50c
RUSONITE CATWHISKER
14 Karat Gold Multiple Contact Super Sensitive..... 25c
Order from your dealer or direct from us,
RUSONITE PRODUCTS CORP.
19 Park Row, N. Y.

Numerous Letters from Fans Show Listener In Audience Wants Variety

Entertaining a Million Persons a Night Proves Big Job but Program Directors Get Valuable Hints from "Bouquets and Brick" Letters from Fans

By William H. Easton

If the Radio audience could realize some of the problems that have to be solved by those who are engaged in preparing the programs, they would, I am sure, not only sympathize with them but would wonder how they preserve their sanity. No one before has ever had to entertain a million or so people every night; and consequently those who have undertaken this simple little task have had to stumble along as best they could, learning as they go, and profiting wherever possible by their mistakes. They are, however, exceedingly fortunate in having an audience that tells them frankly just what it thinks about their efforts; and with the hundreds of letters that reach them daily as a guide, they have been able to work with some degree of certainty.

First Rule, Give Variety

The first rule that the letters lay down is: Give the Radio public infinite variety. If you were to open their mail some morning the first letter would probably say, "I enjoyed your concert so much last night. That's right; give us more good music and do away with those execrable popular selections." Then the second letter would say, "For the love of Mike, cut out the Uproar and give us good old American Jazz." Letter number three would read as follows: "Prof. Simpkins' address on 'The Color of Cats' was the most interesting speech I ever listened to," and letter number four would state, "Why do you inflict your audience with such stupid stuff as the talk on cats? I hung up my receiver in disgust."

Hard to Satisfy Everybody

With testimony like this it is quite evident that it is very difficult to satisfy everybody all the time. The only thing to be done is to draw from the entire field of music, literature, science, politics, culture, hygiene and religion, and thus please every one at least part of the time. Consequently, those who do not like jazz music must bear in mind that many will listen to nothing else; while those who do not like speeches must remember that a very large number of Radio listeners are isolated or are invalids and absolutely depend upon Radio for their contact with the outside world.

Must Keep Improving

The second point that the letters prove is, there must be constant improvement in broadcasting both technically and artistically. No station can maintain its programs on a dead level and retain the interest of its audience. The complaints soon begin to come in. Curiously enough, they are all to the effect that the programs are getting so poor. This is not the case. They are just as good as ever; but the taste of the audience has improved. It is for this reason that Westinghouse Station KDKA is experimenting so constantly in every direction. Its engineers are incessantly striving for better tone reproduction and for the elimination of unpleasant noises. Its program staff is incessantly working for better artistic effects and for entirely new features. They began with the phonograph; then introduced artists and speakers in person; then went outside of the studio for church services, important meetings, symphony concerts, operas and sporting events, and recently established an orchestra so that incidental music could be rendered in the best possible manner. Thus, in accordance with the well-known formula, "Every day in every way we are getting better and better." But no one realizes more fully how much more must be done in order to continue to preserve the good opinion of the Radio audience.

Want No Interference

The third important fact that develops from the correspondence is, Interference must be eliminated. Not only must the audience be able to hear this station clearly and distinctly whenever they wish to hear it, but they must also be at perfect liberty to eliminate its signals and receive equally clearly the program to some other station that may, for the moment, please them better. This is their most serious problem at present. The great increase in the number of stations has filled the ether with chaos and confusion, and if this is not remedied broadcasting will die out. The government, the Radio engineers, and those broadcasting stations that are interested in Radio for its own sake, and not for selfish reasons, are struggling with it valiantly. Though the situation may at times look hopeless, one should not forget that worse troubles than this have been smoothed out.

Broadcasting is only an infant. If it develops as rapidly within the next two years as it has in the past two (and there is every reason to believe that it will), interference will disappear; trivial programs will make way for those of real interest and importance; and it will be possible to hear not only the large American stations clearly and distinctly almost anywhere in the United States, but stations in London, Paris and Rome as well.

Give Radio Instruction

CEDAR RAPIDS, IOWA.—The Board of Education here has gone on record as favoring Radio instruction. Receiving sets will be used for instruction during class hours, and will be operated for the benefit of the parents in the evening.

Wayfaring "Ham" Tells Story

MILWAUKEE, WIS.—Upon his recent return from California, Charles S. Polacheck addressed the Milwaukee Radio Amateurs' Club, Inc., under the title of "Some experiences of a Wayfaring 'Ham' in the West."

When telephones are of the same resistance, connect them in parallel. If they are of different resistance, connect in series.

SUMMER CLEARANCE
Price List
NOW READY
Send for list of BARGAINS
ECONOMY RADIO CO.
132 Nassau Street, NEW YORK CITY

Summer Static Overcome
"Good-bye Aerial"

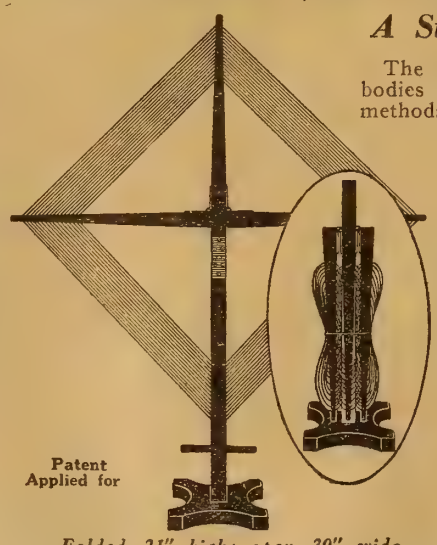
ANTENELLA
No aerial or antenna needed
All outside wiring, aerial, lightning arresters, switches and other inconveniences so inductive to static are eliminated.
Merely plug Antenella in any light socket and you can enjoy all Radio pleasures in any room in your home, apartment or hotel. No current consumed.
New Improved
ANTENELLA
NOW ONLY $1.25 formerly $2.00
At your dealer's—otherwise send purchase price and you will be supplied postpaid.
Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE, NEW YORK

CUNNINGHAM
TUBES REPAIRED

C-300 or UV-200	$2.75
C-201 or UV-201	3.00
C-302 or UV-202	3.50
C-201A or UV-201A	3.50
WD-11 or WD-12	3.50
Moorehead Detectors	2.75
Moorehead Amplifiers	3.00
DV-6 or DV-6A	3.00
Also the new UV-199	3.50
NEW DX 1½ VOLT TUBES	4.00

All tubes guaranteed to work like new.
Mail Orders Given Prompt Attention
"24 Hour Service"
RADIO TUBE CORP.
55 Halsey Street Newark, N. J.
TUBES SENT PARCEL POST, C. O. D.

The Qurad Folding Loop Aerial
A Summer Necessity



The Qurad Folding Loop Aerial embodies the most practical and efficient methods in loop construction. It FOLDS in every sense of the word and is so constructed that the wires cannot tangle. By merely raising the arms into their proper position, leverage is brought to play which draws the wire tight insuring perfect alignment and rigidity.

It is designed for use with radio frequency receivers but can be used effectively with any circuit. Undesired stations can easily be tuned out and interference from static is greatly decreased.

It is of rugged construction, yet attractive in appearance and will withstand hard usage. Finished in Walnut and strung with green silk covered wire. The Loop is mounted on a pivot base and arms are provided for shifting its direction.

Suitable for use in the finest home and especially desirable when genuine portability is required.

Folded, 21" high; open, 30" wide.
Price, complete, ready for use..... $12.50
Manufactured and guaranteed by
QUINCY RADIO LABORATORIES
Dealers are invited to write for our proposition
QUINCY, ILLINOIS

GLOBE PICK-UP PICTURES AUDIENCE

Here is the control operator at WJY-WJZ with the new double pick-up microphone half open. All of the harsh, mechanical parts are enveloped and hidden by the unique globe arrangement. The globe is about eighteen inches in diameter and stands on a mahogany pedestal

The heart of WJY-WJZ, an oscillograph that shows the Radio waves as they leave the antenna. This allows corrections to regulate the modulation, etc. There is an actual "motion" picture of the wave on the revolving square mirror. Operator W. E. Tesch is observing

Reputed the finest and most modern station, WJY-WJZ, atop the Æolian building, New York City, has probably the most novel pick-up microphone in use today. This transmitter is shown above in the Classic studio. (There is also a Jazz studio.) At the left, the pick-up is shown closeup. The globe is really a sphere atlas and typifies the world, the invisible audience of Radio. The sensitive microphone is concealed within the thin gauze globe, painted to make it more realistic. The seas are deep green while the continents are tan. The unique arrangement is meant to aid many ether artists who have found it difficult to give their best in a soundproof studio with no visible listeners or applause Photos © K. & H.

CFCN PLANT HELPS TO CALIBRATE SETS

CANADIAN STATION SENDS ON VARIED WAVES

Announcer Begins at 10:30 O'clock and Works on Rising Scale from 200 Meters

By Jeffrey J. Dingman

CALGARY, ALTA.—With the object of aiding Radiophans to tune in more easily and expeditiously on broadcasting stations on their scheduled times and wavelengths, CFCN, the broadcasting station of The W. W. Grant Radio, Ltd., at Calgary, is now conducting a service which will enable listeners-in to calibrate their receiving sets.

One night a week the announcer at CFCN broadcasts on many different wave lengths, varying from 200 metres to 750 metres. The announcer commences at 10:30 o'clock, Mountain Standard time, and announces that CFCN is working on 200 metres, asking Radiophans who are on their air to note carefully just what position on their dials the pointers are in while signals are being received on this wave length.

Great Aid to Listeners

This is repeated every few minutes on rising wave lengths, and thus listeners-in are able to record on the dials of their receiving sets the various wave lengths. This tends to allow them to tune in more quickly when they know a certain station is broadcasting on a regulation wave length at a set hour.

Many communications have been received by CFCN congratulating the management on this Radio service feature, which, judging by the number and tone of the communications received, popular and much appreciated.

Phones Repaired

Phone expert. Repaired phones for U. S. Navy. Can repair yours. Work guaranteed, rates reasonable.

RADIALL ELEC. CO., Passaic, N. J.

TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.

S. A. TWITCHELL

1925 Western Ave. Minneapolis, Minn.

FLEWELLING ANSWERS

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Use of Loop Aerial

(Submitted by A. W. H., Oelwein, Iowa.)

Question.—In using the Flewelling Super on a loop should I connect the two ends of the loop to the binding post in the regular way or how should the loop be used?

Answer.—The Flewelling Super picks up so much energy through its own wiring that a loop is not of very much use. If you use a short piece of wire, say 5 to 6 feet long and let it hang down from your set, you will secure as good results as you would with a good loop. Due to this habit of picking up its own energy, the Flewelling set robs a loop of any attempt that it might make to show directional effects as it does on, say, a Radio frequency set. The writer's own personal preference is to simply connect his set to the nearest radiator or water pipe and "go to it." Fully as good and generally better results are obtained in this way as upon a regular set with a good antenna.

They Didn't Like the Paint and He Didn't Like Radio

CHICAGO.—John P. McNamara painted the front steps of a house he owned at 1935 Taylor street recently. This did not please the tenants, Mr. and Mrs. Frank O'Connor, and to show their displeasure they walked down the newly painted steps and went out. When they returned they found the aerial of their Radio set torn down. Yesterday O'Connor obtained a warrant for McNamara charging disorderly conduct.

The latest and most essential part of an efficient tube set

Variable Resistance Leaks

FOR PANEL MOUNTING

Mounted on any panel in a few seconds—2 screws serving as connections behind panel.

Get stations you never heard before

No pencil markings—assure unbroken range of 180 degrees. Clarifies signals—eliminates hissing.

Complete with either .00025 or .0005 mfd. Micon Cond..... **$1.00**

Without Condenser.....75c

At your dealers—otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products

106 Seventh Ave. New York

WJAX INSTALLS NEW LIGHT-SIGNAL SYSTEM

Announcer Can Communicate with Operator Without Speaking

CLEVELAND, O.—In order to insure the highest class of service from WJAX, the Union Trust Co. is planning to install a soundproof telephone booth inside its studio. While the program is going on the announcer will remain within the booth and so can communicate with the operator at all times over a private telephone, even though the operator is only in the next room.

A system of signal lights will be installed for immediate communication between the announcer and the operator. These lights will be amber, green, red and white. When the announcer is ready to proceed with any number on the program, he will flash the amber light to the operator. That will mean, "I am ready." The operator will then flash a green light, which will mean, "The set is in operation." He will follow this with a red flash which will mean, "The microphone is ready—go ahead." The flash of a white light to either the announcer or the operator will mean, "Answer the telephone."

In this way, even while the programs are going on, the announcer can talk to the operator, arrange for the next number on the program, and so forth, without in the least interfering with the actual broadcasting.

The ringing of three silver chimes is the signal that announces programs from KFI.

MAGNAVOX TYPE R3. Latest nationally advertised models in original sealed factory cartons. List $35. Special introductory offer $25. Radio Central, Dept. D, Abilene, Kansas.

This Convict Eases His "Time" with Receivers

Ohio Penitentiary Inmate Asks to Install His Set

COLUMBUS, OHIO.—The most rabid Radiophan in this section has been found. He is Erwin F. Kumler, an inmate of the Ohio penitentiary serving from three to five years for automobile stealing. He was returned recently to Cleveland to testify at the trial of his alleged partner and was given permission to return to his cell with his Radio outfit.

Kumler brought the set back from his trip and has installed it in the prison. The concert hours have been set from 6 to 7 P. M. and a loud speaker will be used. After these hours, Kumler will be allowed to continue his listening in with an individual headset.

WE REPAIR YOUR

VACUUM TUBES

WD-11, WD-12, UV-199, UV-201-A, C-301-A .....$3.50 each
UV-200, C-300, AP Detectors..... 2.75 each
UV-201, C-301, AP Amplifiers..... 3.00 each
DV-6, DV-6-A, $3.50; UV-202..... 4.00 each
And Guarantee Them Equal to New

QUICK SERVICE Include with your order remittance to cover repair plus parcel postage for one pound per tube. If preferred, tubes will be returned C.O.D. repair charges.

Abalene Radio 416 D Broadway New York, N. Y.

WILLARD RADIO COMPANY

291 Broadway New York City

FLEWELLING CIRCUIT

Every part complete, including drilled panel and book of diagrams and instructions **$11.95**

REINARTZ CIRCUIT

Every part complete, including drilled panel and book of diagrams and instructions **$10.95**

Two-stage Audio-Frequency Amplifier. Every part complete for above circuits at **$11.00**

CONDENSERS

5 Plate Variable; value, $1.75	$1.05
13 Plate Variable; value, 2.50	1.20
23 Plate Variable; value, 3.50	1.35
43 Plate Variable; value, 4.50	1.95
13 Plate Vernier; value, $5.50	3.75
23 Plate Vernier; value, 6.00	4.00
43 Plate Vernier; value, 6.50	4.25

Honeycomb Coils, 50 turns mounted	.95
Honeycomb Coils, 75 turns mounted	1.00
Double Coil Mountings	2.45
Triple Coil Mountings	3.35
Reinartz Coils and Mounting	1.45
Jacks, Single Circuit; value, 65c, special at	.30
Double Circuit; value, 90c; special at	.45
Multiple Point Inductance Switch with Knob and Dial (15 Switch Points)	1.45
Lightning Arresters, approved	.90
Three-inch Dials, unbreakable, heat resisting composition, high finish; special	.30
Two-inch Dials, same design, for rheostats and potentiometer; special at	.25
Audio Frequency Transformer. Designed for use with W. D. 11 tubes; list, $4.50; price	$2.75
Variocoupler—Litz Wire Wound Secondary; value, $4.50; special	2.25
Ball Bearing Inductance Switch; value, 75c; special	.30
V. T. Sockets, nickeled, brass, sleeve, composition base; value, $1.00; special at	.40
Aluminum Loud Speaking Horn, nickel plated, highly polished; $8.00 list	3.75
Filament Rheostat, 6 ohm	.65
Filament Rheostat, 20 ohm	.80
Filament Rheostat, 50 ohm With 2" Dial, 15c extra.	.90

Every article advertised above is guaranteed by the manufacturer and by us. Mail orders filled immediately. Transportation PREPAID on all orders of $5.00 or over east of the Mississippi River. All others include postage.

LEVIATHAN'S OUTFIT KING OF THEM ALL

TWO MOTOR-DRIVEN LIFE-BOATS TO BE EQUIPPED

Huge Shipping Board Vessel's Installation Will Connect Boat with Two Continents

By F. N. Hollingsworth

BOSTON, MASS.—Surpassing even that of the Majestic, which has hitherto been credited with having the most powerful and up-to-date Radio equipment of any ship in the world, the United States Shipping Board's steamship Leviathan, now being refitted and equipped in Boston in the largest drydock in the world, will have everything in Radio that is necessary to make her equipment the greatest on earth. It will be eclipsed in importance only by her powerful machinery and delicate controls. The contract to equip the Leviathan, whose call letters are WSN, with a super-power marine Radio installation has been let and completion of the work will give America the distinction of Radio supremacy on the high seas.

Can Talk with Two Continents

She will have a six kilowatt tube code transmitter. This is six times as powerful as that carried by the average great Atlantic liner, and assures uninterrupted communication with points 3,000 miles distant, or with Europe and America en voyage. In addition to the telegraph service, she will have a two kilowatt Radiotelephone installation, which will provide voice contact with other vessels and stations on both shores of the Atlantic as well.

With the increasing number of ships having Radiophone installations, it is likely that land stations will soon be erected to handle voice messages from ships at sea to points inland over the regular land wire systems. The Leviathan will have a special emergency 600-meter spark transmitter in addition to the regular installations. Several sensitive vacuum tube receivers will be installed for reception, including Radio frequency amplifiers and interference eliminating devices.

Radio on Motor-Driven Lifeboats

The two big motor-driven lifeboats, the finest that marine engineering can devise, and primarily designed for towing other lifeboats in long strings, will be completely Radio equipped. Each motor lifeboat will carry a crew of eleven in charge of a second officer, and two Radio operators. One of these boats will be located on each side of the ship on the boat deck. Each is 32 feet long, unsinkable, and is propelled by a 100-horsepower standard marine engine, and by means of the main shaft drives a 4-blade towing pitch propeller.

Each boat is equipped with a one quarter kilowatt transmitting outfit and is capable of sending and receiving messages a distance of at least 250 miles. The operators will be specially trained men, whose duty will be to see, with frequent tests, that the outfit is always in working order.

SPECIAL OFFER LIST

(Continued from page 2)

Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.).

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.) Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Decima Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.).

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Decima 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (B. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.).

Largest Radio Store in America

RADIO BARGAINS

Buying Direct—in Quantities—for Cash, and Operating on a *"Small Profit—Big Sale—Quick Turn"* Basis Makes Possible These Values

Radio Supplies Purchased Here Are Sold Under a Positive Guarantee of Satisfaction. We Carry the Largest New Stock of First Quality New Merchandise.

Largest Radio Store in America

BUILD YOUR OWN SET!

All Panels Drilled—Results Guaranteed If You Use Our Instructions

COMPLETE PARTS FOR KNOCKED-DOWN RECEIVING SET

$17.95

CONSISTING OF	Reg. Price	Our Price
2 Variometers	$10.00	$3.90
1 Variocoupler	5.00	1.75
3 Bakelite Dials	3.00	.75
Remler Bakelite Socket	1.00	.45
Howard Rheostat	1.10	....
Cunningham C-300 Detector Tube	5.00	4.45
Mahogany Cabinet	4.50	2.75
Genuine Formica Panel	2.25	1.75
8 Binding Posts	.80	.40
Switch Lever	.50	.25
12 Switch Points	.40	.20
Freshman Grid Leak and Condenser Combined	1.00	.65
Complete Drawing for Assembly and Wiring	1.00	.50
Regular Price	$30.85	Our Price $17.95

COMPLETE PARTS FOR REINARTZ SETS

$11.45

CONSISTING OF	Reg. Price	Our Price
7x18 Formica Panel	$1.89	$1.70
Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cuni Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Freshman Variable Grid Leak and Condenser Combined	1.00	.65
8 Binding Posts	.80	.40
25 Feet Tinned Wire	.30	.20
Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$21.69	Our Price $11.45

COMPLETE PARTS FOR 2-STEP AMPLIFIER

$12.45

Can be used to amplify Reinartz, Flewelling, Short Wave Receiver, Crystal, Ultra Audion or any Receiving Set so that Loud Speaker or Phonograph can be used in place of head set.

CONSISTING OF	Reg. Price	Our Price
7x10 Formica Panel or Other Suitable Size	$1.05	$0.80
High Ratio All-American or Thordarson Transformer	4.75	3.95
Low Ratio Thordarson or All American Transformer	4.50	2.95
2 Howard Rheostats	2.20	....
2 Remler Bakelite Sockets	2.00	.90
3 Double Pacent Jacks	6.00	1.50
13 Binding Posts	1.30	.65
Baseboard for Mounting	.30	.15
Regular Price	$20.10	
Wiring Diagram, with Complete Instructions for Drilling and Assembling Panel		Our Price $12.45

COMPLETE PARTS FOR FLEWELLING CIRCUIT

$12.45

CONSISTING OF	Reg. Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Remler Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
75 Turn Honeycomb Coil	.80	.40
2 Remler Coil Mounts with Straps	1.20	.80
1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	....
1 Bakelite 3" Dial	1.00	.25
8 Binding Posts	.80	.40
1 Baseboard for Mounting	.30	.20
1 Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$22.16	Our Price $12.45

COMPLETE PARTS FOR SINGLE TUBE REFLEX CIRCUIT $32.65

CONSISTING OF	Reg. Price	Our Price
43-Plate Vernier Variable Condenser	$7.00	$3.95
Radion Loop Aerial	8.50	5.95
Cunningham C301-A Tube	9.00	5.85
Grewol Glass Inclosed Detector	2.00	1.65
Radio Frequency Transformer	4.50	3.45
All American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
2—.001 Micon Condensers	.70	.50
1—.002 Micon Condenser	.45	.35
Howard Potentiometer	$1.50	$1.35
Howard 25 Ohm Rheostat	1.10	1.00
8 Binding Posts	.80	.40
9x10½ Formica Panel	1.42	1.20
9x10½ Genuine Solid Mahogany Cabinet with hinged top	5.00	2.95

Complete instructions for drilling, assembling and wiring furnished so that any one with no technical knowledge can easily follow. Regular price, $45.22. Our Price **$32.65**

COMPLETE PARTS FOR ULTRA AUDION CIRCUIT $11.90

(Known as the Wonder Circuit)

CONSISTING OF	Reg. Price	Our Price
9x10½ Formica Panel	$1.42	$1.20
23-Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, plain or bank wound with tape	3.00	1.95
1 Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
8 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½, with hinged top	5.00	2.95
25-ft. Hookup Wire	.20	.10
Regular Price	$19.37	Our Price **$11.90**

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Genuine Baldwin "Mica Diaphragm" Type "C" Loud Speaking Units. Special **$4.65**

$10 Value Long Range Headset $3.65

Made in style and design proved by use and experiment to be the best. Coil wound with about 6,500 turns of No. 40 enamel coated copper wire. Direct current resistance approximately 1,600 ohms. Impedence at average music and voice frequency (800 cycles) is 21,000 ohms **$3.65**

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Brandes superior headset	5.75
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75 Turns	.40
50 Turns	.40
35 and 25 Turns	.40
Rubber Spaghetti Tubing, yard	.10
Antenella—Use Electric Light Socket for aerial	1.15
22½-Volt B Batteries (stock replenished every day)	1.65
Dials—2, 3 and 3½ inch	.25
Ultra-Audion Bank Wound Coils	1.95
Grewol Detectors	1.45

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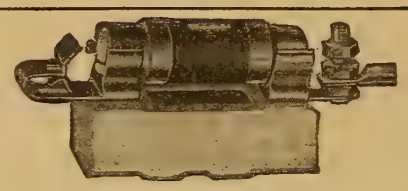

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Moulded	3.65
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The Week's Advance Broadcast Programs

Tuesday, June 12

CFCA (Eastern, Daylight Saving, 400), 8:00 P. M., Concert, "The Merry Wives of Windsor," Star Orchestra; "Mimi's Farewell" from "La Boheme," Naomi Wedd soprano; "The Broken Melody," H. Saunders, cellist. Intermezzo from "Naila," Star Orchestra. Aria from "Tom Jones," Naomi Wedd. "Serenade," "Moment Musical," Orchestra; "Somewhere a Voice is Calling," Naomi Wedd. "From the South," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee, Mildred Geiger, pianist, Helen McNeal, whistler, 6:45-7:30 P. M., Children's Hour; Bedtime story, "Uncle John"; 8:00-10:00 P. M., Program presented by Eagle Rock Realty Board.

KSD (Central, 546), 3:00-9:45 P. M., Concert, Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Agnes T. MacMeekin, soprano; Elmer Polam, tenor; Ada Weber, soprano; Esther Remington, pianist.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Band Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:45 P. M., Organ recital, Stanley Theatre; Arcadia Concert Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical program and short talks; 7:30-8:00 P. M., Dream Daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray; 8:30-9:30 P. M., Concert, Trinity University Male Quartet, Waxahachie, Tex.; 11:00-12:00 P. M., Program under auspices of Lester Gunst Co.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00-3:30 P. M., Musical program; 3:30 P. M., Song recital; 6:30-7:00 P. M., Safety talk; 8:00-8:30 P. M., Boy Scout period; 8:30-10:30 P. M., Musical program, 10:30-12:00 P. M., Dance music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Babson Report; Playlet, "Mrs. Pat and the Law," Amrad Players; Concert, Gladys Berry, cellist.

WGY (Eastern, 380), 1:00 P. M., Music and address, "A Submarine in the Mohawk River in 1862," Mrs. Katherine Y. Steers; 7:35 P. M., Address, "New York's Vacation Land," Herbert F. Prescott; 7:45 P. M., Musical program; "Diamond Flush," WGY Instrumental Quartet; "From the Shores of the Mighty Pacific," Frederick J. Clinnick, cornetist; "Tout Paris," Quartet; "The Going of the White Swan," Edward Drumm, reader; "Sorella Espagnole," Quartet; "Elegy," "Ave Maria," Frederick J. Clinnick; Address, "Safeguarding Our Most Valuable Asset," Claude M. Hall; "Nocturne," "Gavote," Quartet; "Neptune's Court," Frederick Clinnick; "Waltz Lenta," Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Mrs. Lawrence Evans, pianist. 7:30-9:00 P. M., Concert, William Layne Vick Studio; Address, Capt. Amos Tyree.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Musical program; 3:00-4:30 P. M., Short talks and musical program; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip; 8:00-12:00 P. M., Concert; dance music, Charlie Kerr's Cafe L'Aigion Orchestra.

WJAX (Eastern, 390), 7:30 P. M., Concert, arranged by Cleveland News-Leader.

WLW (Central, Daylight Saving, 309), 10:00 P. M., Sacred concert, State Avenue M. E. Church Choir; "The Old Rugged Cross," "Will There Be Any Stars?" "In the Garden," "Love Lifted Me," Choir; "Fear Not Ye, O Israel," Joe Loenstein, tenor; "He Keeps Me Singing," "Held By His Hand," "The Church in the Wildwood," "Sweeter as the Days Go By," Choir; Talk, C. L. Myers, minister of M. E. Church. Negro spirituals, "Heaven! Heaven!" "Standin' in the Need of Prayer;" Musical program, Joe Loenstein, tenor; Sinclair Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Babson report; Program by De Willo Concert Company, courtesy of Mutual Morgan Chautauqua Bureau; 9:25-10:00 P. M., Program arranged by Corydon Smith.

WMC (Central, 400), 8:30 P. M., Concert, Talent from Earle, Ark.; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Grand organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ, Mary E. Vogt.

WWJ (Eastern, 580), 8:30 P. M., Concert, News Orchestra; The Town Crier; Musical program furnished by Detroit Chamber Music Society.

Wednesday, June 13

CFCA (Eastern, Daylight Saving, 400), 8:00 P. M., Concert; Selection from "High Jinks," Star Orchestra; "The Watchman," W. R. Curry, bass; "Calling Me Home To You," W. Woods, cornetist; "From the Country-Side," Orchestra; "The Deathless Army," W. R. Curry, bass; "Autumn Voices," Orchestra; "Only A Smile," W. Woods, cornetist; "Invictus," W. R. Curry; "Serenade," "Intermezzo," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Program presented by Overseas League.

KSD (Central, 546), 8:00 P. M., Recital, Helen T. Carpenter, soprano; Robert Malone, tenor; Oscar Condon, pianist. Addresses, F. C. Eversull, G. L. Ball, Charles M. DeForest of New York.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Salvation Staff Band; Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, San Souci Glee Club, Abilene.

WDAR (Eastern, Daylight Saving, 305), 12:00-12:45 P. M., Organ recital, Stanley theatre; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Song recital and short talk; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00 P. M., Song recital; Dance music, Howard Lanin's Arcadia Cafe Concert Orchestra; The Morning Glory Club.

WFAA (Central, 476), 12:30-1:00 P. M., Address, M. B. Bogarte, president of Terrill School.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00-4:00 P. M., Song and piano recital; 4:00 P. M., Short talks, 6:30-7:00 P. M., Children's own half hour, Talks, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Concert, C. R. Emery, baritone; Louis Palmieri, pianist; Sigmund Somy, baritone; Loomarmick Dance Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Clifford Gorman, organist; **7:30-9:00 P. M.,** Concert, Courier-Journal Quartette, Mrs. K. W. Surman, contralto; K. W. Surman, tenor; Albion Cornwall, baritone; Mrs. Albion Cornwall, accompanist; Address, Capt. Amos Tyree; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Trio; Babson's report.

WIP (Eastern, Daylight Saving, 509), 10:00-11:00 A. M., Musical selections; **1:00-2:00 P. M.,** Dinner music; **3:00-4:00 P. M.,** Song recital; **6:00-7:00 P. M.,** Dinner dance music; bedtime stories, Uncle Wip.

WLW (Central, Daylight Saving, 309), 8:00 P. M., Musical playlet, "When Betsy Ross Made Old Glory," Pupils of Alfred Blackman, Cincinnati Conservatory of Music; Stanley Brauniger's second lesson in Swimming; Concert, Circle Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Stories, Georgene Faulkner; Concert, Brown Lee Weber Concert Co.; 9:15-10:00 P. M., Musical program, Sara I. Campbell, soprano; Catherine W. Smith, violinist.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk; **8:00 P. M.,** Recital, Erwin Swindell, organist, assisted by Grace H. Lohmiller, soprano; **10:00 P. M.,** Musical program, Vinnie Thompson, Ethel Miller, Willis Weld, Walter K. Voss.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Tea Room Orchestra; **4:45-5:00 P. M.,** Organ recital, Mary E. Vogt; **7:45-8:30 P. M.,** Musical program; **8:30-10:55 P. M.,** Dance music, Hotel Adelphia orchestra.

WWJ (Eastern, 580), 7:00 P. M., Concert, News Orchestra; The Town Crier; Musical program, Raymond Claire, tenor; Walter J. Novak, baritone, Irene Karsehnick, pianist; **6:45-7:30 P. M.,** Children's Hour; **8:00-10:00 P. M.,** Patriotic program arranged by Dr Edward M. Ilmer.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program furnished by Lyon & Healy Concert Dept.; Wendall W. Hall, KYW's Music Maker; 9:05 P. M., Twenty Minutes of Good Reading, Rev. C. J. Pernin.

WBAP (Central, 476), 9:30-10:30 P. M., Bonner Square Dance.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:45 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra; **2:00-3:00 P. M.,** Musical program; **4:30-6:00 P. M.,** Short talks; **7:30-8:00 P. M.,** Dream Daddy with boys and girls.

WFAA (Central, 476), 12:30-1:00 P. M., Musical program, Wednesday Morning Choral Club; **8:30-9:30 P. M.,** Musical program, talent from Grand Prairie, Tex.; **11:00-12:00 P. M.,** Concert, Old Mill Melody Men.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; **3:00 P. M.,** Musical program; **6:30-7:00 P. M.,** Bedtime stories, Cousin Sue; **7:00 P. M.,** Short talk; **8:00-10:30 P. M.,** Song and musical program; **10:30 P. M.,** Meyer Davis Bellevue Stratford Concert Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Musical program, Dean Winslow Hanscom, tenor; Talk, "Real Estate Bonds," I. E. Dierdorff; Readings, Grace R. Olin. Musical program.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Czardas," Kathryn Hinkey, pianist; "To You," Mrs. John Wisely, soprano; "Nur we die Sehnsucht kennt," Raymond Zwack, violinist; "A Spirit Flower," Mrs. John Carey, contralto; "Rhapsody No. 10," Kathryn Hinkey; "O That We Two Were Maying," Mrs. John Wisely, Mrs. John Carey; "Valse Bluette," Raymond Zwack; "I Know a Lovely Garden," Mrs. John Carey; Address, Rev. William E. Compton; "Ernani involami," Mrs. John Wisely; "Rhapsody in B. Minor," Kathryn Hinkey; "Sacrament," Mrs. John Carey; "Irish Lullaby," Mrs. John Wisely; "Tempo di Minuetto," Raymond Zwack.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra, Margaret Monroe, pianist; Ruby Fresman, soprano; Clifford Gorman, organist; **7:30-9:00 P. M.,** Concert, Concordia Singing Society; Prof Bernard Dentinger; Sunday school lesson talk; Child Welfare Talk, S. W. McGill

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner dance music; **3:00-4:00 P. M.,** Song recital; **6:00-7:30 P. M.,** Musical program; Bedtime stories, Uncle Wip; **8:00-12:00 P. M.,** Song and piano recital, short talks; dance music by Charlie Kerr's "L'Aiglon Orchestra.

WJAX (Eastern, 390), 8:00 P. M., Concert, Hotel Cleveland Orchestra, Ivan Francisci, director.

WLW (Central, Daylight Saving, 309), 10:00 P. M., Concert, Norwood High School Girls' Glee Club, John G. Cook, director; "Sextette from Lucia," "Rockin' Time," "Silent O'Moyle," "Old Oaken Bucket," "April Moods," "The Dance Invites Us," "Summer Night," "Good Night, Beloved"; Piano recital "Harmonies of Eventide," "Rigoletta Fantasie," Jean Frances Small, pianist; Playlet, "The Slave With Two Faces"; "Sous Bois," "Czarxdas," Jean Frances Small.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Talk, Rockwell Stephens; Musical program, Cleavers Operatic Quintet; Talk to Boy Scouts, Gilbert Butler; **9:15-10:00 P. M.,** String Quartet, Paul Vernon, director.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; **5:45 P. M.,** Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 P. M., Organ recital, Mary E. Vogt; **12:00-12:55 P. M.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45-5:00 P. M.,** Organ recital, Mary E. Vogt; **7:30-7:45 P. M.**

WWJ (Eastern, 580), 8:30 P. M., Concert, News Orchestra; The Town Crier; Musical program, James E. Brown, tenor; Edith Moore; pianist; Viola Bridges, contralto.

Thursday, June 14

CFCA (Eastern, Daylight Saving, 400), 8:00 P. M., Concert; "May Day," Star Orchestra; "Vision Fugitive," Rupert Lucas, baritone; "Songs My Mother Taught Me," Harry Adaskin; "Molly on the Shore," Star Orchestra; "Down Vauxhall Way," Rupert Lucas; "Entrance of the Boyars," Orchestra; Violin solo, Harry Adaskin; Gavotte from "Mignon" Orchestra; "Love Me or Not," Rupert Lucas; "Woodland Sketches," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee;

Friday, June 15

CFCA (Eastern, Daylight Saving), 400), 8:00 P. M., Concert; Selection from "Gypsie Love," Star Orchestra; "Danny Boy," Kate Jackson, contralto; "Only a Smile," W. Woods, cornetist; "Seranade," Orchestra; Contralto solo, Kate Jackson; "Valse Bluette," Orchestra; "Auld Robin Gray," W. Woods, cornetist; Selection from "The Chocolate Soldier," Orchestra; "Annie Laurie," Kate Jackson; "Dreaming," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee, Florence W. Dadney, pianist; Mary N. Bower, soprano; **6:45-7:30 P. M.,** Children's Hour; **8:00-10:00 P. M.,** Program arranged by Lincoln Park High School.

(Continued on page 9)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

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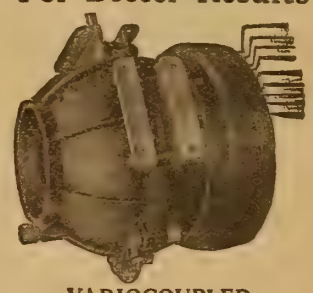

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Auburn, WMAV
Birmingham, WSY
Mobile, WEAP
Montgomery, WKAN

Arizona:
Phoenix, KDYW, KFAD, KFCB
Tucson, KFDH

Arkansas:
Fayetteville, KFDY
Fort Smith, WCAC, WGAR
Little Rock, WCAV, WEAX
Pine Bluff, WOK

California:
Altadena, KGO
Bakersfield, KDZB
Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Eureka, KNI
Fresno, KMJ
Hanford, KFBD
Hollywood, KFAR
Long Beach, KSS
Los Angeles, KDZF, KFCL, KFI, KHJ, KJS, KNN, KNV, KNX, KUS, KWH
Modesto, KXD
Oakland, KLS, KLX, KZM
Richmond, KFCM
Sacramento, KFBK
San Diego, KDPT, KDYM, KFBC, KFFA
San Francisco, KDZG, KDZX, KFDB, KPO, KSL, KUO
San Jose, KFAQ, KQW
San Luis Obispo, KFBE
Santa Ana, KFAW
Santa Barbara, KFHJ
Stanford Univ., KFGH
Stockton, KJQ, KWG
Sunnyvale, KJJ
Taft, KFEB
Venice, KFAV

Colorado:
Boulder, KFAJ
Colorado Springs, KFFQ, KFCR
Denver, DD5, DN4, KDZQ, KEEP, KFAF, KFDL, KFEL, KFIC, KLZ
Greeley, KFJD
Gunnison, KFHA
Lakeside, KFKH
Pueblo, KFGB
Trinidad, KFBS

Connecticut:
Bridgeport, WKAX
Greenwich, WAAQ
Hartford, WDAK
Middleton, WOAS
New Haven, WJAJ
Waterbury, WQAD

Delaware:
Wilmington, WHAV, WOAT

District of Columbia:
Washington, WABE, WDM, WEAS, WHAQ, WIL, WIAY, WJH, WMU, WQAW

Florida:
Jacksonville, WABG, WDAL
Miami, WQAM
Pensacola, WGAN, WLAV
Tampa, WDAE, WHAW
West Palm Beach, WKAH
Winter Park, WRAF

Georgia:
Atlanta, WGM, WSB
College Park, WDAJ
Decatur, WAAS
Gainesville, WKAY
Macon, WMAZ
Savannah, WHAO, WRAB

Idaho:
Boise, KFAU, KFDD, KFFB
Kellogg, KFEY
Moscow, KFAN

Illinois:
Belvidere, WOAG
Carthage, WCAZ
Chicago, KYW, WAAF, WBU, WDAP, WJAZ, WMAQ, WPAD, WSAH, WWAY
Decatur, WBAO, WHAP
Elgin, WTAS
Lake Forest, WABA
Mattoon, WQAL
McLeansboro, WRAS
Mt. Vernon, WABF
Peoria, WJAN, WQAX
Quincy, WCAW
Rockford, WIAB
Sterling, WBBC
Tuscola, WDZ
Urbana, WRM

Indiana:
Anderson, WABC
Brookville, WSAL
Evansville, WAOU
Greencastle, WLAX
Huntington, WHAY
La Porte, WRAF
Marion, WIAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WGAZ
West Lafayette, WBAA

Iowa:
Ames, WOI
Boone, KFGQ
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Iowa City, WHAA
Lamoni, KFFY
Le Mars, KFOY, WIAU
Newton, WIAH
Oskaloosa, KFHL
Shenandoah, WGAJ
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Cheney, KFGP
Emporia, WAAZ
Hutchinson, WLAS
Iola, KFJD
Liberal, WMAG
Lindsborg, WDAD
Manhattan, WTG
Marion, WRAD
Parsons, WOAJ
Topeka, WJAQ, WPAM
Wichita, KFHI, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WJAH
Louisville, WHAS WLAP
Paducah, WIAR

Louisiana:
Alexandria, KFFY
Baton Rouge, KFGC
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, KFHF, WGAQ

Maine:
Bangor, WABI, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAV
Frostburg, WPAQ

Massachusetts:
Boston, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Berrien Springs, KFGZ
Dearborn, WWJ
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Rodgers, WCAF
Saginaw, WIAW

Minnesota:
Baudette, KFGY
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, KFEX, WBAD, WBAH, WCAS, WLAG, WRAH
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, KFHD, WEAK
St. Louis, KFEZ, KFGJ, KFIB, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Hastings, WQAY
Kearney, KFHP
Lincoln, KFDU, WFAV, WJAB, WKAC, WMAH, WQAP
Norfolk, WJAG
Oak, KFEQ
Omaha, KFCZ, KFFX, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ

State, City, Call

Utica, KFGV
York, KFDR

Nevada:
Reno, KDZK
Sparks, KFFR

New Hampshire:
Laconia, WKAV

New Jersey:
Camden, WRP
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WOR,
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Buffalo, WGR
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WEAF, WJX, WJY, WJZ, WLAW, WSAP
Poughkeepsie, WFAF
Rochester, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Stapleton, WDT
Syracuse, WDAI, WFAB, WLAH, WNAN
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, WRAC
Wahpeton, WMAW

Ohio:
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH, WSAI
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WABD, WJAJ
Fairfield, WLZ
Granville, WJD
Greenville, WCBB
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Newark, WBBA
Sandusky, WABH, WQAF
Springfield, WNAP
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY

Oklahoma:
Ardmore, WOAA
Chickasha, KFGD
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY
Okmulgee, WPAC
Tulsa, WGAF, WLAL

Oregon:
Arlington, KFGL
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW
Salem, KFCD

Pennsylvania:
Allentown, WCBA
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Harrisburg, WABB
Johnstown, WTAC
Lancaster, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Reading, WBBD
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Brookings, KFDY
Platte, KFIJ
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas:
Abilene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, KFFZ, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP, WPA
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WRAA, WSAV
Laredo, WWAX
Orange, KFGX, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, WCAR, WAOI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KFCP
Salt Lake City, KDYL, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZR
Everett, KFBL
Lacey, KGY
Mt. Vernon, KFGF
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFIO, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFIQ

West Virginia:
Clarksburg, WHAK

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFCQ, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ

Porto Rico:
Ensenada, WGAD
San Juan, WKAQ

Canada:
Calgary, CHBC, CFAC, CFCN, CJCY
Edmonton, CFCK, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS, CJGGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CJCD, CJCH, CJCN, CJSC, CKCE, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKY, CKZC, CJNC

Cuba:
Havana, PWX

(NOTE—The third and last part of the schedule list appears below. Next week the first part will appear.)

WJAX, Cleveland, O. 390 meters. 1,000 mi. Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment Eastern.

WJAZ, Chicago, Ill. Chicago Radio Lab.

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 273 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 1500 mi. R. C. A. and Westinghouse Co. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.

WJZ, New York City. 455 meters. 1500 mi. R. C. A. and Westinghouse Co. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11:30 pm, special program. Sun, 10:30 am-1 pm, church service; 8:30-10:30 pm. Eastern Daylight Saving.

WKAA, Cedar Rapids, Ia. 360 meters. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 360 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. 360 meters. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. 360 meters. 200 mi. Planet Radio Co. Slogan, "The Heart of Florida." Club, "Alligator Hop." No regular schedule.

WKAK, Okemah, Okla. 360 meters. Okfuskee County News.

WKAL, Orange, Tex. 360 meters. Gray & Gray.

WKAN, Montgomery, Ala. 360 meters. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Grandston, R. I. 360 meters. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 7:30-9 pm, entertainment. Eastern.

WKAR, East Lansing, Mich. 360 meters. Mich. Agri. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.

WKAW, Beloit, Wis. 226 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm, 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 360 meters. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern, daylight saving.

WKN, Memphis, Tenn. 360 meters. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 9:45-10 am, 10:15, 11:45, 12:15 pm, 1:15, markets, weather; 2:30 pm, concert; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Thurs, Fri, pm, concerts. Central.

WL2, Fairfield, O. 360 meters. U. S. Army.

WLAC, Raleigh, N. C. 360 meters. N. C. State College.

WLAG, Minneapolis, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Slogan, "The Call of the North." Club, "Tooth Brush." Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Daily ex Wed, Sun, 9:30 pm, concert. Sun, 10 am, church services; 4 pm, concert; 5, children's hour; 7:30 services. Central.

WLAH, Syracuse, N. Y. 234 meters. 900 mi. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. 360 meters, Tulsa, Okla.

WLAN, Houlton, Me. 360 meters. Putnam Hdwe. Co.

WLAP, Louisville, Ky. 360 meters. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 360 meters. 100 mi. A. E. Schilling. No regular program. Central.

WLAS, Hutchinson, Kan. 360 meters. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm, 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. 360 meters. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

WLAZ, Warren, O. 100 mi, 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat, 2 pm, special. Sun, 11 am, church services. Central Daylight Saving.

WMAC, Cazenovia, N. Y. 360 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. 360 meters. Atchinson County Mail.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp.

WMAG, Liberal, Kan. 360 meters. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 341 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central. Temporarily discontinued.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 360 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 1:30-5 pm. Central, Daylight Saving.

WMAR, Waterloo, Iowa. 360 meters. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 360 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. 250 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7-8 pm, music. Central.

WMAW, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 5:45 pm, sports, news. Fri, 10-11 pm. Central.

WMAX, Ann Arbor, Mich. 360 meters. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC, Memphis, "Down In Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 12 pm. Midnight Frolic. Central.

WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Mon, Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAL, Omaha, Neb. 360 meters. R. J. Rockwell.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern, Daylight Saving.

WNAV, Knoxville, Tenn. 360 meters. People's Tel & Telg. Co.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yanktown, S. D. 360 meters. Dakota Radio Apparatus Co. Wed, Sat, 9-10 pm, music. Central.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.

WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 400 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 360 meters. 50 mi. C. E. Ervin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 360 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAS, Middletown, Conn. 360 meters. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAU, Evansville, Ind. 360 meters. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 527 meters. Woodmen of the World.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12-1 pm, concert; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Fri, 8-11 pm, music, concert. Eastern, Daylight Saving.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Tues, Fri, 8-11 pm, music, entertainment, lectures. Eastern.

(Continued on page 9)

STATION SCHEDULES

(Continued from page 8)

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.
WOU, Omaha, Neb. 360 meters. Metropolitan Utilities Dist.
WOV, Omaha, Neb., 360 meters. R. B. Howell.
WPA, Ft. Worth, Tex. 360 meters. 1,000 mi. Fort Worth Record. Temporarily discontinued.
WPAA, Waco, Neb. 360 meters. Anderson & Webster Elec. Co.
WPAB, State College, Pa. 360 meters. Pa. State Col. lege.
WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.
WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wiebodt & Co. Daily ex Sun, 12:30-2 pm, 6:30-7 pm, music. Tues, Wed, 8-9 pm, concert. Thurs, Fri, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.
WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.
WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.
WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.
WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.
WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.
WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.
WPAM, Topeka, Kans. 360 meters. Awerbach & Guet
WPAR, Beloit, Kans. 360 meters. 50 mi. R. A. Ward.
WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.
WPAR, Beloit, Kans. 50 mi. 360 meters. R. A. Ward. Fri, 8 pm, entertainment. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.
WPAS, Amsterdam, N. Y. 360 meters. J. & M. Electric Co.
WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.
WPAU, Moorhead, Minn. 360 meters. Concordia College.
WPAY, Bangor, Me. 360 meters. Bangor Radio Lab.
WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.
WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.
WPI, Clearfield, Pa. 360 meters. Elec. Supply Co.
WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. 360 meters. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.
WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.
WQAF, Sandusky, O. 240 meters. Sandusky Register.
WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.
WQAK, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. 360 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.
WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.
WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.
WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern Daylight Saving.
WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.
WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WQAT, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5. Eastern.
WQAV, Greenville, S. C. 360 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.
WQAW, Washington, D. C. 360 meters. Catholic University of America.
WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.
WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.
WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.
WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.
WRAC, Mayville, N. D. 360 meters. State Normal School.
WRAD, Marion, Kans. 360 meters. Taylor Radio Shop. Daily, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.
WRAF, La Porte, Ind. 224 meters. Radio Club. Inc.
WRAH, Providence, R. I. 360 meters. Stanley N. Read.
WRAK, Escanaba, Mich. 360 meters. Economy Light Co.
WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.
WRAN, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.
WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.
WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.
WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.
WRAV, Yellow Spring, O. 360 meters. Antioch College.
WRAY, Scranton, Pa. 360 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15-11:30 pm, music. Sun, 4 pm, chapel. Eastern.
WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Wed, Sat, 9-11 pm, music, lecture. Sun, 2-4 pm, music. Central.
WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.
WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.
WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.
WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11:30 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.
WSAA, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.
WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.
WSAI, Cincinnati, O. 309 meters. United States Playing Card Co.
WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.
WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.
WSAP, New York, N. Y. 360 meters. Seventh Day Adventist Church. Fri, 7:30-9:30 pm. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.
WSAV, Houston, Tex. 360 meters. Clifford W. Vick. Temporarily discontinued.
WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.
WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.
WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.
WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. 360 meters. 200 mi. Agricultural and Mechanical College of Tex. Wed, Fri, 7:30-8:30 pm, addresses. Sun, 11 am, 4 pm, 7, church services. Central.
WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. 360 meters, Wright & Wright, Inc.
WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWAY, Chicago, Ill. 360 meters. Marigold Gardens.
WWB, Canton, O. 360 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, 3-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.
WWL, New Orleans, La. 360 meters. Loyola Univ.
(Note.—This completes the station schedule list. The first part will appear again next week.)

ADVANCE PROGRAMS

(Continued from page 7)

KSD (Central, 546), 8:00 P. M., Opera, "The Fencing Master."
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Jewell Lovejoy, soprano; Debate, "Is Woman Man's Equal?" Richard J. Flannigan, H. C. L. Sanders, Julian Skinner, Henry F. Antes.
WBAP (Central, 476), 9:30-10:30 P. M., Concert, Original Johnnies Jolly Jazz.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:45 P. M., Organ recital, Stanley Theatre; Dinner dance music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Short talk and musical program; 4:30-6:00 P. M., Short talks and concert; 7:30-8:00 P. M., Dream Daddy with boys and girls; 10:10 P. M., Howard Lanin's Arcadia Orchestra.
WFAA (Central, 476), 12:30-1:00 P. M., Address, Dr. Robert S. Hyer, Southern Methodist University; 8:30-9:30 P. M., Recital, Ruth Fabian, soloist in First Baptist Church.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Concert; 4:30 P. M., Musical program; 6:30-7:00 P. M., Meyer Davis Concert Orchestra; 7:00-7:30 P. M., Children's stories, Cousin Sue.
WGY (Eastern, 380), 7:45 P. M., Radio drama, "Clarence," WGY Players. Instrumental selections, WGY Orchestra; 10:30 P. M., Irish Night, Medley of Irish Airs, WGY Quartet; "Molly Brannigan," J. F. Quinlan, baritone; "In An Irish Jaunting Car," Edward A. Rice, violinist; "All Erin is Calling," J. F. Quinlan, baritone; "The Last Rose of Summer," Earl Rice, pianist; "Macushla," J. F. Quinlan; "A Bit o' Blarney," Quartet; "I'll Take You Home Again Kathleen," J. F. Quinlan; "Killarney," Ernest Burleigh, cellist; "Come Back to Erin," J. F. Quinlan; "The Old Sod," Quartet.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Charles Jackson's Novelty Orchestra; Myrtle Stinger, soprano; H. Archer Culmer, tenor; Mrs. Murray Nicol, soprano; Reading, "An Interesting Historical Episode."
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Dinner dance music; 3:00-4:00 P. M., Concert; 6:00-7:30 P. M., Dinner dance music; Bedtime stories, Uncle Wip.
WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Children's program, Jessie G. Van Cleve; Musical lecture, Mrs. Marx E. Oberndorfer; 9:15-10:00 P. M., Mixed Quartet, Lucy Hartman, contralto, director.
WMC (Central, 400), 8:30 P. M., Concert, Apollo Club of Memphis; 11:00 P. M., Midnight Frolic.
WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Savings, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45-9:45 P. M., WOO Orchestra, Robert E. Golden, director; 9:45-10:55 P. M., Organ recital, Clarence E. Bawden.
WWJ (Eastern, 580), 7:00 P. M., Concert, News Orchestra; The Town Crier; Musical program, Althea Bird, soprano; Dennis Taylor, baritone; Florence Adams, pianist; Percival Peters, tenor.

Saturday, June 16

CFCA (Eastern, Daylight Saving, 400), 8:00 P. M., Concert; "Mirella," Star Orchestra; "We Red-Coat Soldiers," Alfred Butler, baritone; "Viennese Melody," Mannie Roth, violinist; "To Thee," Orchestra; Baritone solo, Alfred Butler; "La Berceuse," W. Woods, cornetist; Selection from "San Toy," Orchestra; "Meditation" from "Thais," Harry Adaskin, violinist; Baritone solo, Alfred Butler; Intermezzo from "Cavalleria Rusticana," Orchestra.
KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee, Bouquet Southland Serenaders; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Program by Chamber of Commerce, Huntington Park, Calif.
KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, W. W. Kimball Co.; Weldell W. Hall, KY's Music Maker; 9:05-9:25 P. M., "Under the Evening Lamp," Youth's Companion.
WBAP (Central, 476), 7:00-7:30 P. M., Radio Bible Class, Mrs. W. F. Barnum, First Methodist Church.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Song recital and Arcadia Cafe Concert Orchestra; 4:30-6:00 P. M., Ugo Savino's Orchestra from Cafe La Riviere; 7:30-8:00 P. M., Dream Daddy with boys and girls.
WFAA (Central, 475), 12:30-1:00 P. M., Address, "The Monroe Doctrine Today," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Recital; J. A. Fite, basso, and assistants; 11:00-12:00 P. M., Concert, Dallas Symphony Orchestra, Walter J. Fried, director.
WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Musical program; 3:45 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00 P. M., Safety talk, Stanley Cowman; 8:00 P. M., Short talk; 8:15 P. M., Short talk; 9:00 P. M., Musical program.
WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk on New England Business Problems, Arthur R. Curnick; Playlet, "The Man Who Went," Amrad Players; Musical program.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Alice Monore, soprano; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Lucile Schneider, Bernice Funk, Anna Blankenbaker, Mrs. Jane W. Murrell, Mrs. William Herman, Mrs. A. W. Ott, sopranos; Josephine Miller, Ione Hoover, contraltos; Mary A. Ott, violinist; Ethel Fisher, Lucile Schneider, pianists.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital; Carl Bonawitz, at Germantown Theatre; 3:00-4:30 P. M., Dance music; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talks and musical program.
WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Talk on the Red Cross, Captain Hiatt; Arthur Kirkham, pianist.
WMC (Central, 400), 8:30 P. M., Concert, Washington Syncopators, H. H. Guinett, director.
WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

Sunday, June 17

WBAP (Central, 476), 11:00 A. M., Church services, First Methodist Church, Rev. J. W. Bergin, pastor, Will Foster, organist.
WDAR (Eastern, Daylight Saving, 395), 1:00 P. M., Organ recital, William Klaiss, organist.
WFAA (Central, 476), 2:30-3:00 P. M., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor of First Presbyterian Church, Dallas; 9:30-10:00 P. M., Sacred concert, singers from Haskell Avenue Methodist Church; 10:00-11:00 P. M., Concert, Lone Star Five Orchestra.
WFI (Eastern, Daylight Saving, 395), 10:45 A. M., Services, Arch Street Presbyterian Church; Rev. Clarence Edward Macartney, minister; 4:30 P. M., Chapel services; 9:30 P. M., organ recital.
WGI (Eastern, Daylight Saving, 360), 4:00 P. M., Twilight program; "Adventure Hour," Youth's Companion; Concert, Mrs. Vestelia M. Daniels, pianist; Helena Trolsaas, soprano; Earl Moulton, baritone and violinist; 8:30 P. M., Federation Church Services; 9:00 P. M., Musicale, Charles E. Dockrill and Choir.
WGY (Eastern, 380), 9:45 A. M., Church services, Trinity Evangelical Lutheran Church, Albany, N. Y.; Sermon, "Jesus saith unto him, I am the way, the truth, and the life; no man cometh unto the Father but by me," Rev. G. A. Bierdemann, D. D.; 6:45 P. M., Church services, Trinity Evangelical Lutheran Church; Sermon, "Exalting the Christ," Rev. G. A. Bierdemann, D. D.
WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church services, First Presbyterian Church; Dr. Richard T. Gillespie, pastor; Margaret McLeish, Organist; Mrs. R. L. Compton, soprano; Bessie E. McLeish, contralto; Henry H. Scherff, tenor; E. Marvin Locke, baritone; 4:00-5:00 P. M., Sacred concert, Pupils of Rose Henley's Studio.
WHK (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra and soloists.
WWJ (Eastern, 580), 7:30 P. M., Church services, St. Paul's Cathedral; 2:00 P. M., Concert, News Orchestra.

Monday, June 18

WBAP (Central, 476), 9:30-10:30 P. M., Concert, West Texas Orchestra.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical program; 7:30-8:00 P. M., Dream Daddy with boys and girls; 8:00 P. M., Song recital; 10:10 P. M., Dance music, Howard Lanin's Dance Orchestra.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Piano recital; 3:35 P. M., Song recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30 P. M., Bedtime stories, Cousin Sue.
WGY (Eastern, 380), 7:45 P. M., Musical program, "Tenth Regiment March," WGY Quartet; "The Answer," "Boats O' Mine," Mildred Schilling, soprano; "Sextette" from "Lucia," Charles Wold with his musical glasses; "Visst d'arte," from "Las Tosca," Mildred Schilling, soprano; "Pilgrims Chorus," Charles Wold; "Lethe," "Lindy Lou," Mildred Schilling; "Serenade," "Traumerei," Charles Wold; "Topics of the Day," Pathe Exchange; "Song to the Evening Star," Charles Wold; "The Chantyman's March," WGY Quartet.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Carl Bonawitz, at Germantown Theatre; Song recital; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.
WLW (Central, Daylight Saving, 309), 8:00 P. M., Concert, Roger Hill Dance Orchestra; Musical program, Cadman's Morning of the Year," Mixed Quartet of Church of the Covenent; Besse Hall, soprano; Louise Koetter, contralto; Erwin Meyer, tenor; Edwin Weidinger, baritone; J. Warren Ritchey, accompanist, director.
WMC (Central, 400), 8:30 P. M., Concert, Janssens Cafe Hawaiian Orchestra, Harry Halil, director.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary Vogt; 7:45 P. M., JWCI Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M. Organ recital, Mary Vogt; 7:45 P. M., JWCI Band; 9:30 P. M., Organ recital, Clarence Bawden, organist.

British Broadcasters Number 260

MANCHESTER, ENG.—About 260 Radio manufacturing firms have become members of the British Broadcasting Company, states Sir W. Joynson-Hicks in Parliamentary Debates. The number of types of broadcasting receiving apparatus approved by the Post Office is 1,450. The number of Radio licenses at present issued is approximately 115,000, of which about 80,000 are in receipt of receiving sets bearing the trade mark of the British Broadcasting Company.

Recruit Reserves by Air

CHICAGO.—Recruiting by Radio has recently accomplished marvelous results for the Illinois Naval Reserve. The Zenith-Edgewater Beach hotel station, WJAZ, has broadcast several talks by Capt. E. A. Evers, commandant of the reserve. Practically the entire quota has been filled as a result.

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Standard, threaded rubber, Willard's specially adapted for use with WD-11 Tubes. Supply current at 2 volts to one WD-11 Tube for 210 hours on a single charge. Rechargeable. Brand new, size 4x5½x7 inches—Chi-Rad guaranteed.

2-Volt Willard Charged . . . $7.50
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These same Willards can be adapted to deliver 8 volts for pure D. C. for C. W. Transmitters. Better than a generator because no filter is necessary. Much less expensive.

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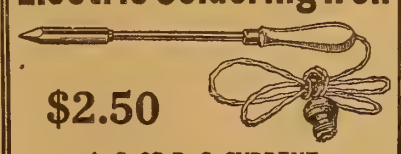
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3/32"	THICK	1¢ PER SQ. INCH
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3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2½¢ PER SQ. INCH
3/8"	THICK	4¢ PER SQ. INCH
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—employs perfect combination of both Regeneration and Tuned Radio Frequency Amplification with only 2 tuning adjustments?
—receives all broadcasting?
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, June 16, 1923 No. 10

Future Possibilities

Applicable to Business and Social Life

FUTURE possibilities of Radio are inconceivable. Various principles which will make it more applicable to business and social life are having considerable research. The supreme inventive genius of the country, the greatest organizing ability and the most powerful resources at hand are now at the service of the new art, with the result that Radio has made greater strides in the past two years than in twenty years previous.

Receiving Sets in Camp

Broadcast Concerts Much in Favor by Vacationists

ONE feature of vacationing this summer in out-of-the way places where mail and train service is infrequent but Radio instant is the fact that farmers throughout the country who cater to summer boarder trade are installing Radio sets. Of course countless farm homes in the land are already equipped with sets, many of which are high powered ones, which have been in use the year around. Now other farmers realize that in order to get the vacation boarder trade this year he must add Radio to his other attractions.

Radio baseball fans who feel they cannot exist without at least being in touch with the results of the game by wire and who begrudge taking a few weeks' rest in the country because of the delays in receiving returns, rejoice in the news that even though they are buried in forest's depths, a few turns of the dials will give them not only baseball returns but the latest market reports and news.

There is practically no limit of localities where Radio can be brought in by portable sets. Sets can also be put in motorboats, canoes and rowboats with equal success and, as tests show, these sets receive as well as any shore station.

Confirmed Radio bugs who had begun to fear they could not play with the dials if they took a vacation this summer have changed their minds and are now actively engaged in preparing to enjoy their "off to the country" period with the knowledge that they can sit around the camp fire after a day's pleasure and listen to the best entertainment programs.

Radio to Outdo the Wires

Cables Are Becoming Obsolete, Seemingly

THE success of the Radio talk across the Atlantic is a distinct step toward a complete globe girdling system of Radio. A distance of 3,400 miles across land and sea was bridged by a Radio conversation. The demonstration is vivid and dramatic proof of the giant strides being made in the improvement of Radio communication. Indeed, so rapid is this progress that laymen find it hard to appreciate its full significance.

It is planned in the near future to have President Harding and King George engage in a little transatlantic chat in the interests of science. The outlook is that telegraph wires and submarine cables must eventually give way to the more practical and less expensive system of long distance communication without wires.

Verbal transatlantic Radio communication is still more distant, in view of the fact that the number of available wave lengths is so limited. Now, only a few conversations can be carried simultaneously over the same wave length. The danger of "crowding" the air with messages is very apparent and the government is taking steps to regulate Radio communication. However, land and sea Radio telegraph companies are feverishly striving to produce apparatus which will insure a round-the-world, 24-hours-a-day service. No one can doubt, in view of recent improvement, that these difficulties will eventually be overcome.

At the present time not only do the land and sea telegraphs circle the globe, but Radio does likewise. However, only messages involving the dash-and-dot signals can be transmitted around the earth—Radio telephony has yet to be perfected to a degree permitting a message to be telephoned around the world. Yet Radio as a whole is affecting geography by linking up the continents with ether waves and thus bringing people nearer together. The days of the land and sea telegraph seem numbered—their wires are doomed. At some future day a new generation may recover a discarded cable from the depths of the ocean and smile to think that how crude were our methods of communication in the old days.

RADIO INDI-GEST

WALLA WALLA INDIGEST STATION ANNOUNCES FIRST NIGHT PROGRAM

WALLA WALLA.—Positively unique in all respects is the opening program of Indigest's brand new slightly used broadcaster recently erected here when it was built. The program, it was reported to a special Indigest reporter in an especially arranged interview, will be held on the night after the day before Sunday, June 31, if it ever is held that is.

Fearsome of dastardly competition on the night in question, it took several quarts of immoral persuasion and one and one-half Pittsburgh stogies before the musical director and announcer were sufficiently ready to climb Palm trees and let the cat out of the bag. But they did. Translated from Wallan Wallan, the native means of self-expression, the program finally looked like this:

(Tune to 99⅔ feet on your Stebbins Degenerative.)

Article A.—Antenna raising exercises at sun down. The Walla Walla flag will be brought down from the two cocoanut tree masts and the aerial clumb into position by Izzy and Mike, the station's particularly trained (Harvard Grads) Chimpanzees. Both belong to the I. R. E. and have Tree-climber's Union cards, so that all may listen in to this ceremony without fear of its being illegal.

Article B.—Antenna will be tuned. A very special expert piano tuner with complete set of tuning forks and diagram has been engaged parcel post prepaid.——

(Continued on page 17 or next week.)

In Quest of the Kanoofis

Part I—The Search Begins

A Kanoofis is a funny thing, and very hard to find. *(Look, look.)*
There are only three in the whole wide world so bear this fact in mind. *(Isn't it terrible?)*
Found first in the fork of a goofer tree not far from old Madrid, *(Who did?)*
Where for years and years this little thing was tucked away and hid. *(Now, you find me.)*

I'll tell you a tale of a Radiophan who tried to build a set. *(Go on.)*
He hunted high and low for parts but there's one he couldn't get. *(How sad!)*
This part was called a Kanoofis and he tried and tried in vain, *(Oh, ma.)*
Until one day he heard someone say that one could be found in Spain. *(Yes, we have no strawberries.)*
So he left one day in June, la, la, for the land of the Matador. *(Sailing, sailing, over the bounding main.)*
Resolved to get what he wanted, if it cost a fortune or more. *(Change a hundred?)*

On reaching Spain this Radiophan went straight to the Onion King. *(A horse, a horse, or a bicycle.)*
Who promised to give them help to find a Kanoofis or anything. *(The grandest king.)*
The King was a mighty man, yes, yes, who ruled with an iron hand. *(Horseshoe nails.)*
In fact he was the finest type of onion in the land. *(Sliced or fried.)*
So with the help and such, however much, they started on their quest. *(Forward, march!)*
First going North, then going South, then East; last going West. *(Directional I would say.)*

After many days of travel, they stopped near a Russian river. *(Shushwush.)*
Because these boys were famished, and had to eat their liver. *(Blah, Blah.)*
Then on again went the searching train, till they came to a forest great. *(Wood, wood.)*
"'Tis here," said one, "where we'll see some fun, or else we'll know our fate." *(Oh, lady, lady.)*

—ROZEE.

(Search to be continued.)

Moral: Always Wear Your Headset

deer endy: i hav bekum sutch a konfirmed radeeo fan that i allus wear my hedset 2 bed with me. last night i broke the durn thing and konsequentically had to leve it off. my wife saw me without it fur the furst time in 6 mo. and lambasted me with a roeling pen acct. of her thinking i wuz a stranger that had broke into our domicycle. —eZra hechT.

Oh Yes!—He Gave It To Flew Himself

Dear Indigest: Methuselah ate no Skookum apples every day, did not walk a mile for a Camel, never read the Saturday Evening Post, did not chew Wrigleys, nor did he have his iron every day and yet he lived to the ripe old age of nine hundred years. I would like to know if he had a Flewelling Flivver. —Imp.

Sleeping here is Dan
Casey Al Zapp.
He stuck his head
In a rotary-gap.

We Haven't Tried the Hook-Up Yet, but Wait—

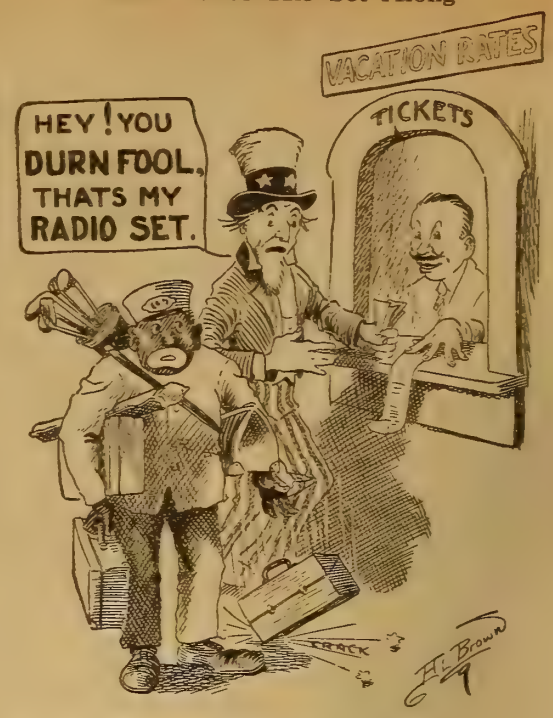
My Dear Sir Indi: The writer was passing the time away with a number of congenial friends at the Marigold Gardens and the conversation was, as the poet said, "of women and other things." While tuning in on the latter we drifted to Radio. . . . . The audience with few exceptions was plainly bored. Then one Radiophan happened to say something about "Regeneration." Several faces brightened as if by magic, and the possessor of one asked us, "Do you really believe there is anything to this 'monkey' business?"

—N. Wayne Blackford.

Looking Ahead

A-B-C Lessons for Indigest Beginners will start with the next issue of Indigest. The novel style of describing what the various parts are, and why if so, will no doubt aid those wishing to tear their sets to pieces. Buy Indigest for indigestion next week from your most dyspeptic newsdealer—10c.

Sam Takes His Set Along



Condensed

By DIELECTRIC

You don't often hear of a broadcasting station deliberately setting up a competitor right in the same town and donating call letters in the bargain. Well, it seems that that is exactly what a popular station in Atlanta did (in a way). WSB lengthened its call into Winnifred Susan Beatrice at the request of Mrs. Coker whose baby will transmit compass signals under that call until further notice—years hence.

Now turn your loop due north and you'll catch a new wrinkle from Calgary, Canada, where it is contrary to Radio law for two stations to communicate with each other directly, via the ether, some other means must be found, and this CFCN did. Wishing to hear from the station at Telegraph Hill, in San Francisco, regarding the reception of their test program, they had the latter play certain music which would indicate whether it came through well or otherwise. Announcers are clever, sometimes!

I should like to think that the letter written to our consul in Calgary, Canada, from someone in Philadelphia, was really intended for printing in the column to your left. Indeed there are parts of the Dominion of Canada which compare with most anything we can show in the States, and some of their hotels would make you step around to find their equal here. Furthermore, broadcasting stations in that part of America are right up to the minute. I was a Philadelphian —once!

Since the broadcasting station in the famous Eiffel Tower in Paris was put out of commission through its antenna being struck and destroyed by lightning, it is probable that the neighborly Germans are making merry over the fact. They complained that their own programs were interfered with by some disturbance originating in France. For the rest of Europe, however, this will be a distinct loss, as they were in the habit of tuning in this station for special news service.

We may look for an additional South American country to have its own Radio stations before very long, if reports coming from Chile are true. The interest in this fascinating adjunct to a happy home is decidedly on the increase among the Chileans, who are buying receiving sets in anticipation of the coming of broadcasting stations. At the present time they have to rely on picking up the programs from other more fortunate countries. This will make them expert in tuning later.

Transatlantic ship service is subject to very disagreeable surprises in the summer months due to the ice that floats across this international highway. We have not forgotten the tragedy which befell the Titanic a few years ago. Two coast guard cutters are to patrol the danger zone and warn ships twice daily via Radio of any danger.

When the President finally reaches Alaska he will find how vitally Radio affects the everyday life of those living in remote sections of the world. Remote from large centers of population with their telegraph and telephone lines giving easy access to intercommunication he will find Radio really essential for sending and receiving advice. There is but one cable from Sitka to Seattle, which sometimes breaks and when it does, nothing is left but to use the ether.

It was suggested at the time that Station WEAF made its test in transmitting a full program from New York to WNAC in Boston that this would lead to a series of toll stations over the country. The new station in Washington, which is practically a duplicate of WEAF, may perhaps be so utilized when occasion warrants it. This is owned by a member of the Bell system and may indicate the beginning of such a policy.

First Steps for Beginners in Radio

Chapter V—Tuners and Tuning

By Thomas W. Benson, A. M. I. R. E.

A TUNER is simply an arrangement of inductances and capacities capable, by reason of either or both of these devices being adjustable, of being put in resonance with a current of a given frequency. We have learned from the previous chapter how condensers and capacities function to control the length of time it takes for a current to flow or oscillate in a circuit.

When a circuit contains both inductance and capacity we can increase the length of time for one complete oscillation by increasing either of these factors. Now it is reasonable to assume and in fact it is found that the time constant of the circuit or the period remains constant if we increase one factor and decrease the other the proper amount.

Without going deeply into the mathematics of Radio we find that so long as the square root of the product of the inductance and capacity remain constant the period of the circuit and consequently the wave length it will respond to remains the same.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The articles yet to appear are:

Chapter VI—About Crystal Detectors.
Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

Tuners in Two General Classes

Returning to tuners, we can put them in two general classes, non-regenerative and regenerative. The former can be used with either crystal or tube detectors but the latter type can only be used with a three electrode tube. Non-regenerative tuners can be further divided into single and double circuit tuners. Regenerative tuners are also built in three circuit types.

A single circuit tuner is one in which but one circuit, the aerial, is tuned. In the chapter on aerials it was seen that the aerial itself accounts for half the wave length of the station to be received. The other half is made up by inserting inductance in the aerial lead and providing some means of adjusting the circuit to resonance. In Figure 24 are shown several methods of tuning the aerial circuit, the detecting device being usually shunted across the inductance to indicate the presence of currents.

Fixed Inductance

At A in the illustration is shown a fixed inductance, usually a honeycomb coil, with a condenser in series to tune the circuit. The effect of connecting the condenser in series with the circuit is to make the wave length shorter than if the inductance was used alone. The reason for this is that the tuning condenser in series with the aerial, also a condenser, is to reduce the total capacity in the circuit as we learned when considering condensers in series.

Should we desire to tune to a wave length greater than the inductance alone will give the condenser is connected in parallel with the inductance as shown by the dotted lines. The tuning condenser is then in parallel with the aerial and the total capacity in the circuit is increased.

It might be worth noting at this point that should one experience difficulty in tuning the longer wave lengths with a series condenser it is only necessary to connect the condenser across the primary inductance to tune them easily.

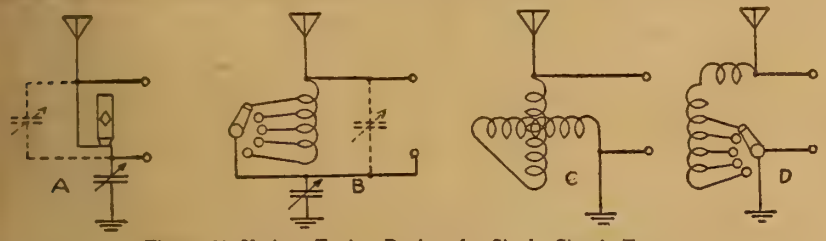


Figure 24—Various Tuning Devices for Single Circuit Tuners

Tapped Inductance

Considering the other circuits shown in Figure 24 we find at B a tapped inductance used with a variable condenser. This gives a wider range of tuning and is to be preferred to a large fixed inductance. With this arrangement the tuning is sharp and is as selective as can be obtained with a single circuit tuner. Here also the condenser can be shunted across the inductance but the series arrangement is preferable.

At C a variometer is used for tuning without a condenser. This arrangement is not so selective and is improved by the addition of a variable condenser. At D is shown a combination of a small variometer for fine tuning with a tapped inductance to increase the wave length.

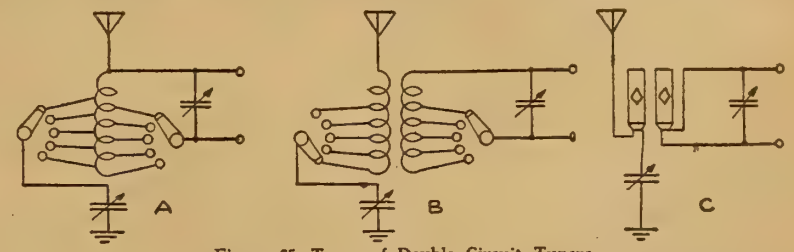


Figure 25—Types of Double Circuit Tuners

The tapped inductance and stator of the variometer are all one winding, tapped about every 12 turns, and the rotor has 15 turns of wire. Thus with the switch on the first point only the small variometer is in the circuit. More inductance is then cut in with the switch as needed. This arrangement is selective and simple to handle.

In using these tuners it is always to an advantage to use as much inductance as possible and as little capacity as will give sharp tuning. The circuits shown are all non-regenerative and suitable for use with either crystal or tube detectors or for aerial tuning when Radio frequency amplification is employed.

Double Circuit

We come now to double circuit, non-regenerative tuners. As the name implies two circuits are used, means being provided for controlling the coupling between them. The advantage of using a second circuit lies in the fact that we can construct this circuit with low resistance, with both capacity and inductance under control, thus enabling the oscillatory currents to build up to their maximum value without hindrance.

The old double slide tuner was really a two circuit tuner with close coupling. Thus, were we to take the arrangement shown at B Figure 24 and add another switch and a set of taps connected as shown in A Figure 25 we would have a double slide tuner circuit. There are now two circuits, one from the aerial through the inductance and condenser to ground,

(Continued on page 14)

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BRIGHT STAR—No. 15-03-6—22½ V.	2.25	1.45
BRIGHT STAR—No. 30-90—45 Volts.	5.00	3.50
FRANCO—No. 1529V—22½ Volts	2.50	1.85
FRANCO—No. 3045V—45 Volts	5.75	3.95

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Extra fine quality—Hinged top—Mahogany finish.

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7x12	2.95	7x24	3.95
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Variations in Flewelling Circuit

Maker Claims Set Gets More Music, Less Noise

The two circuits shown are modifications of the Flewelling that have given the writer excellent results. The diagrams are self-explanatory. The top hook-up is the Flewelling variation with one step of audio frequency amplification. The bottom hook-up is the same variation practically with the exception that the stage of audio frequency has been removed. The binding posts are shown in the top diagram to explain how the step of amplification can be cut out.

The upper diagram shows a .006 mfd. condenser with a variable grid leak across it. Those who have had trouble with the critical Flewelling whistle can use this hook-up. It has volume galore, but for the person who has found the whistle a stumbling block let him use the second diagram. The volume produced by this hook-up is almost as good, with the added advantage of having the critical whistle eliminated. The lower hook-up is my favorite set, sometimes using one stage of amplification. However, it gives wonderful results with the detector tube only as shown.

It is important not to use plate voltage above the amount stated in each case, except where 45 volts is indicated. This may be increased to 67½ volts, but I find 45 volts quite sufficient. In fact it will give results on one stage of amplification with 22½ volts.

Allow me to emphasize that connecting the variocoupler in this way saves one variable condenser. I have tried several variocoupler hook-ups and they will work, but when it comes to loud signals, mine seems to be best. The 1½-volt grid bias battery on the detector tube is not an absolute necessity, but it helps to increase signals.

Stress should be laid on the little rubber covered levers that I attach to my dials. These are better than tinfoil and other methods of shielding from body capacity. It is often impossible to tune without some means to turn the dial at a distance. It has been a pleasure to tune in with the ten levers attached to the knobs.

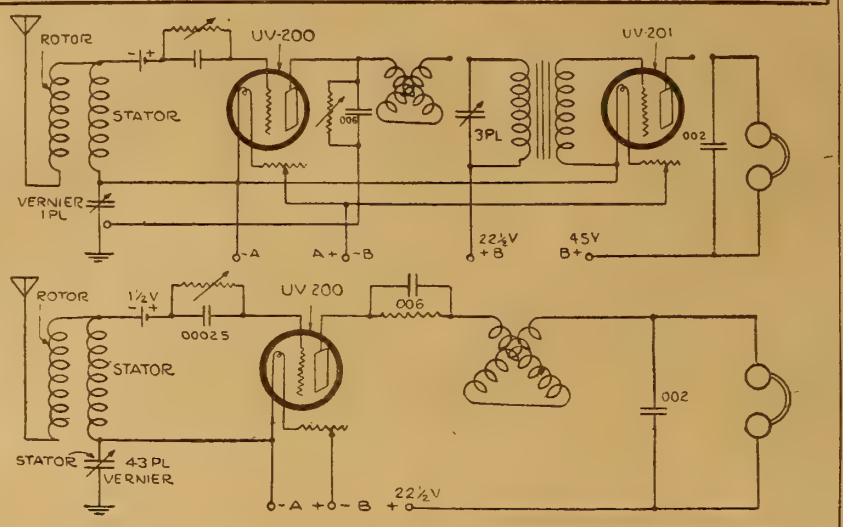
It is also quite necessary to keep the grid condenser and the 1½-volt bias battery as far back in the set as possible.—O. P. Klein, Leduc, Alta.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

ONE AND TWO TUBE CIRCUITS



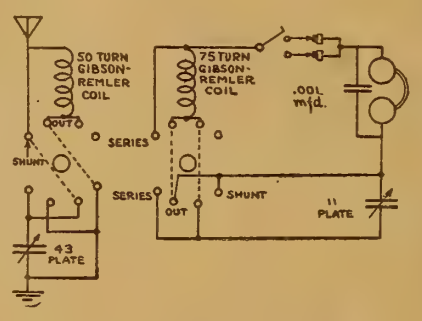
Effective Height of Antenna

The element of the antenna which determines its ability to pick up or give off signals is its effective height. The term of effective height does not mean the height from the ground connection to its topmost point, but is more nearly the average height from ground connection to the center of its exposed area. For an antenna consisting only of a straight vertical wire the effective height is almost two-thirds its actual height, while for an antenna having a large horizontal top structure the effective height is very nearly the actual height. The only purpose of the horizontal top element of a receiving antenna is to give a greater effective height for a given actual height.

The filament posts in 1½-volt tubes are diagonally opposite, while in the 6-volt tubes they are adjacent.

Crystal Hook-up

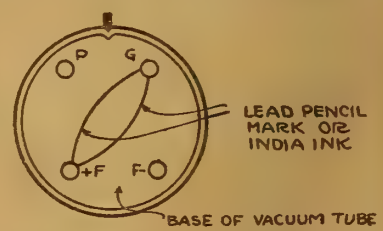
The hook-up here given has proven very selective and effective on long distance reception for a crystal set. Some of the many stations heard are WEAF, WOC, WLAG and WSB. A two-wire 65 feet in length aerial was used on the set.—Neill H. Martin, Wilmette, Ill.



Lines for Grid Leak on Bottom of Triode Tube

In operating vacuum tube receiving sets I have found that no two detector tubes are alike when it comes to the amount of current consumed and the resistance of the grid leaks which each requires. For the amateur who cannot afford to purchase several tubular grid leaks of different values, this kind which I have been using myself will prove quite a help.

Trace back from the tube socket and find which filament terminal of the tube is connected to the positive side of the A battery. After determining this, draw



with a soft lead pencil or a pen full of india ink, a line, or perhaps two lines, between this particular terminal and the grid terminal of the vacuum tube, as is shown in the accompanying illustration. The leak may be regulated by making the lines heavy or light as the case may be, and once adjusted it will always remain the same. Thus a separate grid leak may be had for each different tube used without changing any of the apparatus within the machine.

The one caution which must be observed is in determining the respective grid and positive filament terminals.—Howard R. Ackerman, Prairie City, Ill.

Use 25-ohm rheostats on 1½-volt tubes.

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20	320	311	298	324	319	307	315
21	404	387	370	400	389	380	394
22	509	488	401	501	493	479	497
23	642	612	584	632	631	600	622
24	810	763	745	799	779	750	781
25	1019	953	903	1008	966	933	982
26	1286	1201	1118	1263	1202	1166	1232
27	1620	1500	1422	1584	1543	1457	1548
28	2042	1860	1759	1988	1917	1824	1946
29	2570	2370	2207	2520	2485	2288	2433
30	3218	2860	2529	3165	3009	2810	3031
31	4082	3482	2768	3933	3683	3473	3793
32	5132	4234	3737	4913	4654	4267	4737
33	6445	5141	4697	6129	5689	5267	5956
34	8093	6317	6168	7646	7111	6461	7427
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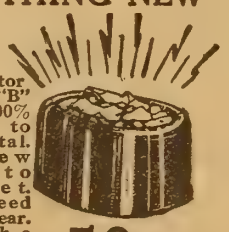

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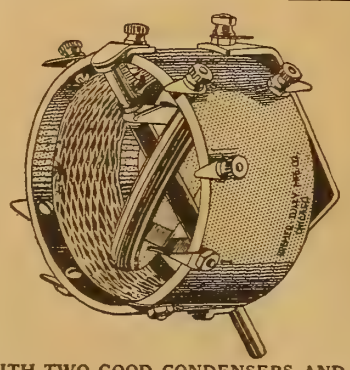

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Characteristics of Some New Vacuum Tubes

Part III—Curves for Five More Triodes; Conclusion

By H. J. Marx

SINCE the first part of this series was written, a multitude of tubes have been tested. Often three and four of one type have been required in order to get the average value. Where unusual curves were discovered a number of the

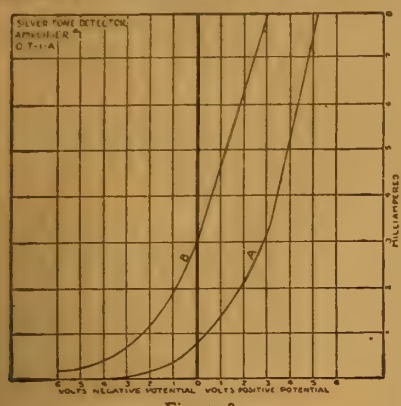

Figure 9

same tubes were obtained from average dealer stock, if possible, and were tested to substantiate the curves given. In one or two cases, however, only one tube was available and time was lacking to send for more. This is mentioned in the remarks referring to these particular curves.

Undoubtedly there will be many cases where occasional tubes will show much better curves—also some much worse. The curves given are presented as average values. Slight variations in filament voltages will usually make but little differences in the curves. As the plate voltage is increased the critical point of grid potential moves back further and the grid requires a more negative value.

"Bumpy" Curves

A "bumpy" or uneven curve, if very marked, makes the tube impractical for use. The uneven sections of the curve create an uneven plate flow, producing distorted reception. A tube of this type is very apt to be rather noisy in addition.

If the filament of a tube lights unevenly, that is, shows brighter in some spots

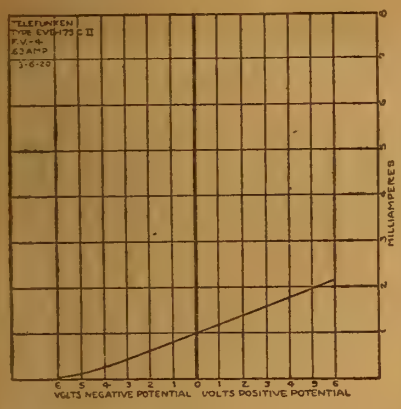

Figure 10

than others, then the chances are its life will be short. The bright spots are the thin or weak spots and will burn out rapidly. If uniformly lighted the filament resistance is uniformly distributed and gives much longer service.

Later on those characteristics of vacuum tubes which effect the methods of coupling in stages of amplification, and circuit interaction will be taken up in conjunction with the characteristics of the balance of the apparatus used. The influx of new tubes on the market has made it difficult for the fan to realize that the transformers must be so designed as to work best with the particular types of tubes used. Most of the present transformers are not balanced well with the many new tubes that have been introduced. It is anticipated that quite a number of new tubes will be introduced in the Fall and also the Spring of next year. This naturally will necessitate numerous new transformers to work with these tubes.

Silvertone Tube

This tube has aroused considerable interest because of several unusual characteristics. It operates on a filament voltage of 3 and consumes but .15 amperes. It has a standard base and fits the regular socket. A 6-ohm rheostat can be used if the storage battery is tapped at two cells. If three dry cells are used it is best to connect a fixed resistance of about 6 ohms in series in order to get the proper range of operation.

The first tube tested showed a remarkably good curve—so four were obtained—of these two were just as good while the

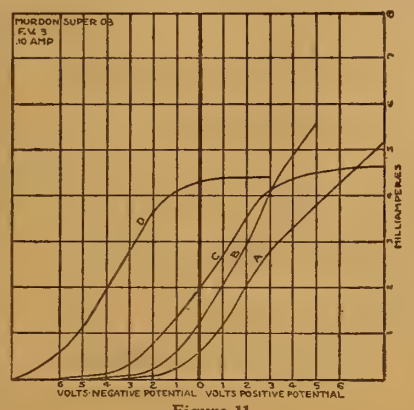

Figure 11

other two were rather mediocre but by no means bad. The three good ones were tried out in the Reflex De Luxe and the reception was exceptionally good although the tube was very microphonic, that is any mechanical disturbance or knock created an unpleasant clatter in the reception. It is understood that because of limited manufacturing facilities quite a few were made that do not show up so well, but it is also said that these difficulties have now been overcome.

The curves of this tube, type OT1A, are shown in Figure 9. Curve A was developed with a plate potential of 22½ volts, when this was changed to 45 the curve B was worked out.

Telefunken Tube

The opportunity of testing an old type German tube was presented and taken advantage of for general interest. The date on this tube was March 6, 1920. The filament voltage was 4 and the current consumption was .63 amperes. The tube required a special socket. Only one plate voltage curve (85) was taken and is shown in Figure 10. Variations made but little difference. The curve is very uniform but its efficiency is low compared to the latest developed tubes.

Murdon Super 08

One of the more modern tubes is the Murdon Super 08. Its curves are given in Figure 11. This tube uses a filament voltage of three and consumes only .1 ampere. The curves are fairly uniform and good results should be anticipated from a tube of this type. No reception tests were made due to lack of time. Further details will be furnished later.

Curve A was taken with a plate voltage of 21; B with 29; C, 45; and D, 87.

This tube has a standard base and fits the regular socket. The same rheostat conditions hold true for this tube as for the Silvertone. When the plate voltage runs above 80 a grid biasing battery is necessary.

Mercury Tube

Another tube, considerably advertised, is the Mercury 1½-volt tube. The current consumption of .98 ampere is rather high. If dry cells are used for filament lighting, about 3 should be connected in parallel, **not in series.** This tube has a standard base. The ordinary 6-ohm rheostat will give sufficient regulation of the filament current.

The curves are shown in Figure 12, A giving the values with 15 volts on the plate, B, C and D with 18, 21 and 22½, respectively. While the higher plate voltages show excellent curves yet the decided "bumps" in each curve is detrimental. If the grid potential is so adjusted that the operating range does not take in this part of the curve, then results will be satisfactory. Otherwise distortion will be noticed. Since only one tube was available for test, it could not be confirmed whether or not other tubes of the same

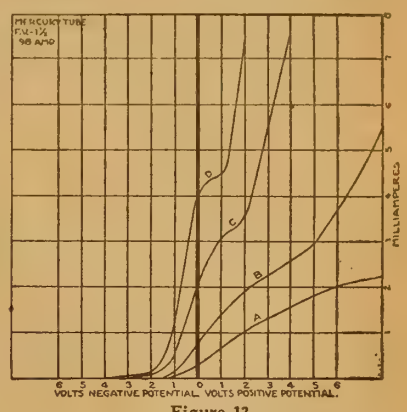

Figure 12

type would have similar characteristics. Undoubtedly there may be many such tubes. Although the curve may be more regular, yet they may not all show as efficient as the first would indicate.

Philips Amplifier

In the curves presented in Part II of this series was a set of a Dutch Detector

(Continued on page 14)

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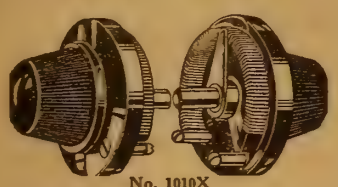

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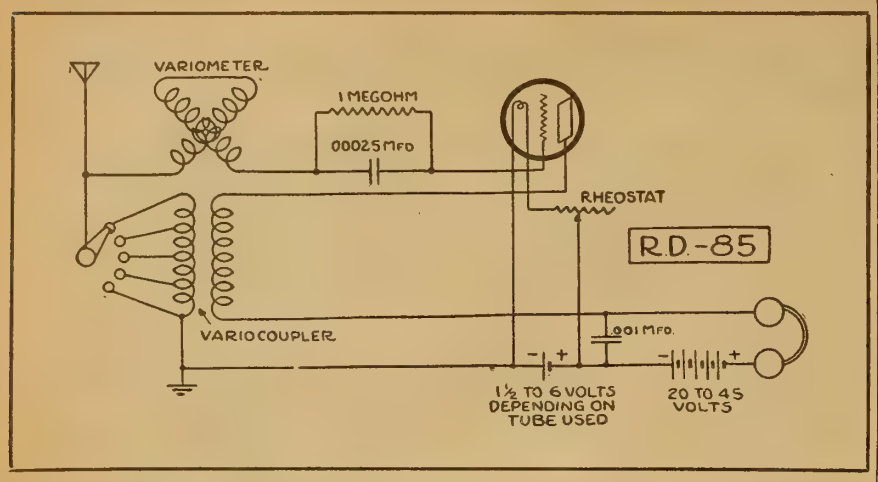


SINGLE tube hook-ups for portable sets are in popular demand. R. D.-85 is another circuit that combines selectivity and volume with the use of a dry cell tube.

A variocoupler is used, with the rotor acting as a tickler. The antenna circuit is tuned by means of the tap switch on the primary. The grid circuit is controlled by means of a variometer. This circuit permits strong volume and at the same time permits very good selectivity.

A variable grid leak can be substituted as the opportunity of grid adjustment will permit better results with any change in tubes used. The filament battery can be made up of dry cells connected for the voltage required.

Any small suit case makes a convenient cabinet for a portable set. Half the space should be divided off for panel and instruments, while the other half should be laid out for battery cells and receivers. Apparatus preferably should be panel mounted—and the panel should be removable so that all apparatus is accessible. Tube sockets should be mounted on some form of cushion base in order to reduce the possibility of jars and shocks to a minimum, thus avoiding damage to tubes. This will also reduce the microphonic tendency of peanut tubes.

FIRST STEPS IN RADIO

(Continued from page 11)

the other comprising part of the inductance and the second variable condenser. Currents in the aerial circuit would induce a current in this second circuit and by tuning both circuits an increase in signal strength would be noted due to the low resistance of the second tuned circuit.

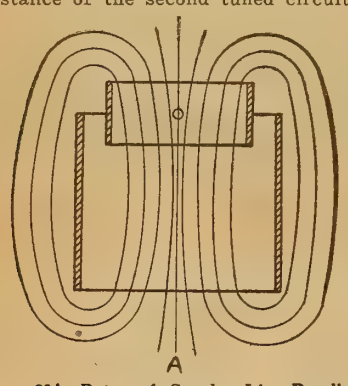


Figure 26A—Rotor of Coupler Lies Parallel to the Stator

However, the coupling between the two circuits in a double slide tuner is fixed so the second circuit cannot oscillate freely because some of its energy would be returned to the aerial circuit. To overcome this retransfer of energy two separate coils are employed as shown at B Figure 25.

These coils are usually wound on tubes of such a size that the secondary winding will slide into the primary or aerial circuit winding. By sliding the secondary in and out the coupling, or the number of magnetic lines of force from the primary coil acting on the secondary is varied. With this arrangement, known as the loose coupler, the secondary can oscillate freely and the amount of energy retransferred to the aerial circuit kept at a minimum.

Honeycomb Coils as Tuner

Two honeycomb coils mounted in a two-coil mount with variable condensers for tuning is another form taken by two circuit tuners suitable for use with crystal detectors. As a rule a 43-plate condenser having a capacity of .001 mfd. is used in the primary circuit while nothing larger than a 23-plate or .0005 mfd. variable condenser should be used in the secondary circuit. The use of a larger condenser will reduce the signal strength by reducing the voltage applied to the detecting device.

The more modern form of the double circuit tuner utilizes a variocoupler, turning the secondary winding at an angle with the primary to vary the coupling instead of sliding the secondary out of the primary as was done in the loose coupler.

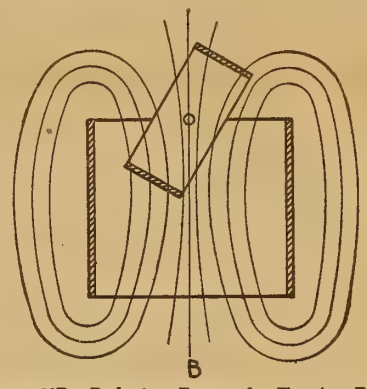
The action taking place in a variocoupler is shown in Figure 26.

In Figure 26A the rotor is shown lying parallel to the stator in which position the lines of magnetic force from the primary moving at right angles to the turns on the rotor induce a maximum amount of current in the rotor or secondary circuit. This means the energy transfer is the greatest when the rotor is in this position.

When the rotor is turned at an angle (Figure 26B) the lines of force do not cut the coil at right angles and the transfer of energy to the rotor is much less, thus the coupling between the circuits is loose.

In a plain two circuit tuner using a variometer, a condenser is connected across the rotor to tune the secondary circuit or a variable inductance such as a variometer is added in series to tune the circuit. With the average variocoupler the inductance of the secondary is so low that a large variable condenser is required to tune the circuit which has the effect of weakening the signals so an additional inductance is usually necessary.

It is not necessary that the primary of a double circuit tuner be tuned as sharp as the secondary and for that reason use



Fgure 26B.—Reducing Energy by Turning Rotor Nearer Right Angles

is often made of single taps for fine tuning. This will usually be found sharp enough for most conditions and the variable condenser can then be eliminated in the primary circuit.

The three circuit tuner mentioned previously is not suitable, in fact, cannot be used with a crystal detector and is of the regenerative type and will be taken up in detail later. All the tuners described in this chapter can be used with a crystal detector, and with modifications to be covered later, are used with regenerative tube detectors.

Selection of a Tuner

In selecting a type of tuner it is well to bear in mind the following:

A single circuit tuner gives the loudest signals, is easier to tune and simpler in construction. However, it is not as selective as a double circuit tuner and is more subject to interference from spark sets, static, etc. On the other hand the double circuit tuner is more selective and works more consistently over long distances and will work through heavy interference where a single circuit tuner would be practically useless. It is interesting to note that single circuit tuners were declared unsuitable for long range work back in 1912 and more than ten years later we find them the most generally used type.

Methods of employing regeneration with these tuners will be taken up in the chapter on regeneration while the next chapter will cover crystal detectors and give instructions for obtaining the best results with these instruments.

(TO BE CONTINUED)

CURVES OF NEW TUBES

(Continued from page 13)

Tube. The amplifier of the same make known as Type D11, has a similar filament voltage of 3.5 and current consumption of .5 ampere. Like the detector bulb it has a standard socket base.

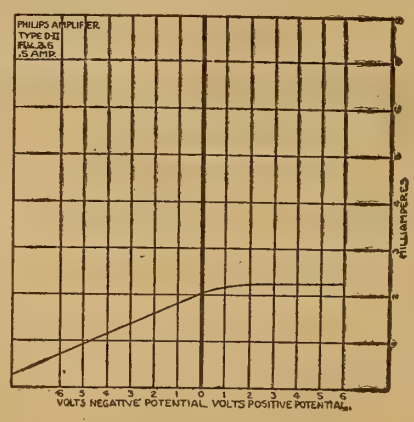


Figure 13

The characteristic curves are given in Figure 13. Variation in plate voltage made but little difference in plate current so only one set of readings for the curve were taken, leaving the plate voltage at 75. It might be stated that on previous tests of this type of tube the curves were very much more efficient. No other tubes were immediately available, however.

This concludes the series on tube characteristics. As new tubes are placed on the market they also will be tested and the curves and full details will be given.

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

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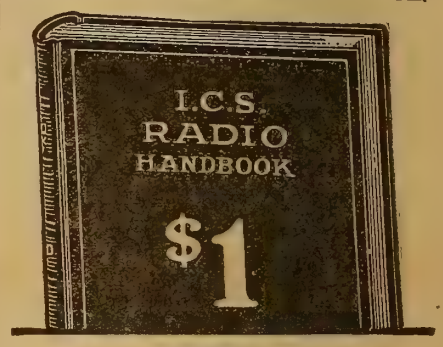

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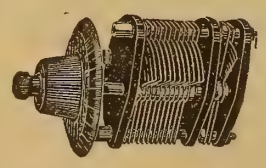

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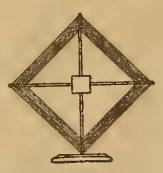


RITTER LOOP AERIAL $1

Including wood parts—wire and binding posts. Can be assembled or taken apart in a few minutes—Portable, requires little space, 36 inches wide across when put up. Interference—Static—Lightning practically eliminated. Full instructions sent with every SET. By Mail, 10c Extra.

RITTER RADIO COMPANY
230 Canal Street NEW YORK

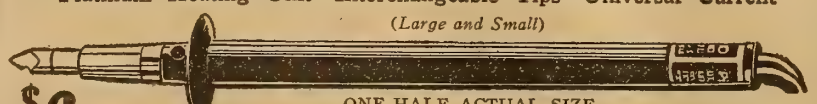
Delicate Soldering

Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.

THE POST SOLDERING IRON

Platinum Heating Unit—Interchangeable Tips—Universal Current

(Large and Small)



$6 ONE-HALF ACTUAL SIZE

Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute

From your Dealer, or write

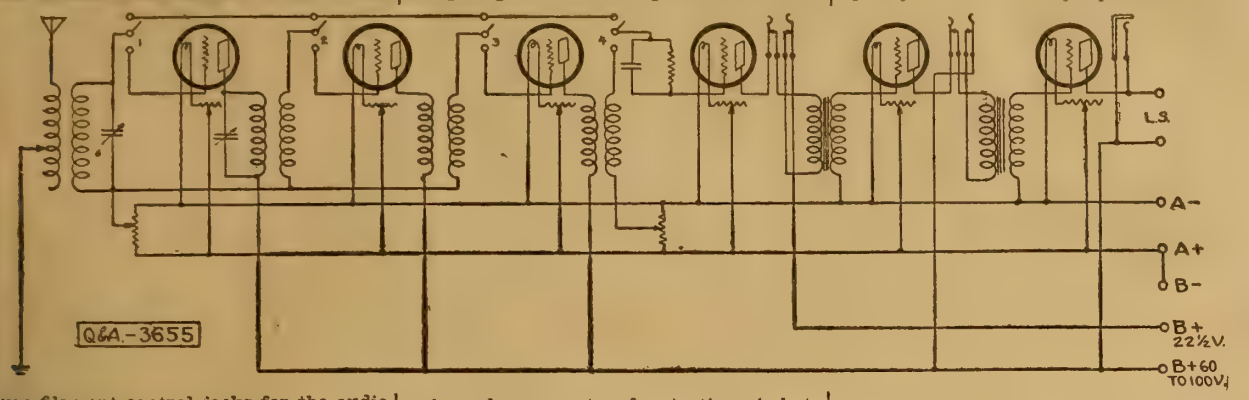
POST ELECTRIC COMPANY (Dept. 509), 30 E. 42nd St., New York

Questions and Answers

Six Tube Circuit

(3655) CH, Chicago, Ill.

Can you show me how to put switches on my set which I am using, having three stages of Radio frequency, detector and two of audio? I want to cut out the Radio amplification by means of switches when getting local stations. I do not want to use filament control jacks for the audio frequency.



A.—In circuit diagram given above, the switches are single pole double throw switches. If the detector alone is to be used, without R.F. amplification, the switch arms of one and four are thrown up while two and three are left open. When R.F. amplification is desired, four and one are both thrown down, then the position of two and three can be set for the number of stages desired.

The audio frequency jack system is standard and requires no explanation. The condenser in the primary of the first R.F. transformer is a variable with a capacity of about .00025 mfd.

Condenser Capacity

(2654) ILH, Long Branch, Ontario.

I have a good number of copies of your paper and keep them on file for the valuable information they contain. However, I have had some trouble in calculating the capacity of a condenser by the formulae given by P. J. M. Clute in September 2, 1922 issue, page 11. In the formula

$$C = \frac{K\,S}{4 \times 3.1416 \times D}$$

Mr. Clute says S is the area of one plate. According to this a condenser with one plate would have the same capacity as one with 100 plates.

Is not something wrong with this formula?

Even with a two plate condenser it seems to talk nonsense. Is it intended that this formula should apply to all types of condensers?

I have made several condensers out of brass tubing, one tube sliding inside the other, with wax paper for dielectric. Length, 5 inches; inside diameter of larger tube, 1⅛ inches; outside diameter small tube, 1⅛ inches. Please tell me as nearly as possible the capacity of this condenser, using wax paper, and also mica as dielectric?

A.—Answering your inquiry with reference to formulae for computing capacity of condensers, as appearing in Radio Digest will advise that it is correct for a condenser of two plates. For additional, multiply by the increased number.

I would estimate the capacity of condenser described as approximately .0005 mfd. The difference in thickness of the waxed paper and mica is not stated, so it would be impossible to estimate the capacity of condenser of mica construction.

B Batteries

(2896) CIW, Washburn, N. Dak.

I have recently purchased storage B batteries and I am obliged to ask that you advise me how I may determine the condition of the batteries as a whole or in part. I find that a hydrometer cannot be used satisfactorily for this.

Since you recommend the use of a voltmeter I am obliged to ask that you advise further as to type of voltmeter required for giving correct reading of A and B batteries, also ammeter for testing A batteries. I am considering incorporating both instruments in panel form in my set and will ask that you advise proper type to procure. I believe these should be for direct current, but am not sure what divisions should be or capacity best suited for my needs.

A.—Answering your inquiry with reference to testing B batteries will advise that a voltmeter should be placed across them while set is in operation. If a 22½-volt battery tests lower than 18 volts it is ready for the ash can! This test must be made while set is in operation as batteries will almost immediately resume their rated voltage otherwise. This method may also be applied to A batteries, although a hydrometer will more nearly determine actual condition.

Any standard D. C. voltmeter with scale reading from 0 to 25 or 50 will serve.

Daylight Reception

(2894) GWD, Laurel, Miss.

I have been a reader of your Radio Digest for the last five or six months, and wish to congratulate you on publishing one of the most wonderful pieces of Radio literature in the Radio field.

Through the information and recommendation of your paper I ordered one of the famous Flewelling circuits. This circuit has just been completed and placed in operation, and has proven to be a most wonderful receiver.

For an illustration, the Friday midnight concert broadcast by Station KYW of your city was brought in as clear as if the music was in the room. Station WWJ, Detroit, Michigan, also came in very loud and as clear as any station brought in that is not over two or three hundred mlies distant.

I have been unable so far to receive anything during the daylight broadcasting hours, and would appreciate any information you could give me in regard to what to do in order to receive daylight broadcasting.

A.—We are glad to congratulate you upon your satisfactory operation of the Flewelling circuit. It has many enthusiastic users and never fails under skillful construction to afford the results claimed for it.

In the matter of daylight reception of broadcast it is recognized to be less favorable than at night, due to the partial ionization of the air by the sun's radiation. There is less reflection of what is known as space wave in the daytime consequently guided wave (electromagnetic) will not be assisted materially by any reflected or refracted part of the space wave. At night, however, when the upper boundary is more sharply defined, there is more reflection of the space wave, and in general signals received at night are stronger than in the daytime.

R.D.-73

(2281) ABB, Fond du Lac, Wis.

I wish to build Hook-up Diagram R.D.-73. Please explain coils L1, L2 and L3, also other coil in middle left of diagram. I wish to use set for 360 and 400 meters. Can the new type C-301A Cunningham amplifier tubes be used in this set?

A.—Referring to Radio Digest diagram 73, the descriptive details accompany diagram as does also table for computing wave length values of honeycomb coils to be used if chosen; variocoupler or loose coupler may be employed if preferred. Further details will appear shortly giving constructional data, panel layout, etc.

The new Cunningham 301A tube will work to perfection in this circuit.

Glass Panel

(3478) GAL, Olustee, Okla.

I am making a Flewelling set on a glass panel. Have all the holes bored and about all installed. I have had Radiophans tell me that glass will not work for a panel, and that it is not a good insulator. Please advise me, as I have always thought that glass was as near 100 per cent as any material.

A.—Answering your inquiry with reference to the properties of glass used as a panel for Radio receiving set, we are advising that it makes a wonderful panel, being one of the best insulators known.

Amsco Rheostats

Guarantee an unusually uniform and steady contact.

For base or panel mounting.

Condensite base, high-grade resistance unit, attractive knot. Adjustable shaft to any thickness panel.

6 Ohms.....$1.00; with dial.....$1.25
20 Ohms..... 1.25; with dial..... 1.50
(For UV-201A Tubes)
50 Ohms..... 1.30; with dial..... 1.55
(For UV-199 Tubes)

At All Good Dealers

AMSCO PRODUCTS, INC.
Broome & Lafayette Sts., New York City

10c

FLEWELLING, REINARTZ, SUPER-REGENERATIVE

and other diagrams will be brought to you immediately in our new 32-page booklet. Information about tubes, hints on construction of sets and other valuable and instructive data for everyone interested in Radio is included.

Our complete line of standard equipment is also illustrated and described—an up-to-date catalog of the newest in Radio at right prices.

FREMONT RADIO SALES CO.
227-229 Fulton St. NEW YORK CITY

The Wonder Tube of the Age

MARGO Detector Vacuum Tube $1.00
1 1-2 VOLT .. Socket 25c

Operates on one dry cell either with or without B Battery. Wiring diagram FREE with each tube. 10c extra for parcel post insured.

Modells ESTABLISHED 1889

191 Fulton St., Dept. G-17, New York City
9 New York Stores
America's Greatest Radio Mail Order House

A LARGE TWO COLOR MAP

Size 25x38 inches, showing the location of all the broadcasting stations of United States and Canada, their wave lengths, exact geographical position, change of time area, amateur radio districts, etc., etc. Also a complete list of call letters (listed alphabetically) of all the broadcasting stations, bound in a separate cover.

(Mailed on the Receipt of 25 Cents in Coin or Stamps)

Walter B. Spiegel, 45 Vesey St., New Yokr City

RADIO VIA PARCEL POST AT N. Y. PRICES

Standard Parts Only, in Original Packing
NO SALVAGED GOODS SOLD
Where "Money Back Policy Prevails"

	For Parcel Post Ins. Add
PHONES	
Dietzen 3,000 Ohm	$3.75 $0.12
Brown Single (4,000 Ohm Pr.)	4.95 .09
Royal 2,200 Ohm	3.75 .12
COUPLERS	
Dayton 45	4.85 .12
Atwater Kent	6.80 .14
Freed Eiseman (180 Degree)	2.45 .09
All Wave (Genuine Capitol)	6.95 .18
VARIOMETERS	
Dayton	4.85 .12
VARIABLE CONDENSERS	
U. S. Tool 46-Plate Vernier	4.45 .24
U. S. Tool 24-Plate Vernier	4.10 .20
3 Plate Vernier	.95 .08
23 Plate Vernier	2.95 .14
43 Plate Vernier	3.45 .18
TRANSFORMERS (Audio Frequency)	
Sampson	4.95 .14
Acme	3.45 .14
TRANSFORMERS (Radio Frequency)	
Acme	3.45 .14
Cotoco	2.45 .12
Owl	.95 .10
Sleeper	1.95 .10
MISCELLANEOUS	
Hydrometers	.49 .08
Electric Soldering Iron	2.50 .15
Wave Trap	5.95 .20
Double Phonograph Attachment	.65 .06
SETS	
Westinghouse, Jr.	6.95 .40
Westinghouse R. C.	79.50 1.80
Aerex Crystal Set	7.95 .45
Victor Single Tube, completely assembled	12.50 .45
RHEOSTATS	
Union Radio Corp.	.65 .12
Bradleystat	1.49 .10
SOCKETS	
Bell V. T. & W. D. 11	.89 .10
V. T. Bakelite	.50 .10
LOUD SPEAKERS	
King Amplitone Horn	4.95 .28
Pathe	17.50 .50
Reflex	9.85 .30
TUBES	
Welch Peanut Tube	2.00 .10
U.V.-200	4.95 .15
Sterling 1½ V.	3.95 .15
Margo 1½ V. (2 Element)	1.00 .15
CABINETS (In White)	
7x10	1.45 .20
7x12	1.65 .25
7x14	1.85 .30
7x18	2.15 .40
7x21	2.45 .45
7x24	2.95 .50
LIGHTNING ARRESTERS	
Argus, Outdoor or Indoor	.95 .12
DIALS	
2-inch (Bakelite)	.25
3-inch (Bakelite)	.35 .08

Modells ESTABLISHED 1889

191 Fulton St., Dept. F-17, New York City
9 New York Stores
America's Greatest Radio Mail Order House

GOLD-GRAIN CRYSTAL DETECTORS
DEALERS—New List Attractive Discounts
HUDSON-ROSS
123 W. Madison St. Chicago

Your Choice

Radio Digest Illustrated

BOUND VOLUMES
Numbers
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Postpaid by Parcel Post with One Year's Subscription to Radio Digest
Greatest Collection of Radio Information Ever Published
Reinartz Long Distance Circuit; Ultra-Reinartz Circuit; Flewelling "Flivver" Circuit; Grimes "Inverse Duplex" Circuit; Single Tube Reflex Circuit; Armstrong "Super-Heterodyne" Circuit; Two, Three and Four Tube Reflex Circuits.
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ALL ORDERS MUST BE SENT DIRECT—No orders on this offer will be accepted through subscription agencies, news dealers or other sources. Check, money or express orders (no stamps) must accompany all orders.
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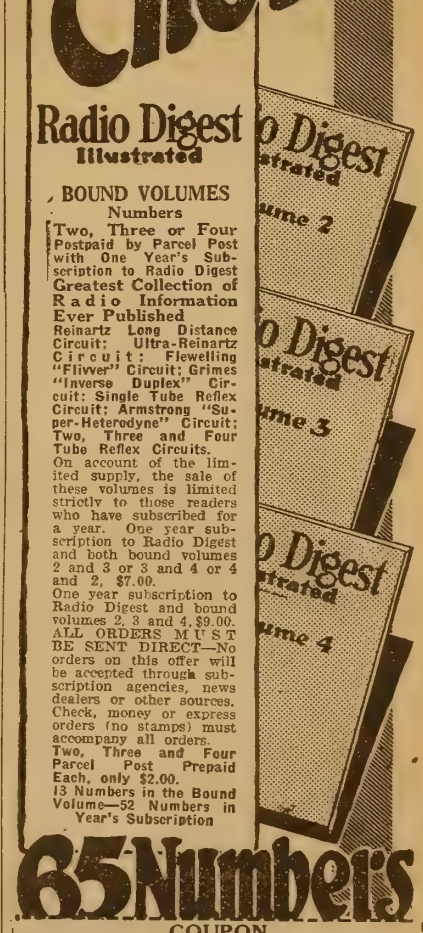


65 Numbers

COUPON

PUBLISHER, RADIO DIGEST.
123 West Madison St., Chicago, Illinois.

Please reserve me Bound Volume Number Two and also Number Three, and one year's subscription to the Radio Digest, for which I am inclosing check—M. O. for Seven Dollars.

Please reserve me Bound Volume Number Two or Three or Four and one year's subscription to the Radio Digest, for which I am enclosing check—M. O. for Five Dollars.

Name.....

Address.....

City..... State.....

Radio Illustrated

Della Vanna, formerly of the Greenwich Village Follies and now one of Hollywood's film colony, is not only a favorite with KFI listeners but is herself an ardent Radiophan. Miss Vanna says that nothing is more relaxing after a hard day's work at the studio than to make herself "comfy" and tune in on local stations. There is no better tonic for the tired nerves than good music. With the Radio set entertainment may be had with little effort

When you go parading or shopping on Fifth Avenue take along your receiving set. This is accomplished by placing the set on a tea wagon. The picture shows Miss Anna Tinsler parading on Fifth Avenue, New York City © K. & H.

Even the largest set can be made portable. Gladys Jones is shown with a long distance receiver in the North Woods, where she is on a camping trip

Gale Research Co. 1923

Smallest Regenerative Set in World—Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S PAT. OFF.

Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, JUNE 23, 1923 | No. 11

RADIO PHOTOSCULPTURE

FOUR GIANT PLANTS LINKED FIRST TIME

BROADCASTS PUT ON AIR SIMULTANEOUSLY

WEAF, WGY, KDKA, and KYW, Widely Separated, Join in Experiment

NEW YORK, N. Y.—For the first time in history, four big stations in various parts of the country were linked together and broadcast simultaneously recently when the program of the National Electric Light Association convention here was put on the air by WEAF, WGY, KDKA and KYW. The stations were linked with microphones in the hall by telephone lines.

The speaker at the evening meeting was Julius K. Barnes, president of the United States Chamber of Commerce, and Anna Case, Metropolitan Grand Opera star, sang.

The engineers who worked on the installation of the lines encountered a serious problem in preparing telephone lines suitable to the handling of high frequency currents. Each of the lines had to be carefully balanced and equalized by means of special networks and other adjusting instruments.

Hear Anna Case at Home

When Anna Case sang her voice was heard by a vast assemblage on the common and in the streets of Flemington, N. J., the century-old town near which the singer spent her early girlhood days.

This was accomplished by means of a mobile public address system which a citizens' committee arranged to bring to the historic county seat of Hunterdon County for the occasion.

A receiver operated by engineers picked up Miss Case's voice, and transmitted it to a big vacuum tube voice amplifier which made her voice audible in even the farthermost corners of the park and along the tree-lined streets.

SCULPTOR NO LONGER NEED SEE SUBJECT

Carving by Ether Waves Made Possible by Radio Photo Transmission

British-Yank Invention

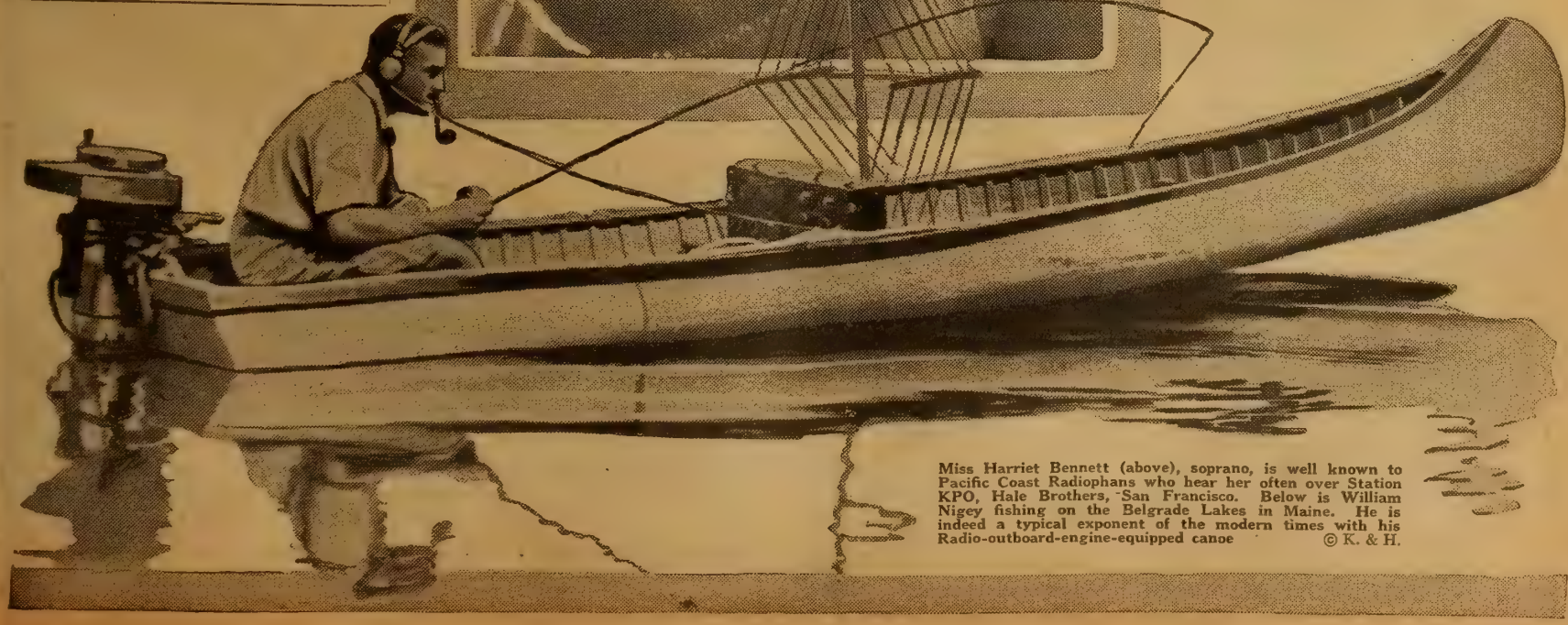
Line Charts of Pose Are Flashed Through Air to Artist Many Miles Distant

By Fred Claire Zumbro

First, pictures by Radio and now "Radiosculpture"! This remarkable accomplishment is brought about through the inventions of H. M. Edmunds and C. Francis Jenkins. By combining the inventions of these two men it is possible to carve a perfect likeness of a person thousands of miles away. Not a slight artistic likeness is the result, but a mechanically perfect model that will measure correct to the thousandth of an inch.

It is now made possible for a person on shipboard of a trans-Atlantic liner to sit for a few seconds before a camera and be able to call at the studio ashore, upon arrival, and see his own likeness carved in stone, marble or granite cast in bronze. The process requires from two to three days at the most for completion, after the

(Continued on page 2)



Miss Harriet Bennett (above), soprano, is well known to Pacific Coast Radiophans who hear her often over Station KPO, Hale Brothers, San Francisco. Below is William Nigey fishing on the Belgrade Lakes in Maine. He is indeed a typical exponent of the modern times with his Radio-outboard-engine-equipped canoe © K. & H.

DIGEST FANS SEND IN OFFER COUPONS

TO GET VALUABLE STANDARD PARTS FOR SETS

More Items Added to List—Readers Endorse Simplicity of Special Offer Idea

SPECIAL REWARD OFFER
Coupon Number 4

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Readers of the Digest all over the country are beginning to send in their Special Reward Offer Coupons. Although only three of the coupons have been printed so far, many letters have flooded in containing two consecutive coupons and remittance for various of the items listed below under Class A. Other Radiophans have told their intentions of saving the offer coupons for more expensive apparatus, listed in Class E or above.

A number of new items have been added this week to the very complete list of apparatus already catalogued. Among these are Turney spider web coils and mount, Premier variable condensers and audio frequency transformers, Delta Midget tubes with sockets and adapters, and Resistometers.

The simplicity of the method of getting the many standard and valuable parts and accessories for sets, in practically every case has appealed to the enthusiastic readers. All that is necessary is to clip the consecutive coupons appearing weekly on page two, and send them, accompanied by the necessary remittance for the selected item, to the Digest. There is no limit to the number of coupon series that can be sent in by an individual for apparatus.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Electrad Grid Leak (with clip mountings); Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 inch black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-20 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH).

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Induc-

(Continued on page 9)

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	.....	11:00- 1:00
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00	.....	10:00-11:00	.....	9:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00	.....	8:00-12:30	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba.	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:00
WKAQ, San Juan, P. R.	360	.....	6:30- 8:00	.....	.....	.....	6:30- 8:00	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00	.....	.....	.....	6:00- 9:00	.....	.....
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....	7:30- 9:00

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

For the Campers, Bathers, Automobilists, Hikers—and who not? Harry J. Marx will continue next issue to tell how to build a portable set complete in a fiber carrying case. Read page thirteen. Batteries, headset, and even a loop aerial are compactly assembled in a convenient unit. In the June 30 issue Mr. Marx will give three good hook-ups from which the builder may choose.

Beginners' First Steps by Thomas W. Benson next week will be devoted to the theory and operation of the vacuum tube as a detector. Mr. Benson's review of this important fundamental in the foundation of Radio knowledge, should be read even by the experienced amateur.

A Super of the Latest Type—The Nacireman—Complete hook-up diagram showing its wiring connections and parts. Many excellent reports have been given on this circuit. Watch for it next week as R.D.-87.

Flewelling Answers to Radiophans' Queries—a department for the Flivver Super fans. E. T. Flewelling continues to write exclusively for the Digest, while he prepares to spring a few more big surprises. Keep your eye on Flewelling!

A Radio Baseball Schedule—for the Ball-Radiophan. This schedule will appear in an early issue and will tell what big stations are giving baseball results and what games are broadcast. Tell your baseball fan friend about it.

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RADIO PHOTOSCULPTURE

(Continued from page 1)

impressions have been transmitted by Radio, which in itself requires about one hour.

Develops From Photosculpture

H. M. Edmunds of Brighton, England, has given to the world "photosculpture" or "cameraography," after many years study and tireless work. This process is brought about by photographing the person or model to be graven and then chiseling by a delicate machine, from the photo-impressions.

First the subject is placed before two cameras, set at an angle so that the two planes formed by the exposed part of the plates in each camera give a two plane view of a three plane object, (the model). That is, the third, or front plane actually overlaps into each of the other or side, two. This simpler form is described for convenience. When more than a side view portrait is wanted, or it is desired to produce a statue, three or more cameras are used set in a circle around the model.

Example of Side View Portrait

For clearness only the side view portrait will be taken for an example of how "Radiosculpture" is accomplished.

With the two cameras set at an angle and focused on the model, a projector, similar to a slide machine used in motion picture theaters, is set between the two cameras and directly in front of the model. A ground glass slide engraved with vertical parallel lines, about 150 to the inch, is placed in the machine and the shadow of the lines thrown upon the model to be sculptured.

These lines will appear warped and distorted when viewed from any point other than that occupied by the projector. It is upon this illusion that this step of the operation is based. The two cameras are set at an angle so as to obtain an impression of the contour of the lines as they fall and rise with the surface covered.

When the plates are developed and the pictures printed the result is a photograph of the model entirely covered with fine lines that accent the curvature of the surface covered. These are the charts for modeling the actual portrait.

So far only Mr. Edmund's invention has been considered, but at this point the equally wonderful invention of Mr. Jenkins overlaps his co-worker's. By Radiophotography the plates, or charts, are sent to where the actual work of sculpturing is to be done.

How Charts Are Sent by Radio

The process of sending these sculpturing charts by Radio is even more simple in operation than sending a photograph. First the model is outlined by an artist, then only the outline and the lines, thrown by the projector, are transmitted. By this method only two tones, black and white, are transmitted whereas in sending an ordinary photograph it is necessary to deal with the series of gray tones ranging from black to white.

The charts are placed in the Radiophoto transmitter which theoretically cuts the photo into small slices. That is, a tiny mirror follows up and down, beginning with one edge, and traveling in a series of parallel lines that slightly overlap the adjacent ones. The impressions of the light and dark on the mirror reflect into a selenium cell that conveys the impression received into the actual Radio transmitter where the impressions are again transformed, this time into ether waves. The receiving mechanism reverses the process on a sensitized medium, such as photo print paper.

How Ingenious Apparatus Works

When the cutting, or modeling charts have been received the process reverts back to the invention of Mr. Edmunds. The charts are then placed in a delicate drilling machine. This guided by the hand of the operator, drills in tiny furrows in a series of parallel lines. These small trenches are varied in depth to conform with the rise and fall of the lines on the Radio transmitted chart. If a bold relief is wanted the drill is driven deeper into the material used than if a plaque is being made.

The furrows are so small and so closely drilled that it is almost impossible to see the ridge between with even the aid of a high powered microscope. To the naked eye the finished product appears even more delicately carved than handwork, work that requires weeks and even months to complete with the model constantly before the sculptor in a fatiguing pose.

Possible Uses of Invention

In the future when a great person of note leaves a foreign land to visit another country it will be possible for him to view his own carved likeness produced in the land of visit. This can de done by Radiosculpture without the sculpturer even seeing his model.

By Radiosculpture it will be possible to preserve the drilling charts for future generations to erect statues of memorial or commemoration.

Relief maps in time of war, may also be rapidly duplicated at distant points where needed.

Another valuable aid of Radiosculpture is that of transmitting architectural models from one city or country to another. No longer will an architect have to rely on drawings to impress a builder. It means a builder will be able to see an actual model of a building or statue submitted by an architect or sculpturer thousands of miles away.

INVISIBLE AUDIENCE HONORS ITS CHURCH

KDKA'S AIR CONGREGATION ERECTS BRONZE TABLET

Contributions Reach 4,700 for Memorial to First Chapel to Have Services Broadcast

PITTSBURGH.—The first Radio memorial tablet in the world—donated by and dedicated to the invisible Radio congregation of Calvary Episcopal Church, Pittsburgh, Pa.,—was unveiled during the church services of that congregation recently.

Hundreds of men, women and children witnessed the dedication of the bronze tablet to the unseen Radio congregation which is known to be, in the area stretching from the Atlantic to the Pacific ocean and from Hudson Bay in the north of Canada to the extreme southern part of South America and which was enlisted when KDKA, one of the pioneer Radiophone broadcasting stations, began to broadcast Calvary Church's services more than two years ago.

First Radio Minister Present

Rev. Edwin J. van Etten, pastor of the church, who was the first minister in the world to have his services broadcast; Bishop Alexander Mann, of the Pittsburgh Episcopal diocese; H. P. Davis, representing Station KDKA of the Westinghouse Company, which station first broadcast church services, and other prominent Pittsburghers took part in the ceremony.

More than 4,700 people contributed to the purchase of the tablet. The contributions came in every form of legal tender—silver dimes, stamps, nickles, pennies and checks. A worker in a southern cotton mill sent Dr. van Etten two cotton socks with a nickel in each toe. A sailor from a boat on the Atlantic sent the minister 120 pennies he had won playing penny ante.

Listeners Respond Quickly

The contributions came as a result of Rev. van Etten's idea that his Radio congregation to which he had been preaching since January 2, 1921, might like to contribute to some sort of memorial. Accordingly during the reading of his regular announcement Dr. van Etten addressed, directly, his unseen hearers and told them of the plan and asked small contributions from such of them as might like to participate.

Responses to the idea were almost instantaneous. An hour after the announcement was broadcasted contributions were received from people living in Pittsburgh. People living in the district even walked to the minister's home a few minutes after they had listened in to him and left their contributions, even as he was preaching by Radio.

Calgary Signals Heard Off Japanese Coastline

5,000-Mile Transmission Sets New Canadian Record

CALGARY, ALTA.—What constitutes a record for long distance Radiophone broadcasting in Canada was established by CFCN, the broadcasting station of the W. W. Grant Radio, Ltd., here recently, when it was heard off the coast of Japan, which is approximately 5,000 miles from Calgary, and in another hemisphere.

CFCN signals were heard by L. S. Haire, Radio operator on board the steamship Stuart Dollar, plying between San Francisco and the Orient, when the ship was just out of Yokohama, according to a communication received from Mr. Haire.

Actress in Flag Day Address

NEW YORK.—One of America's most distinguished actresses, Julia Arthur, gave a patriotic recitation, "The Flag," on Flag Day, before Station WEAF'S microphone. Miss Arthur is one of America's favorites and gave much of her time during the war to patriotic service.

DEMPSEY MATCH ON CFCN—EVERY PUNCH

CALGARY, ALTA.—The Gibbons-Dempsey world heavyweight championship match at Shelby, Montana, will be broadcast July 4 from Station CFCN of Calgary, owned by W. W. Grant, Ltd. A direct wire will run from the ringside to the powerful station. This plant is the nearest super station in the vicinity and has a working range of over 1,000 miles.

"AL" SMITH CHOOSES AIR AGAINST PRESS

ALBANY, N. Y.—By wire from Albany to Station WGY, Schenectady, Governor Alfred E. Smith reached the ear and mind of the citizens of New York state recently when he gave a report of his stewardship. The report generally reaches the voters through the press. This year Governor Smith talked direct to the people, explaining the financial condition of the state in detail.

MAKES CYCLE RIDING EASIER

Why shouldn't it be easier to ride a bicycle equipped with a portable set. (Note, the spokes should make a good antenna.) After balancing some regenerative sets it should be less difficult to keep one's balance on a cycle. At least Miss Josephine Kiernan thinks the plan worth smiling about
© K. & H.

ARMY-NAVY CONCERTS TO BE SENT OVER U.S.

New Washington Plant to Relieve NAA During Summer

WASHINGTON.—Although the broadcasting of the government's band concerts by NAA, Arlington, will cease during the summer months, Radiophans within several hundred miles of Washington will be able to pick up some of the concerts if the plans of the Chesapeake and Potomac Telephone Company are carried out.

By June 18, this company hopes to complete its new station here and start broadcasting the open air public concerts from the White Lot and local parks where the Marine, Navy and Army Bands play almost daily.

Through the aid of a new portable input apparatus recently perfected by the telephone engineers, the company expects to furnish the added electricity necessary to pick up concerts and transmit them by wire to their station for broadcasting. This apparatus is mounted on a motor truck and can be dispatched anywhere in the city where something is to be broadcast.

Important speeches and some of the concerts will be put on a land line to New York and broadcast simultaneously from Station WEAF on a different wave length, it is planned.

RADIOS TREATMENT TO INJURED SAILOR

SEA-AMBULANCE ANSWERS EMERGENCY APPEAL

Vessel Anchored Nine Miles from Land Brings Help by Ether Waves

By L. M. Lamm

WASHINGTON, D. C.—The steamship West Cahous, lying at anchor in Baltimore harbor, nine miles from the city, needed medical help at about 3 A. M. recently and needed it quickly. A member of the crew had fallen into the hold and hurt himself seriously. So the captain of the ship sent a Radio broadcast asking help.

The call was picked up, not in Baltimore, nine miles away, but at Cape May, N. J., about 100 miles due east of Baltimore. As Cape May was separated from the West Cahous by parts of New Jersey and Delaware and by the eastern shore of Maryland, not to mention Delaware and Chesapeake Bays, no direct help from it was possible.

Operator Consults Surgeon

But the operator was on the job. Promptly he consulted the long distance list in the Baltimore telephone directly and called up the residence of the Public Health Service, surgeon in charge of the Marine Hospital in Baltimore, 100 miles to the west. The surgeon, roused from sleep to receive the message, asked him to Radio certain emergency treatment to the West Cahous and to direct the captain to send a boat to a certain pier in Baltimore, where he would find a surgeon waiting to go out to the ship with him. And so, in the middle of the night, in less than an hour, a "Radio-controlled," seagoing ambulance carrying a Public Health Service officer reached the side of the injured sailor and brought him later to the hospital.

PRIVATE PLANTS TO TAKE LAKE STATIONS

Step Necessitated When Navy Quits Nine Plants

CHICAGO.—Radio service will be provided for great lakes shipping as the result of a recent agreement of private broadcasters to handle great lakes traffic. R. H. C. Mathews, Station 9ZN, divisional superintendent of the American Radio Relay league, working in co-operation with Station WJAZ, will handle the "code stuff" for this territory. The necessity of getting a private broadcaster to handle the lakes traffic was caused by the navy's withdrawal from nine great lakes stations.

In Cleveland, according to an Associated Press report, the Great Lakes Wireless association was organized by vesselmen having boats equipped with Radio. Through this organization, which is headed by Fred L. Leckie, of Cleveland, the navy station at Duluth will be operated by the association and negotiations are reported for the association to take over eight other navy stations.

Vermont "U" Plant May Be Link in Army Relay

Star Student Station Drafted to Co-operate Officially

BURLINGTON, VT.—Owing to their activity and successful work of the past two years, the University of Vermont Radio station, 1ARY, has been selected to go through several tests in preparation for co-operating with the army Radio station at Ft. Ethan Allen in receiving and relaying government messages. The station at the university is under the management and operation of the students, and, has been heard regularly in England this spring. Two years ago this station was one of the first to be heard in the amateur transatlantic tests to Scotland.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Undesirable Outside Interference

HEAR FALSE TINKLE OF LIQUOR GLASSES

CANADA PROGRAMS RAISE AWFUL THIRST IN U. S.

Alberta, However, Shatters All Illusions in States—She's Dry Herself! —But She Votes Again

By Jeffrey J. Dingman

CALGARY, ALTA.—Radio is playing a tremendous part in increasing to an almost unendurable stage the thirst of American Radiophans, rendered already severely acute by the Volstead act and ardent prohibition enforcement agents.

Recent broadcasts from CFCN, the station of the W. W. Grant Radio, Ltd., here, have added greatly to the thirst of that part of the American nation which nightly clamps the headset on and tunes in its receiving set to Canadian stations. For, wafted on the ether waves out of Canada come vague hints and aggravating rumors of flowing wine and liquor to be obtained just by crossing the border.

Evidently Radiophans of the United States are suffering from an illusion, for there is just as total prohibition of alcoholic liquors in Alberta at the present time as there is in the United States. However, the people of Alberta are again to vote on the liquor question November 5 and Radiophans of Canada's sister nation across the international line are already making preparations to have their receiving sets in perfect order for that night to hear the big news broadcast from CFCN at Calgary.

Cabaret Broadcast Starts Something

Ever since jazz music from the Plaza Cabaret in Calgary has been broadcast by remote control from CFCN, a flood of letters with the words "prohibition," "liquor," "dry," and the remainder of the well-known vocabulary, has been pouring into the broadcasting station.

In repudiation of rumors to this effect which apparently have become exceedingly common in the United States, it may be stated that absolutely no intoxicating liquors are allowed on the premises of the Plaza cabaret, and only the imaginations of the listeners in are responsible for the false impression which has been gained.

Business men of Calgary report that this feature, recently commenced by CFCN would be a considerable factor in attracting a great many tourists from the United States to Canada this year.

Veteran Humorists Put on Army Program at WCAH

COLUMBUS, OHIO.—La Societe des Hommes et 8 Chevaux, the fun organization of the American Legion, broadcast a program recently through Station WCAH, the Entrekin company. The Columbus branch of the order, Am Le Voiture No. 15, made its Radio debut on this occasion, and presented music and humor redolent of life in the army and navy, featuring bugle calls so familiar to the wearers of the olive drab.

Form Radio Club in Berlin

WASHINGTON, D. C.—A Radio club has been founded in Berlin by a number of experts and amateurs for the purpose of furthering the interests of amateur Radio operators and of bringing general Radio matters to the attention of the authorities.

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SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-door photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago..

RADIO FIRE ALARM SYSTEM FOR BOSTON

City Soon to Have Airphone School for Laddies

BOSTON, MASS.—Although Radio has had an unofficial status in the Boston fire department for some time, most of the firehouses having receiving sets to get the broadcasts and while away the time during hours between alarms, the department is soon to have a school of Radio instruction.

Commissioner Theodore A. Glynn has ordered that such a school be established at once with George A. Fickett, superintendent of fire alarms in charge, and twenty men under instruction at present. When the course is completed, the men of the school will man the Radio fire alarm equipment which will augment the regular signal system, and eventually perhaps, supersede the wire system in directing movements of the fireboats at East Boston and South Boston, which now have Radio equipment.

Copy Navy Code 11,500 Miles

WASHINGTON.—A Radiogram from the naval station at Caviet, P. I., addressed to San Francisco for relay to Washington, was picked up in the Washington Radio Central recently and copied before the San Francisco operator indicated its receipt. Needless to say, it was not relayed to Washington. This message was copied without error over 11,500 miles of sea and land.

Radio for English Travelers

LONDON, ENG.—The Liverpool Express, a fast train running between Liverpool and London, has been equipped with a powerful receiving set, loud speaker and loop aerial, which are located in a special Radio salon, where the passengers can be amused and interested during the tedious journey.

We Live In Kansas

—but we receive programs from Atlanta, Minneapolis, Davenport, Fort Worth, Madison, Los Angeles, Dallas, Kansas City, St. Louis, Denver and San Antonio on Crystal without batteries. Your crystal set requires only easy inexpensive changes. Send stamp for further information or $1.00 for copyrighted drawings and instructions. Everything explained. Satisfaction guaranteed.
LEON LAMBERT, 501 South Volutsia, Wichita, Kansas

ETHER COMPASSES FOR NAVY BLIMPS

Officials Consider Plan to Equip Big "ZR" Ships for Dark and Fog Navigation

WASHINGTON.—Plans for equipping the two new naval rigid airships with Radio compasses so that they can navigate in darkness or in fog, are under consideration. These are the great ZR ships now building.

It is believed that the Radio compass installations can be made satisfactorily, and that this feature will prove a valuable asset for the efficiency and safety of both personnel and material through assisting the accuracy of navigation. The location selected was adjacent to the observation platform located on top of the ship, well forward. A coil has been designed which will enable observations to be made in frequencies extending over a band of from, approximately 600 to sixteen kilocycles. If this installation is made satisfactorily, it will be the first time a Radio compass has been successfully installed upon a lighter-than-air craft.

Give WBAP's "Hired Hand" Miniature of His Cowbell

FORT WORTH, TEX.—G. C. Arnoux, Radio Editor, Star-Telegram, Fort Worth, Texas, alias announcer GCA or "The Hired Hand," who daily wields the cowbell before the microphone of WBAP is proudly displaying a miniature gold cowbell, patterned along the style of the original. This unique token is inscribed "From Gainesville 147-piece Boys' Band, C. C. Shell, Director, to 'The Hired Hand'." It was presented to the popular announcer by the band which was heard several weeks ago, broadcasting from Station WBAP, and complimentary acknowledgments were received by the Gainesville, Texas, band from nearly every State in the Union.

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"Radio Eye" Guide for London Derby Traffic

Flying Scouts Flash Road Conditions to Grandstand Box

LONDON, ENG.—Radio waves again controlled the immense tide of traffic that rolled into Epsom for the derby recently.

From a box in the grandstand one man observed to see just what was happening to the streams of vehicles for twenty miles around. The trek to Epsom began the night before the race and from dawn until the classic was run there was a steady influx by all roads.

This man was able to see through the eyes of his Radio scouts, some of whom were flying over the course, and others touring the approaches in automobiles. Each was in direct communication with the "master eye."

Col. Laurie of the British air ministry, who was in charge of Radio communication at the course, declared that this was the second time Radio had been so used, and had proved very satisfactory.

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The New GREBE Broadcast Receiver

Your key to the true joys of radio!

Receive all broadcasting without outdoor antenna, loop, or storage battery!

The Receiver employs both Regeneration and Tuned Radio Frequency Amplification with only *two* simple tuning adjustments.

A Dial, graduated in wavelengths, enables you to locate quickly the program you desire.

The walnut cabinet, with its battery compartments, harmonizes with the most tastefully furnished room.

Licensed under Armstrong U. S. Pat. No. 1,113,149

World's Smallest Regenerative Set

How to Construct Vest Pocket 800-Mile Tuner

By Warner Bates

THE world's smallest regenerative set! Much interest has attached to the recent announcement of the construction by Roslyn V. Russell, Niagara Falls, N. Y., of a peanut tube miniature regenerative set which can be carried in the pocket and yet will do all that could be expected of many larger and more complicated outfits. Mr. Russell completed the set during the winter and under favorable conditions listened in on broadcasting stations and amateurs in all but the sixth and seventh Radio inspection districts. A portable set indeed!

Dial Container Is Cabinet

Mr. Russell ordered a Sleeper dial and when it was delivered he found it housed in a wooden box 3¼ inches square by 1⅝ inches deep. On receipt of the box the idea struck Mr. Russell that he could by ingenuity design a receiver to fit in the container.

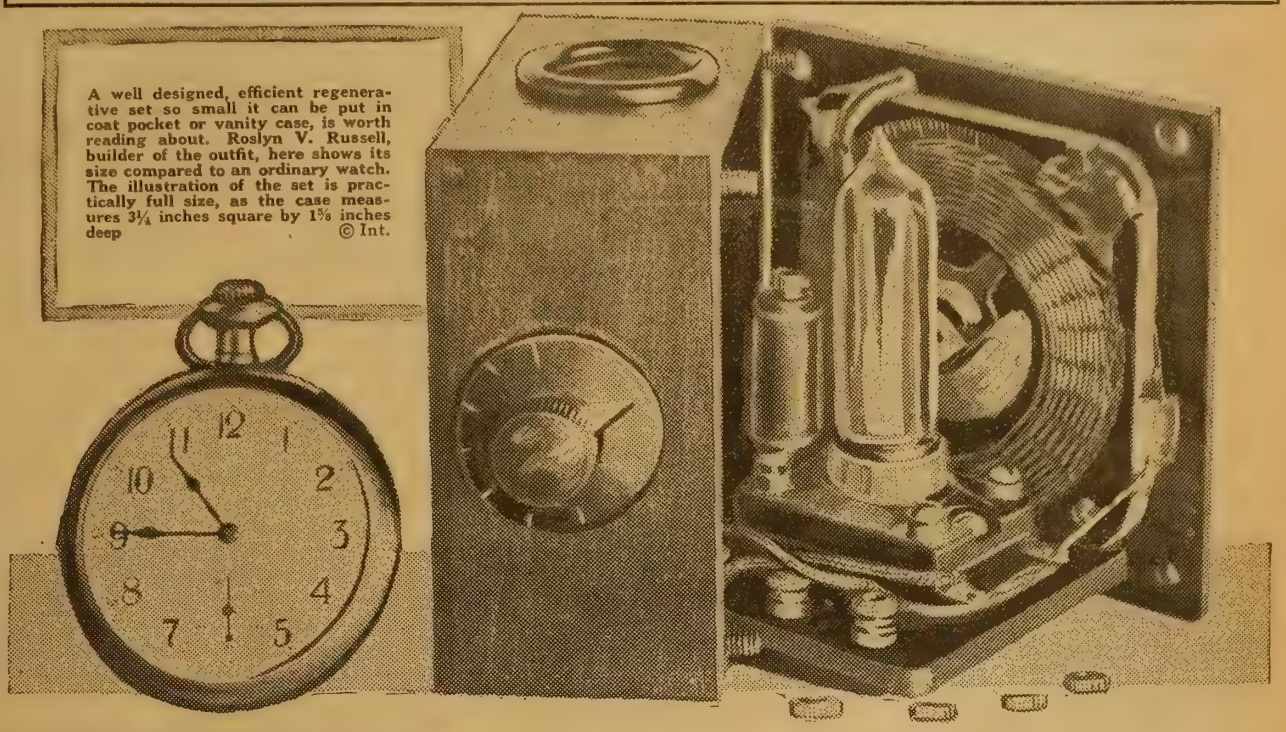
The corners were reinforced by small ⅝-inch triangular blocks of wood with holes through their centers through which screws were passed to fasten the panel on the front of the box. A ⅝ by 2⅝-inch hole was cut out of the back to pass the end of the sub panel which carries the three battery binding posts.

The panel is of ⅛-inch bakelite, 3¼ inches square. The sub panel is fastened to the front panel by two 8-32 flat head screws and is 2⅛ inches wide by 2 inches deep.

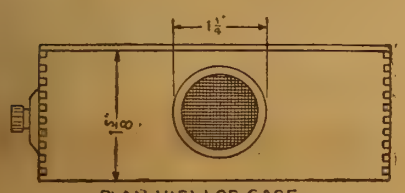
Single Circuit Regenerative

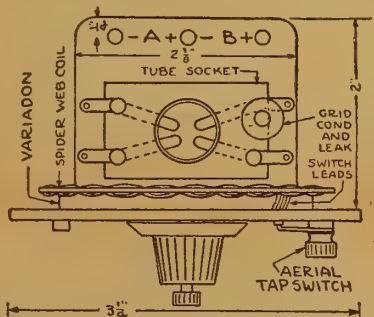
The circuit used is an improved regenerative single circuit using a spider web coil tuned by a vernier variable condenser and a switch on the antenna inductance.

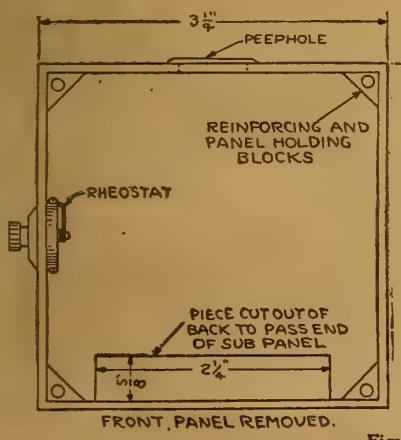
MINIATURE APPARATUS COMPARED TO WATCH



A well designed, efficient regenerative set so small it can be put in coat pocket or vanity case, is worth reading about. Roslyn V. Russell, builder of the outfit, here shows its size compared to an ordinary watch. The illustration of the set is practically full size, as the case measures 3¼ inches square by 1⅝ inches deep © Int.







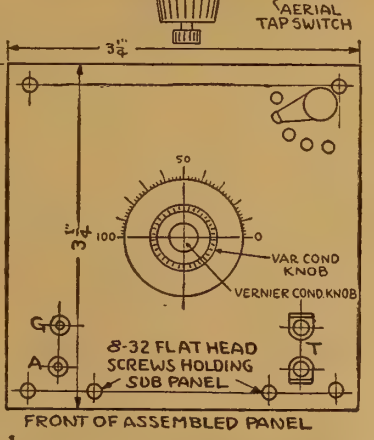


Figure 1

The tickler feedback has fixed coupling. Figure 2 shows the hook-up used and the number of turns in each part of the spider web coil.

As was stated, the secondary is tuned by means of a vernier variable condenser controlled by a vernier dial (small knob in the center) in the center of the panel. The condenser is a .0004 mfd. Variadon

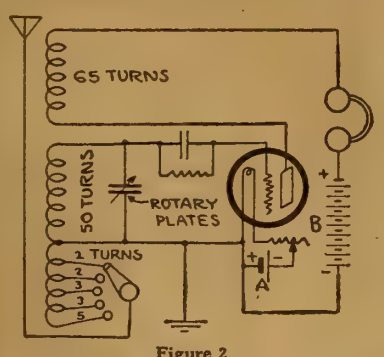


Figure 2

which was cut down from its normal 3¼-inch diameter to a size 2½ inches square without, in any way, impairing its efficiency.

The shaft of the Variadon was drilled through the center to take a 1-16-inch brass rod, and a specially shaped brass vernier plate, shown in Figure 3 was soldered to the rod, which in turn was attached to the vernier knob of the dial.

Winding and Connecting Spider Web

Fastened to the outside of the variable condenser by means of sealing wax at various points is the spider web coil. (See Figure 4). This inductance is wound on a "former" 1½ inches in diameter. Twenty-seven pins are mounted equidistantly on the edge of the former and the coil is wound with No. 30 single silk covered wire so as to pass through every second pin.

The tickler coil is wound first and consists of 65 turns. The wire is then broken and the antenna inductance of 15 turns

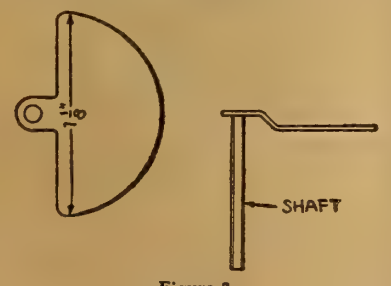


Figure 3

tapped at five points, started. The beginning of the antenna inductance goes to the 5th contact on the aerial tap switch; 5 turns are wound and a tap is brought to the 4th contact; 3 turns are wound and a tap is brought to the 3rd contact; 3 turns are wound and a tap brought to the 2nd contact; 2 turns are wound and a tap brought to the 1st contact, and finally 2 more turns complete the antenna inductance and the last tap is connected to the ground binding post and the Variadon rotating plates.

The wire is not broken at this point but winding is continued for 50 turns and the end of the wire is connected to the grid condenser and leak and the fixed plates of the Variadon. The turns of the inductance after winding were doped with M-R No. 11 varnish. After this had dried thoroughly the pins and former were removed. Figure 4 illustrates clearly the method of winding and of taking taps.

Tube, Socket and Grid Leak

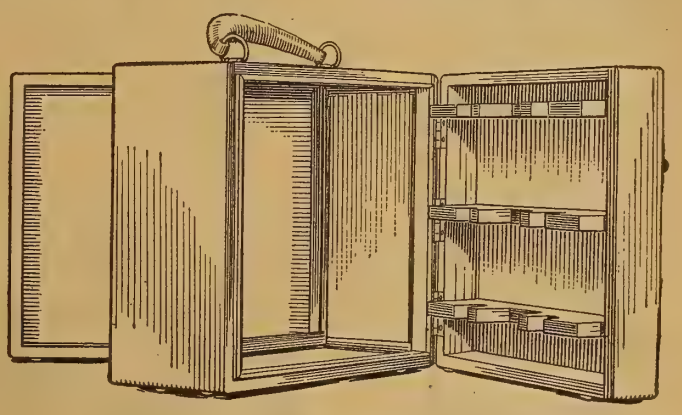
The tube used is a Northern Electric 215-A "peanut" with socket made by the same firm. To get the socket into the case it is necessary to trim the sides until the width is only 1 inch. The socket is mounted on the sub panel and a tubular grid leak and condenser ¾-inch long by ⅝-inch diameter is fastened directly to the grid binding post of the socket.

Mr. Russell made his own grid condenser and leak from a small rolled paper condenser mounted inside a hard rubber tube with brass plugs on each end and with a pencil mark leak extending from one brass plug to another on the outside surface of the hard rubber tube. It is not necessary, however, to follow this practice as very small grid condensers and leaks are available on the market and will serve satisfactorily here.

(Continued on page 6)

Inland Electric Co. Chicago

A RADIO SUMMER?



Brown mahogany finish portable cabinet, both front and back hinged, shelving in rear cover to fit No. 705 Flashlight "A" Batteries and No. 763 "B" Batteries; enough space for 3-tube set; head set fits in front cover, aerial in back. Complete, $15.00.

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HOW AMATEUR CAN AID NATION IN WAR

INTERCEPT MESSAGES OF ENEMY AT FRONT

"Qualify in Radio—No Better Way to Serve," Says Signal Corps Officer

WASHINGTON.—There is practically no end to the possibilities of Radio for military use, an officer of the signal corps stated recently, adding that, young men who wish to serve their country can do so in no better way than to become qualified in Radio and to join the National Guard or Signal Reserve Corps of the U. S. Army.

As an instance of the work of former amateurs who served in the signal corps during the war, it is said that 73 percent of the 400 Radio men engaged in intelligence work were ex-amateurs. Not a single "leak" occurred in the service, which intercepted 73,000 enemy messages and recorded 175,000 bearings on enemy Radio stations. The country is greatly indebted to these amateurs for their war work.

Radio Intelligence Work

Although little was known of the work of the Radio intelligence section of the army during or since the war, it was one of the most spectacular. Radio direction finders were placed all along the lines, at a distance of about five miles from the actual front and spaced about twelve miles apart. These receiving sets located the enemy stations in operation, recorded their bearings by means of directional coils, not unlike modern Radio compasses, and forwarded the bearings to headquarters where they were plotted on maps. The reports from many American Radio observers enabled the staff to keep an accurate check on practically all the German stations all the time.

Other receiving stations at army headquarters, intercepted and copied all enemy code messages, and telegraphed them back to general headquarters where code experts worked them out, giving the staff valuable information as to the movements or intentions of the enemy.

German's Make "Faux Pas"

On one occasion, when the Germans were planning a big offensive, the code all along the line was suddenly changed. The old code, known by the Americans for some time, became valueless. But one German officer could not decipher a long message sent him in the new code and asked his commander to repeat it in the old one. This was done and as the American intercepting stations copied both messages, the staff of experts at headquarters soon had a fair solution of the new code, which they eventually worked out in its entirety. The repetition of the message in both codes was more than they hoped for, and when the new code was transmitted to the French and British headquarters, the American Radio intelligence service was credited with a big "scoop" in aiding the Allies in securing advance information.

BRITAIN AIDS JAPAN TO BAR U. S. RADIO

Marconi Company's Six Gigantic Stations Will Establish Complete World Monopoly

SAN FRANCISCO.—Great Britain is using its diplomatic influence at Peking to aid Japan's opposition to the entry of American Radio companies to China, according to Emmett White, attorney, writer and former director of the insular and foreign division of the American Red Cross in China, who arrived from the Orient recently.

It is believed by American residents of Shanghai, says White, that with the completion of six gigantic stations reported to be under construction in England by the British Marconi Company, Great Britain hopes to establish a complete world monopoly of the air, assisted by Japanese stations in China and Manchuria.

The Federal Telegraph Company of this city is keeping the cables and telegraph wires busy with appeals to Washington, urging that the State Department take action on the reported refusal of the de facto government at Peking to live up to the terms of an agreement permitting the installation of Federal Radio stations at six Chinese ports.

Fort Worth Bids for Third Big G. E. Plant

Location in Southern U. S. Held as Inducement

FORT WORTH, TEX.—The tremendous Radio interest in the territory for hundreds of miles around Fort Worth, largely developed through Station WBAP, and the fact that Fort Worth is near the center of the southern half of continental United States, is offered as an inducement in bidding for the third huge broadcasting station which the General Electric Company is planning.

The ordinary service radius of a station of this kind would be more than 1,500 miles. A similar station is now being erected at Oakland, Calif., and the parent station is WGY, Schenectady, N. Y.

Place Radio in Hospital to Cut Use of Narcotics

NEW YORK.—A complete Radio outfit with more than 150 headsets is installed in Beth Israel hospital for use of the patients. Louis J. Frank, superintendent, said he believed Radio would diminish the giving of narcotics and sleeping potions and ease the patient's mind.

SMALL REGENERATOR

(Continued from page 5)

Rheostat Homemade

Because there is very little space on the panel the filament rheostat is fastened on

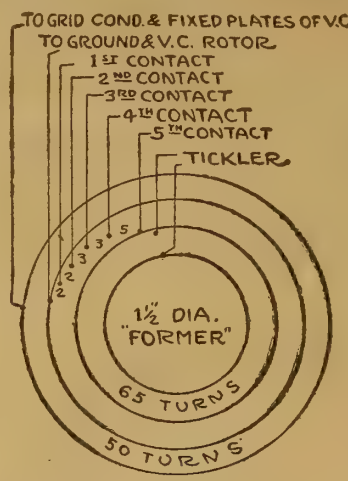

Figure 4

the left side of the case. There being none small enough on the market, the rheostat is made from a piece of ⅞-inch diameter hard rubber rod, ¼-inch thick, and grooved on its outer edge to take the resistance wire coil. The contact blade is ⅝-inch long and is turned by a ¾-inch knob and dial 1⅛-inch in diameter mounted in the center on the left side of the case as shown in Figure 1.

The peephole in the top of the case consists of a hard rubber ring, 1¼ inches in diameter, below which is fastened a circle of nickel plated screen.

Front Panel Assembles

The front view of the assembled panel is shown in Figure 1. The antenna switch is in the upper right corner of the panel, surrounded by five contact points. In describing the winding the contacts were referred to as first, second, third, etc. First means the contact nearest the top, while the fifth contact means the one farthest to the right.

The two lower left binding posts marked G and A are for ground and aerial respectively, while the two lower right binding posts equipped with phone tip clips are for the headset.

It is well to note here that the ground binding post and the aerial switch lever screws go through the screw holes in the Variadon, thus serving to fasten the latter to the front panel.

The four holes in the corners of the panel pass the brass machine screws fastened through the reinforcing blocks in the corners of the case, and small knurled knobs fasten to these screws to hold the panel and attached apparatus in the case.

This remarkable miniature regenerative set occupies an extremely small space and has excited great interest in Radiophan circles, not only on account of its size but because it has consistently received stations 800 miles away.

A meter is equal to 39.37 inches.

Special Sets Made to Order

Let us quote you on any circuit.
Sets made under expert supervision.
We repair sets and test tubes.
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TWO SUPERSENSITIVE CIRCUITS

(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3 90. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.

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RADIO CORPORATION OF AMERICA OPERATIVES use the L. D. R. Crystal as detector in conjunction with one or more stages of amplification. Satisfaction Guaranteed or money refunded.

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Radio Ed. Tribune Radio Laboratory, recently awarded a certificate of excellence to the L. D. R. Super-Crystal, stating—"The L. D. R. Super-Crystal is exceptionally sensitive and covered with many amplification spots. All that can be desired in a real good radio crystal that will last indefinitely."

FREE Crystal Amplification Hook-ups.
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For Better Results

VARIOCOUPLER

The Kellogg variocoupler is of the same standard design as our variometer, being made of molded Bakelite, with reinforced construction.

For increasing the wave length from 500 to 2,500 meters, the Kellogg standard wound induction is added to the variocoupler.

It is arranged for either panel or base mounting. No. 501 Variocoupler $9.00
With No. 502 Diamond Wound Coil, as shown in illustration.....$13.00

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Vernier Var. Condensers

COMPLETE WITH KNOB AND 3 IN. RUBBER DIAL

$5.00 Value 11 plate with 3 plate Vernier.....$2.00
5.50 Value 19 plate with 3 plate Vernier..... 2.15
6.50 Value 41 plate with 3 plate Vernier..... 2.50

Plain—		Plain—	
3 Plate	$0.75	23 Plate	$1.25
11 Plate	.98	43 Plate	1.50

Include 5c per item for parcel post.

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Cockaday Circuit
TUNER COILS

BC AND D COILS
Complete as per specifications

No. 18 Wire Used—D Coil Bankwound. Price, $2.75

Hook-up, directions and material list furnished free with each set of coils.

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SHEETS TUBES RODS

RADIO PANELS
POLISHED BLACK FINISH

CUT PERFECTLY SQUARE TO ANY SIZE

1/32"	THICK	1/2¢	PER SQ. INCH
1/16"	THICK	3/4¢	PER SQ. INCH
3/32"	THICK	1¢	PER SQ. INCH
1/8"	THICK	1 1/2¢	PER SQ. INCH
3/16"	THICK	2¢	PER SQ. INCH
1/4"	THICK	2 1/2¢	PER SQ. INCH
3/8"	THICK	4¢	PER SQ. INCH
1/2"	THICK	5 1/4¢	PER SQ. INCH

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ALL DETAILS FOR ASSEMBLY

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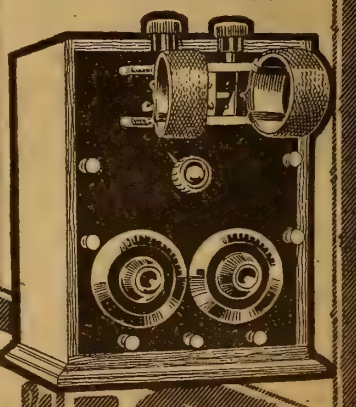

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The Week's Advance Broadcast Programs

Tuesday, June 19

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Three Dances from Henry VIII," Star Orchestra; "The Hills of Donegal," Archibald Munro, baritone; "Luna," Orchestra; Violin solo, Maestic Roth Selection from "June Love," Orchestra, "The Farmer's Pride," Archibald Munro; "Berceuse," Orchestra; "Hungarian Dance, No. 11," Maestic Roth; "Three for Jack," Archibald Munro; "Canzonetta," Orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert, Balsdon's Bon Ton Orchestra; 2:30-3:30 P. M., Musical matinee, Georgia Stark. 8:00-10:00 P. M., Concert, Southern California Saxophone Band.

KSD (Central, 546), 8:00 P. M., Program by Choir of St. Roch's Church

KYW (Central, Daylight Saving, 345), 8:00 P. M., Musical program, Laura E. Burlin, soprano; Lucille Manker, soprano; George Daubach, tenor; Cope Harvey's Orchestra; Sketch, "The Proposal" from "Taming of the Shrew," Rosary High School, River Forest, Ill.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Hotel Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theatre; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program; 4:30-6:00 P. M., Song recital; "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray; 8:30-9:30 P. M., Concert, Band from Ennis, Texas; 11:00-12:00 P. M., Musical program under auspices of W. A. Green Company.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Recital; 3:45 P. M., Song Recital; 6:30 P. M.-7:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; Safety talk, Stanley Cowman; 8:00 P. M., Boy Scout period, Boy Scout Radio Corps; 8:30 P. M., Musical program; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGY (Eastern, 380), 1:00 P. M., Music and address, "The Drama," Mrs. Ralph Jecklin, Schenectady Woman's Club; 7:35 P. M., Address, "Wasting Our Nitrogen," Bussell Suter, N. Y. State Conservation Commission; 7:45 P. M., Musical program, "Scherzo Caprice," WGY Instrumental Quartet; "Spartacus to the Gladiators," John N. Donovan, reader; "Un Giorno in Venezia," Alba," "Gondolieri," Quartet; "The Message of the Violet," LeRoy Pickett, baritone; "Canzone Amoroso," "Buona Notte" Quartet; "King Charles," LeRoy Pickett; "A Matter of Business," John N. Donovan; "Pastorale," Edward A. Rice, Leo Kluwen, violinists; "The Old Road," "For You Alone," "My Jeannie," LeRoy Pickett; "Intermezzo Al Fresco," Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Resta Trio, George C. Resta, piano; Mrs. Nicholas Bosler, Jr., violinist; Maurice Mennen, clarinetist; Fannie E. Stoll, violinist; Henry Hollwager, flutist; Evelyn Kaiser, pianist.

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Trio; Babson's Radio Release; Automobile road report.

WIP (Eastern, Daylight Saving, 509), 3:00-4:30 P. M., Artist recital; 6:00-6:45 P. M., Baseball scores and dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Musical program; 9:00 P. M., Song recital and short talk.

WLW (Central, Daylight Saving, 309), 10:00 P. M., Entertainment by Cincinnati Rotary Glee Club; Joseph Schenke, tenor.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Program by Axel Christensen, The "Rag-Time King"; Babson Report; Saxophone solos, Gardner J. Huff. 9:15 P. M., Program arranged by Mrs. Ruby Donaldson.

WMC (Central, 400), 8:30 P. M., Program arranged by Mrs. Garner Strickland; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 8:30 P. M., Concert, News Orchestra; Town Crier; Hudson Tschirhart, Japanese fiddler; Thelma Hull, pianist; Charles Marjanian, tenor.

Wednesday, June 20

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "In the Tavern," Star Orchestra; "Carnival of Venice," Estelle Fox, soprano; "The Bohemian Girl," Orchestra; "Sextette from Lucia," Robert Dixon, W. Woods; "The Ruins of Athens," Orchestra; "Carmen," Estelle Fox, soprano; "The Better Land," W. Woods, cornetist; Soprano solo, Estelle Fox; March from "Aida," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee; Talk, "Beauty, Health and Charm," Rae Victor; 8:00-10:00 P. M., Concert, Venice America Band.

KSD (Central, 546), 8:00 P. M., Recital, C. W. Williams; 8:45 P. M., Concert, Rotary Club of Independence, Kans.

KYW (Central, Daylight Saving, 345), 8:00 P. M., Musical program, Mrs. Marie Ort, soprano; Max Bogolub, violinist; Emma Starman, contralto; Rose Stein pianist; Georgios Coutrulis, baritone; Cope Harvey's Orchestra; Wendal W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, E. Clyde Whitlock's violin ensemble.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Musical program and short talks on fashion; 4:30-6:00 P. M., Song recital, "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00 P. M., Short talks and song recital; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Musical program, Melba Theater talent.

WFI (Eastern, Daylight Saving, 395), 3:00 P. M., Song recital; 3:45 P. M., Musical program; 7:00 P. M., Children's Own Half Hour, Cousin Sue.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Myrtle Stinger, soprano; Sarah Lee, pianist; Mrs. Betty Kanzinger, soprano; H. Archer Culmer, tenor; J. Henry Brady, guitar; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Musical selections; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Central, Daylight Saving, 309), 8:00 P. M., Musical program, Rosemary Ellerbrock; Children's play, "Little Boy Blue Bird," Students of Reulman School of Expression; William Stoess, violinist. Concert, "Spirit Flower," Richard Pavey, tenor; "Vision Fugitive," Herbert O. Schatz, baritone; "In the Dark, In the Dew," "I Long for You," Richard Pavey; "Forza del Destino," Richard Pavey, Herbert O. Schatz; William Stoess, violinist; "Give a Man a Horse He Can Ride," Herbert O. Schatz; "Recitella," Richard Pavey, tenor; William Stoess, violinist; "To You," "Requiem," Herbert O. Schatz; Duet from "Lily of Killarney," "The Moon Has Raised Her Lamp Above," Richard Pavey, Herbrt O. Schatz.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Stories, Georgene Faulkner; Musical program, Chicago Schools Committee; Eleanor Schweitzer, soprano; Mrs. Helene Uhlir, violinist; Helen Brown, pianist; 9:15 P. M., George J. Hill, Jr., baritone; Mrs. Louis Kohn, soprano.

WOC (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk; 8:00 P. M., Organ recital, Mrs. Frank W. Elliott; 10:00 P. M., Musical program, Talent from Burlington, Iowa.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon Music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Recital; 8:15-8:45 P. M., Musical program; 8:45 P. M., Dance music, Hotel Adelphia Orchestra, A. Candelori, director; 9:45 P. M., Song recital.

WWJ (Eastern, 517), 8:30 P. M., Concert, News Orchestra; Town Crier; Mrs. Violet Hunter, pianist; Genevieve Zeinner, soprano; Herbert Lamb, baritone.

Thursday, June 21

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Mirella," Star Orchestra; "O Flower of All the World," Amy W. Finden, Nelly Gill, sopranos; "Serenade for Strings," "Intermezzo," orchestra; "Tango," Harry Adaskin, violinist; "Ave Maria," Nelly Gill, Mannie Roth; "Air De Ballet," orchestra; Violin solo, Harry Adaskin; "Morning," Nelly Gill; "Extase," orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee, Eva Threw; 8:00-10:00 P. M., Program arranged by the Chamber of Commerce, Van Nuys, Calif.

KSD (Central, 546), 8:00 P. M., Broadcasting St. Louis Reception to President Harding and party.

KYW (Central, Daylight Saving, 345), 8:00 P. M., Musical program, Verona Langhammer, contralto; Frank Elliott, tenor; W. B. Freeman, reader; Edith Stone, pianist; 9:05 P. M., Reading, "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. J., Loyola University.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Lion Tamers Club Orchestra of Decatur.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical program; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Preparing for Opportunity," Judge Eugene B. Muse; 8:30-9:30 P. M., Entertainers from Oak Lawn Methodist Church; 11:00-12:00 P. M., Musical program under auspices of the Bush & Gerts Piano Co.

WFI (Eastern, Daylight Saving, 395), 3:00 P. M., Song recital; piano solo; 3:45 P. M., Short talk and song selections; 7:00 P. M., Short talks; 8:00 P. M., Musical program; 8:30 P. M., Song and piano recital.

WGY (Eastern, 380), 1:00 P. M., Music and address, "Mental Hygiene—Who is Mentally Defective?" Eleanor A. Gray, N. Y. State Dept. of Education; 7:45 P. M., Musical program, Catholic Churches of Albany, Prof. Joseph D. Brodeur, director; "Ecce Sacerdos," "Ave Verum," United Choirs; "Salve Regina," "Ave Maria," Lady of Angels Choir; "Adoramus te," "O Esca Viatorum," Cathedral Quartet; "O Bone Jesu," "Ingrediente," "Pueri Hebraeorum," "Panis Angelicus," Cathedral Choir; "Laudate Pueri," "Tu es Petrus," "Ave Verum," "Tantum Ergo," United Choirs.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Al Gorman's Orchestra; Sunday School lesson, T. A. Luman; Talk on Child Welfare, Mrs. Chas. Semple; Hazel McClennan, soprano; Miss Eichenberger, pianist; Mary E. Poore, violinist.

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Artist recital, 4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner music, and baseball scores; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talk; 9:00-9:30 P. M., Organ recital, Karl Bonawitz.

WLW (Central, Daylight Saving, 309), 10:00 P. M., Musical program, "Sonata in G Major," Marjory Garrigus, pianist; "Valse from Traviata," George Maier, flutist; "Arabesque," Marjory Garrigus; "Friend," "Fear Not Ye O Israel," Mrs. R. L. Flickinger; "Thy Beaming Eyes," "The Story of a Rose," Eugene Schmidt; "Valse," Marjory Garrigus; "Berceuse," "Hungarian Serenade," George Maier, flutist; "Micaela's Air" from "Carmen," Mrs. R. L. Flickinger; "Rose of My Heart," "Rose in the Bud," Eugene Schmidt.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Talk, Rockwell Stephens; "Chicago Scout Camps," C. A. Edson; John Wheeler, astrologist; 9:15 P. M., Evelyn Bostleman, soprano; B. Fred Wise, baritone.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4.45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 8:30 P. M., Concert, News Orchestra; Town Crier; Mr. Wray, tenor; Fred Walters, baritone; Detroit Lyric Trio; 11:00 P. M., News Orchestra; Fred Walters; Watson Saxophone Four.

Friday, June 22

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Selection from "Gypsy Love," Star Orchestra; "Nervana," Frederick Rogers, tenor; "Demoiselle Chic," "Laughing Eyes," Orchestra; Tenor solo, Frederick Rogers; "Rittornel," Jacques Stern, cellist; "Sleeping Beauty," Orchestra; Tenor solo, Frederick Rogers; "From the South," Orchestra.

KHJ (Pacific, 400), 8:00-10:00 P. M., Cantata, "The Holy City," Choir of Second Presbyterian Church, Los Angeles.

KSD (Central, 546), 8:00 P. M., Opera, "Prince of Pilsen," Municipal Theater.

KYW (Central, Daylight Saving, 345), 8:00 P. M., Musical program, Mabel Timms, soprano; Homer Caldington, baritone; Lewis Mechan, tenor; Bernice Solomon, pianist; Cope Harvey's Orchestra; Wendell W. Hall, KYW's Music Maker; 9:05 P. M., Book reviews, Llewellyn Jones.

WBAP (Central, 476), 9:30-10:30 P. M., Program furnished by Fort Worth Chamber of Commerce

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater, Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Short talks; 4:30-6:00 P. M., Musical program; "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00 P. M.-1:00 A. M., Short talks; One-act playlet; Musical selections; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Selections by the Morning Glory Club and special features.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Dr. Robert S. Hyer, Southern Methodist University; 8:30-9:30 P. M., Program by First Baptist Church, Denton, Texas.

WFI (Eastern, Daylight Saving, 395), 3:00 P. M., Song recital; 6:20 P. M., Final baseball scores; 7:00 P. M., Children's Own Half Hour, Cousin Sue.

WGY (Eastern, 380), 1:00 P. M., Music and talk, "Systematizing Housework;" 5:30 P. M., Children's program; 7:35 P. M., Talk, "The Child's Mental and Nervous Make-up," State Dept. of Health; 7:45 P. M., Radio drama, "The Great Divide," WGY Players; 10:30 P. M., Musical program, "Menuette all' antico," WGY Instrumental Quartet; "Absent," "Haymaking," Atlee K. Monty, soprano; "Caprice Vanity," Quartet; "Polka de Concert," Mary Welch, pianist; "Legende," Quartet; "De Scrumptious Wedding," Minnie Vines, reader; "Le Cor," "Dio Possente," Albert Cook, baritone; "Canzonetta," Quartet; "Voce di Primavera," "Mighty Lak a Rose," Helene Healy; "Serenata," Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Evelyn Campbell, soprano; William Fries, flutist; Thomas Simson, pianist; William Fries, baritone; J. O. Noble, violinist; Florence King, reader; J. D. Brecker, baritone; Geraldine McNeeley, pianist; Mary Louise Kubaugh, violinist; Craig Walker, reader.

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Dance program; 4:00-4:30 P. M., Artist recital; 6:00-6:45 P. M., Dinner music and baseball scores; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Stories, Jessie G. Van Cleeve; Musical lecture, Mrs. Marx E. Ebernorfer; 9:15 P. M., Concert, The Whitney Trio.

WMC (Central, 400), 8:30 P. M., Concert, Janssen Cafe Hawaiian Orchestra; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 P. M.,

(Continued on page 9.)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

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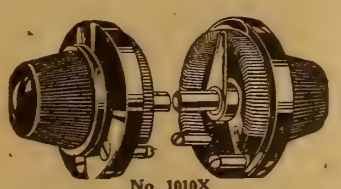

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AQ6, Canton, O. 425 meters. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.
AS6, San Antonio, Tex. 360 meters. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.
AV7, St. Paul, Minn. 400 meters. 500 mi. 6th Inf. Minn. Nat'l Guard, St. Paul Armory. Daily ex Sun, 2-2:30 pm, music, announcements. Tues, 8:30-10 pm. Thurs, 8:30-9:15 pm. Central.
BEI, Tacoma, Wash. 400 meters. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Thurs, Sun, 6-7 pm, music, announcements, lectures. Pacific.
CFAC, Calgary, Alta., Can. 430 meters. 1,000 mi. Western Radio Co., Ltd. (Calgary Daily Herald). Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 meters. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 6:45-7:20, 8:45 pm, concert. Eastern Daylight Saving.
CFCB, Vancouver, B. C., Can. 440 meters. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.
CFCE, Halifax, N. S., Can. 440 meters. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Monday, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. 400 meters. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.
CFCK, Edmonton, Alta., Can. 410 meters. Radio Supply Co. Daily ex Sun, 8-8:30 pm, music. Sun, 3:30-4:30 pm, Concert. Mountain.
CFCN, Calgary, Alta., Can. 275, 440 meters. 1,500 mi. W. W. Grant Radio Ltd. Slogan, "Voice of the Prairies." Mon, 9 pm, music. Fri, 10:30-12:30 pm, dance music. Sat, 10-12 pm. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.
CFCX, London, Ont., Can. The London Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Can. Marconi Co. No regular program.
CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Motreal, Que., Can.. B. L. Silver.
CHYC, Montreal, Que., Can. 410 meters. 1,500 mi. Northern Elec. Co. No regular schedule.
CHXC, Ottawa, Ont., Can. 450 meters. 50 mi. J. R. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.
CJBC, Montreal, Que., Can. 420 meters. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.
CJCA, Edmonton, Alta., Can. 450 meters. 1,000 mi. Edmonton Journal, Ltd. Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour. 8:30-9:30 pm, concert, reports. Mountain.
CJCB, Nelson, B. C., Can. 400 meters. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 meters. 200 mi. T. Eaton Co., No regular program.
CJCE, Vancouver, B. C., Can. 420 meters. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 meters. 75 mi. McLean, Holt & Co., Ltd. Daily, 8-9 pm, music, news, weather. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 meters. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
CJNC, Winnipeg, Man., Can. 400 meters. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm, Fri, 8-10. Alternate Sun, 8:30-10 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram. Licensed only.
CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily ex Sun, 2 pm, 3:30, weather, news, markets. 5-5:15, music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-10 concert, Sun 4-5:30 pm, music. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9 concert. Sun, 9 pm, sacred concert. Mountain.
CKCR, St. John, N. B., Can. 400 meters. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.
CKCO, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.
CKOC, Hamilton, Ont., Can. 410 meters. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 meters. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKY, Winnipeg, Man., Can. 450 meters. 500 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-1:30 pm, news, music; 1:45-2:00 pm, markets. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DD5, Denver, Colo. 360 meters. 1,500 mi. Fitzsimmons Gen. Hospital. Mon, Wed, Fri, 8-9 pm, music. Mountain.
DM4, San Antonio, Tex. 360 meters. 1,500 mi. U. S. Army, Kelly Field. No regular schedule.
DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDKA, E. Pittsburgh, Pa. 360 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. 270 meters. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 360 meters. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Pacific.
KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.
KDYM, San Diego, Calif. 252 meters. Savoy Theater.
KDYQ, Portland, Ore. 360 meters. 200 mi. Oregon Institute of Technology. Tues, 9-10 pm, educational lectures, music. Pacific.
KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.
KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Hughes & Co. Daily ex Sat, 7-7:30 pm. Mountain.
KDYX, Honolulu, T. H., Hawaii. 360 meters. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.
KDZB, Bakersfield, Calif. 360 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.
KDZE, Seattle, Wash. 360 meters. 500 mi. Seattle Radio Assn. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.
KDZF, Los Angeles, Calif. 278 meters. Automobile Club of Southern California.
KDZG, San Francisco, Calif. 360 meters. Cyrus Pierce & Co.
KDZI, Wenatchee, Wash. 360 meters. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.
KDZK, Reno, Nev. 360 meters. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal). Sun, 7-8 pm. Pacific.
KDZQ, Denver, Colo. 360 meters. Pyle & Nichols.
KDZR, Bellingham, Wash. 263 meters. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZT, Seattle, Wash. 360 meters. Seattle Radio Assn.
KFAD, Phoenix, Ariz. 360 meters. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock reports. Mountain.
KFAE, Pullman, Wash. 360 meters. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.
KFAF, Denver, Colo. 360 meters. 1,500 mi. Western Radio Corp. Slogan, "Voice from the Rockies—Out Where the West Is." Daily ex Wed and Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 360 meters. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Ida. 360 meters. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.
KFAP, Butte, Mont. 360 meters. Standard Pub. Co.
KFAQ, San Jose, Calif. 360 meters. City of San Jose.
KFAR, Hollywood, Calif. 360 meters. Studio Lighting Service Co.
KFAT, Eugene, Ore. 275 meters. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Pacific.
KFAU, Boise, Ida. 270 meters. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.
KFAV, Venice, Calif. 258 meters. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.
KFAW, Santa Ana, Calif. 360 meters. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.
KFAY, Medford, Ore. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.
KFBB, Havre, Mont. 360 meters. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, thedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.
KFDF, Casper, Wyo. 360 meters. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.
KFDH, Tucson, Ariz. 360 meters. 200 mi. Univ. of Ariz. Tues, Thurs, 7:30-8:30 pm, music, lecture, reports. Mountain.
KFDJ, Corvallis, Ore. 360 meters. Oregon Agri. College.
KFDL, Denver, Colo. 360 meters. Knight-Campbell Music Co.
KFDO, Bozeman, Mont. 360 meters. H. Everett Cutting.
KFDP, Des Moines, Iowa. 278 meters. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3-3:45 pm, reports, music. Mon, 9-11 pm, music.. Thurs, 9-11 pm, music, entertainment. Central.
KFDR, York, Neb. 360 meters. Bullock's.
KFDS, San Francisco, Calif. 360 meters. John D. McKee.
KFDU, Lincoln, Neb. 240 meters. Neb. Radio Elec. Co.
KFDV, Fayetteville, Ark. 360 meters. 300 mi. Gilbrech & Stinson. Slogan, "Southern Gateway to the Ozarks." No regular schedule. Central.
KFDX, Shreveport, La. 360 meters. First Baptist Church.
KFDY, Brookings, S. D. 360 meters. S. D. State College of Agri. & Mech. Arts. Mon, Sat, 8:30 pm, music. Tues, Thurs, 11 am, music, lectures, news. Central.
KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.
KFEB, Taft, Calif., 360 meters. 200 mi. City of Taft. Mon, Wed, Fri, 6:15-7 pm, music, news. Pacific.
KFEC, Portland, Ore. 360 meters. 25 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, weather, reports; 4-5 pm, music; 6:30 pm, markets, reports. Thurs, 9-10 pm, concert. Sat, 11 am 12 m, children's hour. Pacific.
KFEI, Tacoma, Wash. 360 meters. Guy Greason.
KFEL, Denver, Colo. 360 meters. Winner Radio Corp. Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4 pm, music. Mon, Fri, 9-10 pm, 12-1 am, concerts. Sun, 9-10 am, church services. Mountain.
KFEP, Denver, Colo. 240 meters. Radio Equipment Co.
KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.
KFER, Fort Dodge, Ia. 231 meters. Auto Electric Service Co.

Serially Continuously—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-fourth appearing this week, the second quarter to appear next week, and the third part the week following and the fourth will have the state, city and station index.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.
KFBC, San Diego, Calif. 278 meters. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.
KFBD, Hanford, Calif. 360 meters. 200 mi. Clarence V. Welch. Mon, Wed, 3-4 pm, 7:30-8:30, news, music, agriograms. Tues, Thurs, Sat, 6-7 pm, music. Fri, 3-4 pm, 9-10, news, music. Sun, 7-8 pm, church services. Pacific.
KFBE, San Luis Obispo, Calif. 360 meters. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.
KFBG, Tacoma, Wash. 360 meters. First Presbyterian Church.
KFBH, Marshfield, Ore. 360 meters. Thomas Musical Co.
KFBK, Sacramento, Calif. 283 meters. 300 mi. Kimball-Upson Co. Slogan, "Heart of California." Daily ex. Sun, 6-6:45 pm, concert, news, codes. Wed. 8-9:30 pm. concert. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.
KFBL, Everett, Wash. 224 meters. 50 mi. Leese Bros. Daily ex Sun, 7:15-8:15 pm. Sun, 2-3 pm. Eastern.
KFBS, Trinidad, Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. 360 meters. Bishop N. S. Thomas.
KFCB, Phoenix, Ariz. 360 meters. 500 mi. Nielsen Radio Supply Co. Mon, Wed, Fri, 8-9 pm, music. Tues, 8-10, sports. Mountain.
KFCD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.
KFCF, Walla Walla, Wash. 360 meters. Frank A. Moore.
KFCH, Billings, Mont. 360 meters, 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. 360 meters. Colorado Springs Radio Co.
KFCL, Los Angeles, Calif. 360 meters. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am, 12-12:30 pm, 4-4:30, 8-8:20, live stock reports. Pacific.
KFCM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Slogan, "Out Where the West Ends." Daily ex Sun, 1-2 pm, music. Tues, Fri, 8-9 pm, music. Pacific.
KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare.
KFCV, Houston, Tex. 360 meters. 300 mi. Fred Mahaffey, Jr. Daily ex Sun, Mon, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, entertainment. Central.
KFCY, Le Mars, Ia. 360 meters. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.
KFCZ, Omaha, Neb. 360 meters. Omaha Central H. S.
KFDA, Baker, Ore. 360 meters. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFDB, San Francisco, Calif. 509 meters. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures. concerts. Mon, Wed, Fri, 8-10 pm, concert. Sun, 7-7:30 pm, children's stories. Pacific.
KFDC, Spokane, Wash. 285 meters. 25 mi. E. B. Craney. Temporarily discontinued.
KFDD, Boise, Idaho. 360 meters. St. Michael's Ca-
KFEV, Douglas, Wyo. 263 meters. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.
KFEX, Minneapolis, Minn. 286 meters. 600 mi. Augsburg Seminary. Mon, Wed, Fri, 10:30 am, chapel. Tues, Sat, 5 pm, music. Sun, 9:15 pm, church services. Central.
KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.
KFEZ, St. Louis, Mo. 360 meters. American Society of Mech. Engrs.
KFFA, San Diego, Calif. 244 meters. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.
KFFB, Boise, Ida. 360 meters. 70 mi. Jenkins Furn. Co. (Owyhee Hotel). Daily, 8-9 pm, concert. Mountain.
KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.
KFFO, Hillsboro, Ore. 360 meters. Dr. E. H. Smith.
KFFP, Moberly, Mo. 275 meters. 300 mi. First Baptist Church. Slogan, "The Gospel Messenger of the Air." Sun, 10:45 am, 8 pm, church services. Central.
KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Marksheffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.
KFFR, Sparks, Nev. 360 meters. 50 mi. Jim Kirk. Daily ex Sat, Sun, 3:30-4 pm, entertainment. Mon, 10-11 pm, special. Pacific.
KFFV, Lamoni, Ia. 360 meters. Graceland College.
KFFX, Omaha, Nebr. 278 meters. 600 mi. The McCraw Co. Daily, 2:30-3:50 pm. Central.
KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.
KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes Amusement Co.
KFGB, Pueblo, Colo. 360 meters. Lowenthal Bros.
KFGC, Baton Rouge, La. 254 meters. Louisiana State University. No regular schedule.
KFGD, Chickasha, Okla. 360 meters. Chickasha Radio & Elec. Co.
KFGH, Stanford Univ., Calif. 360 meters. 500 mi Leland Stanford Junior University. No regular schedule.
KFGJ, St. Louis, Mo. 266 meters. National Guards Missouri.
KFGL, Arlington, Ore. 234 meters. Arlington Garage.
KFGP, Cheney, Kans. 229 meters. Cheney Radio Co.
KFGQ, Boone, Ia. 226 meters. Crary Hardware Co.
KFGV, Utica, Nebr. 224 meters. 50 mi. Heidbreder Radio Supply Co. No regular schedule.
KFGX, Orange, Tex. 250 meters. First Presbyterian Church. Sun, 11 am, 7:30 pm, church services. Central.
KFGY, Baudette, Minn. 224 meters. Gjelhaug's Radio Shop.
KFGZ, Berrien Springs, Mich. 268 meters. Emanuel Missionary College.
KFHA, Gunnison, Colo. 360 meters. Colorado State Normal School. "Where the Sun Shines Every Day." Daily ex Sun, 8:30 am, weather, markets. Tues, 7:30 pm, entertainment. Mountain.
KFHB, Hood River, Ore. 280 meters. P. L. Boardwell.
KFHD, St. Joseph, Mo. 226 meters. 50 mi. Utz Electric Co. Slogan, "Where the Mountains Meet the Sea." Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat, 8-9:30 pm, concert. Central.
KFHF, Shreveport, La. 266 meters. Central Christian Church.
KFHH, Neah Bay, Wash. 283 meters. Ambrose A. McChe.
KFHI, Wichita, Kans. 224 meters. Charles V. Dixon.
KFHJ, Santa Barbara, Calif. 360 meters. Fallon Company.
KFHL, Oskaloosa, Ia. 227 meters. Penn College.
KFHP, Kearney, Neb. 246 meters. Radio Bug Products Co.
KFHR, Seattle, Wash. 270 meters. Star Elec. & Radio Co.
KFI, Los Angeles, Calif. 469 meters. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 1-1:30 pm, 5-6 pm, 7-7:30 pm, 8-11 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.
KFIB, St. Louis, Mo. 244 meters. Franklin W. Jenkens.
KFIC, Denver, Colo. 224 meters. Phillip Laskowitz.
KFID, Iola, Kans. 246 meters. Ross Arbuckles Garage. Mon, Thurs, Sat, 7:30-8 pm. Central.
KFIF, Portland, Ore. 360 meters. Benson Tech. Student Body.
KFII, Platte, S. D. 236 meters. Sidney I. Thorean.
KFIK, Gladbrook, Iowa. 234 meters. Gladbrook Elec. Co.
KFIO, Spokane, Wash. 252 meters. North Central High School.
KFIQ, Yakima, Wash. 224 meters. 200 mi. Yakima Valley Broadcasting Assn. Slogan, "The Station That Will Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Fri, 8-9 pm, concert. Pacific.
KFJD, Greeley, Colo. 236 meters. Weld County Printing & Pub. Co.
KFKH, Lakeside, Colo. 226 meters. Denver Park Amusement Co.
KFZ, Spokane, Wash. 283 meters. 300 mi. Doerr-Mitchell Elec. Co. Slogan, "In the Heart of the Inland Empire." Tues, Fri, 7:30-9 pm, music. Sun, 6-7 pm. Pacific.
KGB, Tacoma, Wash. 360 meters. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.
KGG, Portland, Ore. 360 meters. 500 mi. Hallock & Watson Radio Service. Slogan, "The Rose City." Daily ex Sun, 5-6 pm, music, entertainment 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.
KGN, Portland, Ore. 360 meters. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 360 meters. 300 mi. Altadena Radio Lab. No regular schedule.
KGU, Honolulu, Hawaii. 360 meters. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 492 meters. 1,500 mi. Oregonian Pub. Co. Slogan, "KGW, Keep Growing Wiser." Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30 pm, weather. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 7-7:30 pm, lecture; 11-12 pm, Hoot Owls. Sun, 7-8 pm, concert. Pacific.
KGY, Lacey, Wash. 258 meters. 250 mi. St. Martins College. Slogan, "Out Where the Cedars Meet the Sea." Tues, Fri, Sun, 8:30-9:30 pm, news, concert, lecture, bedtime story. Pacific.
KHJ, Los Angeles, Calif. 395 meters. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific.
KHQ, Seattle, Wash. 360 meters. Louis Wasmer.
KJJ, Sunnyvale, Calif. 360 meters. 500 mi. Radio Shop. Tues, 8:15-9 pm. Fri, 7:30-8:15 pm. Pacific.
KJQ, Stockton, Calif. 360 meters. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.
KJR, Seattle, Wash. 270 meters. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.
KJS, Los Angeles, Calif. 360 meters. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30 pm, 6-6:45, 8-9, church services. Pacific.
KLN, Del Monte, Calif. 231 meters. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Tues, Fri, 7-7:30 pm, 8-8:30, concert. Pacific.
KLS, Oakland, Calif. 360 meters. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm. Sun, 12-1 pm. Pacific.
KLX, Oakland, Calif. 360 meters. 500 mi. Oakland Tribune. Daily ex Sun, 3:15-5:15 pm, sports; 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.
KLZ, Denver, Colo. 360 meters. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.
KMJ, Fresno, Calif. 360 meters. 300 mi. San Joaquin Lt. & Pr. Corp. Tues, Fri, 8-9 pm, music. Sun, 5-6 pm, music. Pacific.
KMO, Tacoma, Wash. 360 meters. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7 pm, 9:15-10, concert, news, lecture. Pacific.
KNI, Eureka, Calif. 360 meters. T. W. Smith.
KNN, Los Angeles, Calif. 360 meters. 100 mi. Bullock's. Temporarily discontinued.
KNT, Aberdeen, Wash. 263 meters. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert. Pacific.
KNV, Los Angeles, Calif. 360 meters. Radio Supply Co.
KNX, Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.
KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.
KOP, Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.
KPO, San Francisco, Calif. 423 meters. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 4:30-5:15 pm, music. Tues, Thurs, Sat, 8-10 pm, concert, lectures. Sun, 11-12:30 pm, church services. Pacific.
KQI, Berkeley, Calif. 360 meters. Univ. of Calif.
KQP, Hood River, Ore. 360 meters. Apple City Radio Club. Slogan, "Apple City of the West." Daily ex Sat, Sun, 6 pm, news. Mon, Wed, Fri, 6:30 pm, music. Wed. 9 pm, special. Pacific.
KQV, Pittsburgh, Pa. 360 meters. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.
KQW, San Jose, Calif. 360 meters. 500 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.
KRE, Berkeley, Calif. 360 meters. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.
KSD, St. Louis, Mo. 546 meters. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Mon, Fri, 11:30 pm, concerts. Central.
KSL, San Francisco, Calif. 360 meters. 50 mi. The Emporium. Temporarily discontinued.
KSS, Long Beach, Calif. 229 meters. Prest & Dean Radio Co. No regular schedule.
KTW, Seattle, Wash. 360 meters. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.
KUO, San Francisco, Calif. 360 meters. 1,500 mi. San Francisco Examiner. Slogan, "The Voice of the West." Daily ex Sun, 9-10 am, concert, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 m, 6:45 pm, weather reports. Sun, 9-10 am, 5-6 pm, news. Pacific.
KUS, Los Angeles, Calif. 360 meters. 300 mi. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am. setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

(NOTE—The second part of the station schedule list will appear next week.)

ADVANCE PROGRAMS

(Continued from page 7)

Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital Mary E. Vogt; 7:45-9:00 P. M., Concert, WOO Orchestra, Robert E. Golden, director; 9:00 P. M., Organ recital Mary E. Vogt.

WWJ (Eastern, 517), 8:30 P. M., Concert, News Orchestra; Town Crier, William M. Schumaker, tenor; C. Bruce Myers, baritone; Mrs. Eva Devilleger, soprano.

Saturday, June 23

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program. Selection from "H. M. S. Pinafore," Star Orchestra, Ernest Morgan, baritone; "Valse Bluette," Orchestra, "Until the Dawn," W. Woods, cornetist; Ernest Morgan, baritone; "Peer Gynt," Orchestra; "Nocturne in E Flat," Harry Adaskin, violinist; Ernest Morgan, baritone; "Mignonette," "Russian Serenade," Orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Musical matinee, Rougue's Southland Serenaders; 8:00-10:00 P. M., Concert, Isabelle Block's Hawaiian Quartet.

KYW (Central, Daylight Saving, 345), 8:58 P. M., Musical program, courtesy of W. W. Kimball Co.; Cope Harvey's Orchestra, 9:25 P. M., "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 476), 7:00-7:30 P. M., Bible Class, Mrs. W. F. Harnum.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Arcadia Cafe Orchestra; "Affairs of the Heart," Betsy Logan; 4:30-6:00 P. M., Dinner music, Ugo Savino's Orchestra from Cafe LaRiviere; 7:30 P. M.-8:00 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Concert, Studio Orchestra, Mrs. L. Dillard Estes, School of Music, East Texas State Teachers' College, Commerce, Texas; 11:00-12:00 P. M., Recital, Paul Van Katwijk, Southern Methodist University.

WFI (Eastern, Daylight Saving, 395), 3:00 P. M., Musical program; 4:00 P. M., Recital; 6:30 P. M., Final baseball scores; 7:00 P. M., Safety talk, Stanley Cowman; 8:00 P. M., Short talks; 8:15 P. M., Song recital and musical program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist; 7:30-9:00 P. M., Concert, Louisville Gymnastic Ass'n Players; Dorothy Watson, soprano; Mildred Kirk, contralto; Leo J. Sandman, tenor; Edward Watson, Jr., baritone; Helen Scholl, soprano; Lucy Elliott, reader; Maurice Garefin, baritone.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Dance program; 6:00-6:45 P. M., Dinner music and baseball scores; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:20-9:00 P. M., musical program; 10:10 P. M., Dance music, Charlie Kerr's Orchestra.

C. C. Hall; 5:45 P. M., Chimes concert; 9:30-10:00

WMO (Central, 400), 8:30 P. M., Concert, Aeolian Talk, Paul Rader; Music from The Chicago Tabernacle; 9:15 P. M., Concert, The Lester Quartet.

WMC (Central, 400), 8:30 P. M., Concert, Aeolian Mandolin Sextette, R. L. Sharp, director.

WOC (Central, 484), 3:30 P. M., Educational talk. C. C. Hall; 5:45 P. M., Chimes concert; 9:30-10:00 P. M., Dance program, P. S. C. Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

Sunday, June 24

WBAP (Central, 476), 11:00-12:15 P. M., Church services. First Methodist Church, Rev. J. W. Bergin, pastor.

WDAR (Eastern, Daylight Saving, 395), 1:00 P. M., Organ recital from Stanley Theater.

WFAA (Central, 476), 2:30-3:30 P. M., Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; 9:30-10:00 P. M., Choristers from Ervay Street Baptist Church; 10:00-11:00 P. M., Concert, Ashley's Kidd Springs Orchestra.

WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Chapel services; 7:30 P. M., Services, Arch Street Presbyterian Church, Dr. Edward Macartney, minister; Alton K. Dougherty, organist; 9:30 P. M., Organ recital.

WGY (Eastern, 380), 10:00 A. M., Church services, State Street Presbyterian Church, Schenectady; Sermon, "The Meaning of Courage," Rev. P. A. Macdonald; 6:30 P. M., Thistle Day Celebration, Scottish Societies of N. Y.; Sermon, "Thistle Day and the Place of the Scotch in History," Rev. P. A. Macdonald.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church services under auspices of the Methodist Temple; Rev. Dr. Chas. A. Humphrey, pastor; 4:00-5:00 P. M., Concert under auspices of Carolyn Pell.

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Orchestra.

WIP (Eastern, Daylight Saving, 509), 11:00 A. M., Church services from Holy Trinity Chapel; Organ recital, Ernest Felix Potter.

WMC (Central, 400), 11:00 A. M., Church services, St. Mary's Episcopal Cathedral; 3:30 P. M., Memphis-Little Rock baseball game.

Monday, June 25

WBAP (Central, 475), 9:30-10:30 P. M., Concert, Ramblers Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater; Dinner music, Arcadia Cafe Orchestra; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical program; "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00 P. M.-1:00 A. M., Short talks; Song recital; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Musical program by Philadelphia artists; 4:35 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00-7:30 P. M., Children's Own Half Hour, Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Minstrel program, General Elec. Co., Pittsfield; "Old Black Joe," "Fare Thee Well," "Dixie," "Sailing," Minstrels; "Wonderland of Dreams," Otto Heidel; Minstrel humor; "What's the Matter with the Mail," Clarence Rhoades; "Kentucky Babe," "There Little Girl, Don't Cry," Quartet; Minstrel humor; "Georgia Cabin Door," Thomas Mead, baritone; Poetry, Harry Finch; "Beat It While Your Shoes Are Good," Ernest Beron; Darky monologue, Frank Warren; "Old Kentucky Home," Minstrel.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Clifford Gorman, organist.

WIP (Eastern, Daylight Saving, 509), 11:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Artist recital; 6:00-6:45 P. M., Dinner music; Baseball scores; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Central, Daylight Saving, 309), 8:00 P. M., Concert, "Hilo Bay," "Old Fashioned Days," "Somebody Else," Roger Hill Dance Orchestra; Walter Phillips, baritone; "Gypsy Lady," "Japanese Lullaby," "Please Don't Talk About Me When I'm Gone," Orchestra, Walter Phillips Orchestra, S. A. I. Trio; Songs, Elanore W. Mackay, "Souvenir," "Guitarrero," Lucy R. McKeever, violinist; S. A. I. Trio.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Gayoso Orchestra, Gasper Pappalardo, director.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Concert, John Wanamaker Commercial Institute Band, Arthur A. Rosander, director; 9:15 P. M., Organ recital, Mary E. Vogt.

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SPECIAL OFFER LIST

(Continued from page 2)

tance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser, Premier No. 250 Variable Resistance, panel mounting.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A).

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

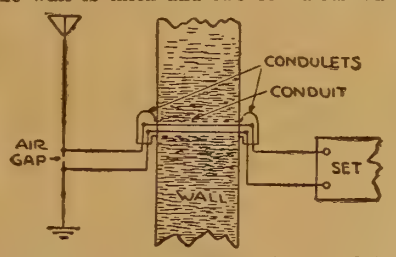
For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Decima Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 2 Ratio.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Decima 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio, Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B.

Novel Lead-In Insulator

A piece of conduit ¾-inch longer than the wall is thick and two condulets make



a very neat and efficient lead-in insulator. The diagram is self-explanatory.—Lloyd Johnson, Liberty, Ind.

There are nights rare in winter, and common in the summer, when it is impossible to bring in distant stations. This is due to atmospheric conditions beyond control. This condition should be met philosophically as something that cannot be avoided, and not used as the basis of a complaint to the Radio dealer who sold you your set.

For Perfect Reception

You Must Use

AMSCO

Vernier Condensers

They satisfy the most exacting. Perfect spacing, permanent adjustment—finished in white nickel.

13 plate	$5.50
23 plate	6.00
43 plate	6.50

At All Good Dealers

AMSCO PRODUCTS, INC.

Broome & Lafayette Sts., New York City

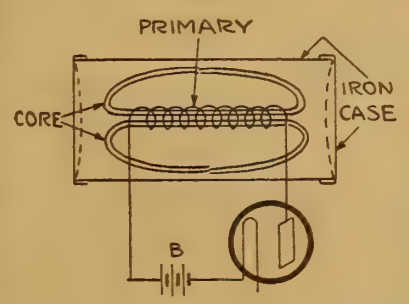
The Reader's View

Talking Transformers

I have just read in the Digest for May 12 an article by a fan who, while presumably sane and sober, heard voices coming out of his box without the use of phones. If he is an ordinarily cautious man, he wrote you anonymously, or under the non de plume "Munchausen" to avert a visit from a Volstead squad or a lunacy commission; yet I'm perfectly ready to believe every word of his tale, for I, too, can pull the plug out of my Flewelling set and she goes right on talking. Don't shoot! I'll come down! The explanation, as I have doped it out, is ridiculously simple and obvious when you think of it.

As surmised by the other fan, credit for the performance is due to an AF transformer, and I'll bet my last dollar (which is the only one the Radio dealers have left me) he has the same type of transformer as I, as only one kind will act in this manner.

This transformer is simply an enclosed type, with a figure 8 core, the shield being of iron in the shape of a cylinder. The whole affair looks like a black tin can about 2 inches in diameter and 3 inches long. Roughly sketched, its cross-section is like the one shown in the illustration.



You get it now, don't you? The plate current simply magnetizes the core, which attracts and vibrates the circular ends of the case, or drum. These ends thus become, in effect, diaphragms and the transformer simply a double-end telephone.

My fellow-lunatic will find that, in all probability, this transformer couples his first and second stages, as the current from the detector tube is probably not powerful enough to vibrate these stiff disks audibly. He will also find that turning on the rheostat of the second stage will make the transformer "shut up," as this closes the secondary circuit in the transformer, allowing a current to be induced therein in the opposite direction from that passing through the primary coil, thus neutralizing the magnetizing effect of the primary on the core.

Thus, a "loud speaking transformer" could be easily constructed, but the secondary would be useless; that is, the "doodad" could not be used as a loud speaker and a transformer at the same time.

So you see this fan and I simply have a very inefficient built in telephone—inefficient because it was not designed for that purpose and the stiff case-ends work as diaphragms merely through what might be called coincidence.—L. B. Godbey, St. Louis, Mo.

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BOX 21

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Complete parts for Regenerative Receiver. We hear Havana, Cuba, regularly on this receiver. It consists of the following standard parts: 1 180° variocoupler, 1 23-plate variable condenser, 1 Howard socket, 1 Klosner vernier rheostat, 1 Fada switch lever, 14 switch points, 2 switch stops, 8 binding posts, 1 7"x9" bakelite panel, 1 mahogany cabinet, 2 3" dials, copper shield for panel, bus wire, tube Solderall, and connecting diagram. $12.85

Mailed Postpaid for .....

Above outfit completely assembled and ready to "listen in." $17.95

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List Price	Miscellaneous	Our Price
$ 9.00	Cunningham 301A Tube (¼ amp.)	$ 5.70
9.00	U. V. 201A Tube (¼ amp.)	5.75
6.50	U. V. 199 Tube (⅛ amp.)	5.90
6.50	W. D. 11 Tube (¼ amp.)	5.75
6.50	W. D. 12 Tube (¼ amp.)	5.85
205.00	Radiola V with Extra Radio Frq. Panel	$149.50
145.00	Colin B. Kennedy Set	119.50
45.00	MAGNAVOX R3	$24.95
22.50	Bristol Audiophone, Jr.	16.95
35.00	Timmons Loud Speaker	24.45
	"B" Batteries. Never over 5 days old.	
1.75	Eveready 22½ Volt No. 763	.95
3.00	Eveready 22½ Volt No. 766	2.10
5.50	Eveready 45 Volt No. 767	3.95
3.50	Lightning Switch	1.95
5.00	Variocoupler, Queen, 180° bakelite, green silk wound	2.00

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254 W. Stiegel Street Manheim, Pa.

FLEWELLING ANSWERS

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Variable Condenser Too Large

(Submitted by T. Z., Jersey City, N. J.)

Question.—My Flewelling set is very selective and pretty loud, but I do not get the steady high pitched whistle when I have tuned in a station because I have to turn down the filament to reduce the whistle in order to bring in the station. Would the 43-plate variable condenser that I am using have any effect on this?

Answer.—Using a 43-plate condenser usually means utter failure with the Flewelling set, because the set tunes so sharply that one is unable to handle such a large sized condenser. Note also that the value given for the coils is such that maximum results are secured by the use of the smaller condensers such as a 7 to 11-plate. If only the values that have been given in the various articles are used, you will find that the rheostat is only useful to turn the filament off or on, and does not in any way aid in tuning. Change your condenser to a smaller one, turn your tube on full, and you will see that the whistle will stay even after the station is tuned in.

Directional Characteristics

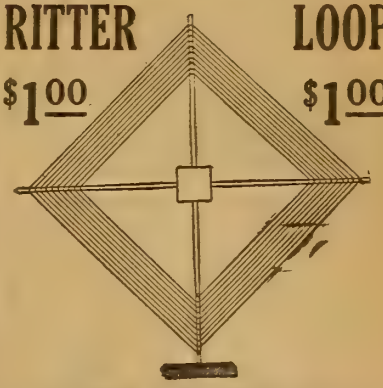
When an inverted L-type antenna is used at a transmitting station and it is desired to radiate the greatest amount of energy in the direction of a particular station, the end at which the lead-in is connected is pointed in the direction of the station with which it is desired to communicate. The reason for this arrangement is that electromagnetic waves radiate more strongly from this end, thus providing directional characteristics which may be used to advantage.

Get a License First

In order to operate a transmitting station, two licenses must be obtained—an operators' license and a station license. The operator must be able to transmit and receive at least ten words a minute, each word consisting of five letters or characters. He must also comply with certain regulations detailed in the pamphlet issued by the United States Government entitled "Radio Communication Laws of the United States."

RITTER LOOP

$1.00 $1.00



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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
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58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, June 23, 1923 No. 11

OUR vacation, wherever spent, offers a host of Radio possibilities. The man in the cool, northern wilderness, the person sojourning at any one of the small lake resorts, the individual who prefers to rest in the country; in fact, all are realizing the full service which their small receiving set can furnish. News, baseball scores, market reports, music, invisible drama, and the multitude of innovations already made possible by the thoughtfulness of studio directors, are all there for the tuning. With fifty super stations keeping the various sections of the country well supplied with broadcast service, it is indeed a poor set that cannot tune in several plants. Again, a set which can reach only one hundred miles out from a city home, is almost sure to do much better than that when installed in a small country town, out on a farm, at seaside, or in the mountains.

AUTOMOBILE tours have had a great revival in interest since it has been demonstrated that one can keep in touch with the world by Radio, even while speeding along. The popularity of the passenger car has hardly had a slump, but the fact remains that the receiving of broadcasting stations en tour has added a new thrill to the jaded similarity of swallowing the unlaid dust of the car just ahead. An aerial around the top of the car, a loop, or even a hastily erected single wire to some nearby tree, plus a compact portable set equipped with dry cell tubes, make an unbeatable combination to fill in the leisure moments when the tourist has just about had his fill of holding the car on the road and wishes to rest. Then, too, the storage battery equipment of the average machine makes it very simple to use one's regular set with the larger tubes.

CAMPING out is a time-honored sport. From the time of the tribes of Israel, and thousands of years before that, the tent has been a shelter accepted by all. Thus we find many lovers of the great outdoors breaking away from the daily routine and making their home in a camp under the canvas spread of a tent where they can hear the bombardment of the rain pitter-patter and the call of the night birds. But add the marvel of the twentieth century to the scene. Easily erected, operated and maintained, a camper's portable set provides that contact and cheer of the busy world, but in the isolation of the wilderness. The tenderfoot may find camping boresome at times, but Radio will give him the entertainment and news, the lack of which is troubling him. Certainly, your vacation will be with Radio. Why not?

RADIO INDI-GEST

FIRST WALLA WALLA PROGRAM

(Continued from where we were interrupted last week.)

for this suspicious occasion.

Article C.—Bambdin Bray, chief head official announcer not emeritus will announce. After announcing all that he has to announce he will not announce any more until there's something more to announce. At present there is nothing to announce except that he will announce. (P.S.—Bambdin Bray, chief head official announcer, uses deaf and dumb sign language in all his announcing when he announces.)

Mr. Wattle Knees, musical director, walking south

Article D.—(Four and one-third coupons and a plugged jitney.) The first act to be broadcast. Le Moqueur and Ellis Broaklewse will terpsichore a synthetic dance before the microphone. (Listen in for this. It's gonna be good.)

Article E.—Community Chorus. All listeners in will sing to the direction of Mr. Wattle Knees, Indigest's ultraordinary musical director. Wattle Knees will direct before the microphone with a muffled baton so that no noises will be made to destroy the great vast multitude of noises of our listeners in.

Article F.—Soft shoes dance by Polly W. and Rita M. Silent hobnail army shoes have been ordered from the U. S. Steal Corp. for this momentous moment.

Bambdin Bray head announcer, and bouncer

Article G.—Motion Picture, "Why Wallow in Walla Walla?" Scenario by Alogonquin Tonsils III; Filmed by Spider Webb; Misdirected by Lillian G.

Article H.—A trip through the Walla Walla Museum. A portable microphone will be carried throughout the entire length of this venerable hall so that all exhibits may be heard.

Article I.—Collection taking for $000,000,000,000.19 to help pay off the victors in the Stebbins Degenerative Set Contest.

Article J.—None has been set inasmuch as this is the finale. All artists will gather before the microphone to smile and bow for the listeners in after which the antenna will be lowered by Mike and Izzy.

In Quest of the Kanoofis

Part II—In Italy

For days they searched the forests, no Kanoofis could be found. *(Misery, don't pester me.)*
They hunted high and low for it, all over the ground. *(Simply no luck.)*
"It can't be here," said one of them, "Let's pack our things and go." *(Merrily we roll along.)*
"Where to? Ah, that's the question." Another said, "I know *(Wise guy.)*
"We'll go to sunny Italy, where the wild spaghetties grow. *(Oh, Marie, my Marie.)*
"And the hot Tomale bushes are blooming in a row. *(Prettty flowers.)*
"You're on!" they all exclaimed at once, "We're going to a clime. *(Isn't it warm to-day?)*
"Where senoritas smoke and dance and drink Italian wine." *(Burn my clothes.)*
They journied to a little town, GARLICO was its name. *(Hamburger.)*
An old Italian stronghold which through smell had won its fame. *(Lillies of the alley.)*
And here they met Marcroni, a duke of great renown, *(Very episetic.)*
Who told them that he knew where a Kanoofis could be found. *(Smart feller.)*
He said there was an island in the ocean far away. *(And she wore a yellow ribbon.)*
The name of it and where it was, he did not care to say, *(Oh, do tell.)*
But he told us when the wind blew West, and the ether waves rolled high, *(Heave to, me lads.)*
To look for it with all our might, and we'd find it bye and bye. *(Mama go bye-bye, too?)*
We told him that he was a prince, although he claimed not such, *(Not he.)*
And mentioned he had helped us out in general, much too much. *(Big hearted.)*
Then we left GARLICO, bound for Egypt, valley of the kings. *(Tut, tut.)*
Now get the next installment and we'll tell you startling things. *(Gee, I'm gonna get it, too.)*

—ROZEE.

(Cheer up, only two more parts.)

Mike Rofarad Sez It's a Tight Squeeze

Dear Mr. Gest: I have frequently heard mention of real, dyed-in-the-wool Radioknuts, and some of them are interesting specimens, but have you heard anything to beat this? I have a girl friend who is such a confirmed Radioknut that she refers to her Gossard as her "Variable condenser"! Yours disrespectfully, ELLIS BROAKLEWSE

A-B-C Lessons for Indigest Beginners

Chapter I—The Antenna Does Which?

BY GOSH

A IS for antenna
Put up to bring in sound,
Sometimes it brings in lightning.
Through your set, down to the ground.

Indigest Plant Mustava Call!

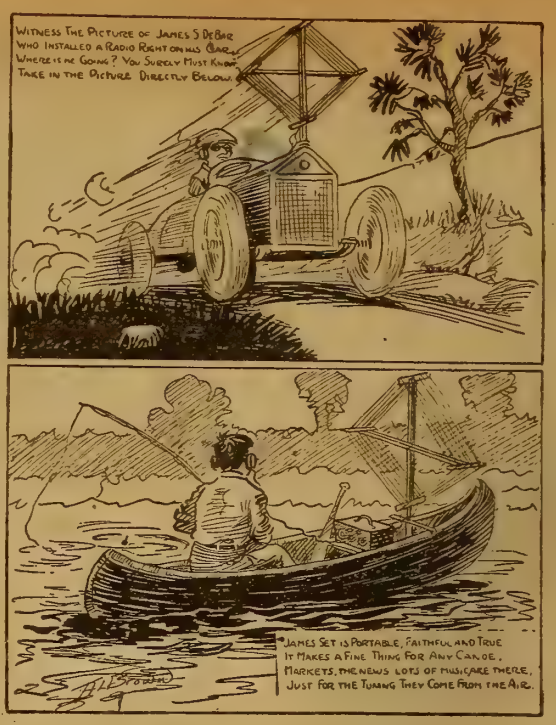
The Walla Walla government has the whole alphabet to choose station calls from as no stations have been assigned calls there up to date. When Indigest established its station on this tropical isle the head gazunkus of the political ring said, "Indi, my most valuable counsel, you can choose any call you please for your station."—Now we put it up to you!

Indigest is going to call on its readers to contribute a name for our plant. Send in your suggestions at once and we are going to pick the best one and award one genuine brass, beveled edge, round switch point to the one who sends in the winner. The picture of this marvelous and magnanimously inspired prize will appear next week. Watch for it!

Asleep here is Tom
McAlaster Geyre.
He put up an antenna
And tried to walk wire.

Looking Ahead

In Next Week's Issue of Indigest Anticipate Nothing



Condensed

By DIELECTRIC

The owners of Station CFCN have launched into the business of manufacturing broadcasting sets and have already sold sets for use in Canada, Mexico and South America. Their programs are heard at considerable distances from Calgary and the W. W. Grant Radio, Ltd., is pretty well known in all parts of this country. Soon these Radiophone broadcasters will be talking back to the maker in Spanish.

When President Harding starts out on his trip across country he will have at hand a very powerful set installed in his private car. This is the first time that a broadcasting set of such power has been used on a railway train. It will also mark an epoch in the speechmaking of a head of this nation. Never before has it been possible for the rest of us to hear presidential addresses when hundreds of miles away, but now we may follow him as he speeds across the land stopping to speak at various towns enroute. Radio does it!

Radio control of the movements of ships has been tried with success on more than one occasion; a notable instance of this was the sinking of the Battleship Iowa off Panama Bay. There was no one on board as the ship was directed to the right or left in giving practice to the American gunners in hitting vessels under steam. More recently the French have tested the use of Radio in directing an airplane under similar conditions—pilotless. From the take-off to landing each move of the plane was actuated by Radio-control devices. It may be found practicable to substitute this medium in many lines now dependent solely on the presence of men.

Mississippi has resisted the impulse to join her sister states in the modern method of addressing the world until now. The first station to be licensed is the University of Mississippi, which has decided on programs of college songs and orchestra music. No doubt the alumni of this institution will be pleased to hear from their alma mater, but I am expecting to learn of educational features in the fall that will appeal to hundreds besides.

Not long ago Station WOR had rather an unique feature on its program when Bebe Daniels was interviewed by David A. Balch, editor of Movie Weekly. Miss Daniels was warned that not only Radiophans all over this country would hear her replies to his questions, but that the young lady with pad and pencil in the studio would take down every word to be given later to the readers of his paper. Judging from her answers she had prepared herself for the ordeal and made some pretty good "shots" in reply.

We are coming more and more to realize how very necessary Radio is to obtain a large hearing on any subject at any one time. In a case of distress, such as that recently in Colorado, Texas, an appeal may be made to folks in every state in the Union from a broadcasting station and quickly benefit thereby. A cyclone having struck this Texas town leaving much suffering in its wake, WBAP was asked to broadcast an appeal for funds. They poured in.

Preaching in churches with empty pulpits is becoming a thing of usual occurrence. Folks sit in their regular pews, sing, join in prayer and listen to sermons with no preacher anywhere in sight. When a church in Birmingham, Ala., found themselves without a preacher for the evening service they just made use of the pastor of another church in the city whose message was being broadcast. Another small church in New Jersey used a loudspeaker to fill their pulpit at short notice and it did well for the entire service of a church in New York city was brought to the congregation.

First Steps for Beginners in Radio

Chapter VI—About Crystal Detectors

By Thomas W. Benson, A. M. I. R. E.

FOR several years in the earlier stages of Radio and before the development of broadcasting stations most Radio reception was accomplished with crystal detectors. Although they are scoffed at today for long range work very remarkable records were hung up in other days. Perhaps this was due to the fact that one had to use a crystal and for that reason coaxed the most out of it. Even today it stands superior to the tube for clearness and freedom from noise as one can testify after listening to a reflex set using a crystal detector.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The articles yet to appear are:

Chapter VII—Tube Detector Theory and Operation.
Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

Crystal Detector Action

Just how the crystal detector functions is still a matter for debate but the prevailing theory is that of rectification. The currents induced in the receiving apparatus, are, as we have learned previously, of extremely high frequency. At 400 meters the current has a frequency of 750,000 cycles. If this current was made to act on the diaphragm of a telephone receiver it would vibrate back and forth that many times per second. The human ear, however, cannot respond to frequencies above 18,000 to 20,000 vibrations per second, so these high vibrations would not be heard.

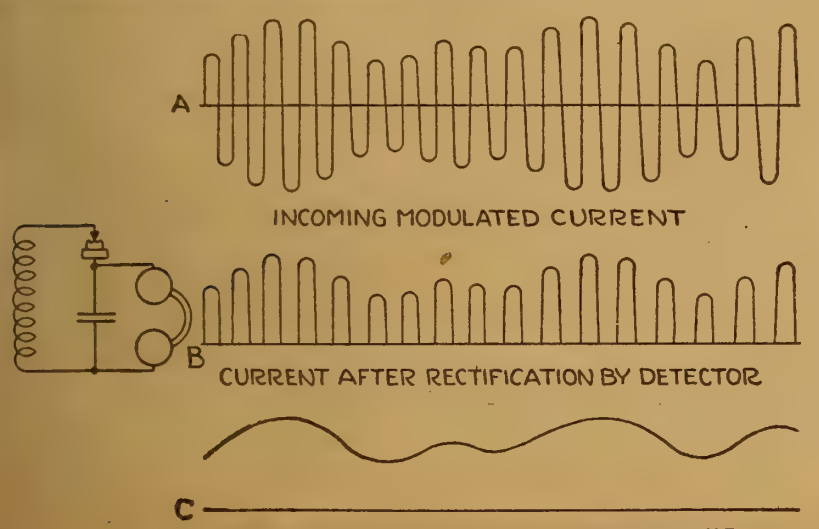


Figure 27—Showing Action of Detector in Radio Receiving Circuit

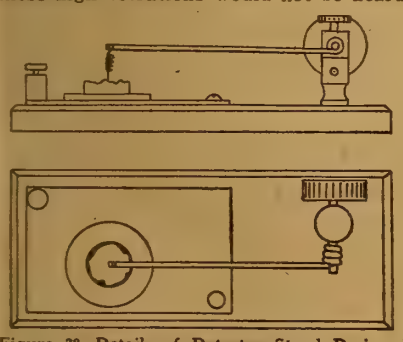


Figure 28—Details of Detector Stand Designed for Use with Galena

A crystal detector connected into the circuit acts to rectify the current, that is, allows the current to flow in only one direction and retards or prevents it from flowing the other half of the cycle.

This may be better understood from Figure 27. At A we have the current induced in the detector circuit showing the modulation of the waves by the microphone at the transmitter. At B is shown the same current after being rectified, that is, with the lower halves of the cycles cut off. The current is now direct but is pulsating, that is, flows in jerks. The effect of this current is to charge the condenser connected across the phones and the potential of the condenser will vary as the amplitude of the current waves. Thus the voltage of the condenser is shown at C and the changes in voltage represented by the curve cause a movement of the telephone diaphragm in synchronism with the music or words striking the microphone at the sending station.

Materials for the Detector

Many substances have been used for detecting purposes with more or less success and each day sees the birth of some new substance or an old one in a new dress. The two most popular minerals that have been found the most sensitive are galena and iron pyrites. Galena is a natural sulphide of lead, its crystals being cubical in form, having a bright metallic lustre and can be readily split up into regular cubes. Iron pyrites is also a natural ore known sometimes as "Fool's Gold" from its yellowish sheen. It is of a bronze-yellow color and fractures very unevenly when split.

For Radio work a good piece of galena is superior to iron pyrites but a good piece is rare and to be treasured. Galena is very sensitive to heat and its detecting properties are ofttimes completely destroyed by the heating incurred during its mounting in metal. For that reason the crystal should be obtained loose and held in the cup with a set screw in preference to being set in molten metal.

Holder for Crystal

The type of stand used with galena should be fitted with a fine cat whisker so the contact will be light. And therein lies the disadvantage of this crystal, for to obtain great sensitiveness an extremely light contact is necessary. This is easily jarred out by slight vibrations. A short silver wire makes a very good cat whisker. A form of detector stand easy to construct and particularly suited to galena is shown in Figure 28. It can be made easily by anyone, the standard being a double binding post with a short brass rod through the top hole having a knob fitted to one end and a stiff wire wrapped around the other end. A small spiral of about No. 30 silver wire soldered to the stiff wire serves as a contact for the crystal. The crystal itself is mounted in a rather thick brass washer and wedged into place with tinfoil. A brass plate on the base makes contact to the crystal holder and permits the crystal being moved until the most sensitive spot is found.

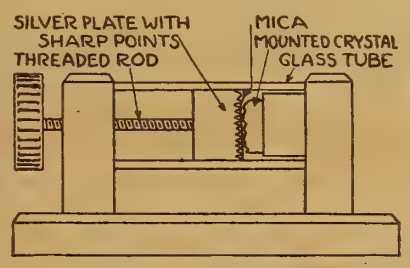
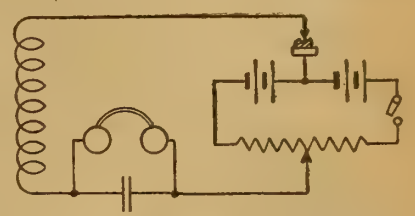


Figure 29—Details of Detector Stand to Obtain Permanent Adjustments with Iron Pyrites

Experiments have been tried using various substances other than metal wires for contacts. Graphite is said to be superior to either silver or gold cat whiskers. The lead from a hard lead pencil sharpened at one end and attached with a small spring to the arms of the detector stand, shown in Figure 28, makes what is classed the best form of galena detector both as regards sensitiveness and freedom from burning out from static.

Iron Pyrites Detector

Let us now consider the iron pyrites. This crystal is shown preference by the Radiophans chiefly because it gives good results without much care in adjusting. It permits of more pressure being put on the cat whisker and hence is not so liable to be jarred out of adjustment. Not being so sensitive to heat it can be mounted in metal without difficulty.



Figue 30—Circuit Employing Potentiometer and Local Battery to Pass Current through Crystal Detector

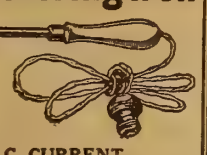
It is not necessary that the stand used with iron pyrites have very delicate contact so any stand on the market can be used with success. However, the form of detector stand, shown in Figure 29, possesses several features to make it worthy of construction by those desiring the most from their crystal sets. With some changes several of the detector stands on the market can be adapted to this principle. It consists simply of a glass or other insulating tube mounted between two brass standards. A crystal of iron pyrites is put in one end as shown and a thin sheet of mica placed over the crystal. The contact member is made from silver. A dime may be soldered to a thick brass disk for the purpose and its face cut into fine ridges with a sharp, three-cornered file, making cuts at right angles. The face of the dime is then covered with many fine points.

Makes Near Perfect Fixed Detector

The contact plate is slipped in against the mica and a screw threaded into the other brass post used to force it against the crystal. With the detector connected

(Continued on page 14)

Electric Soldering Iron



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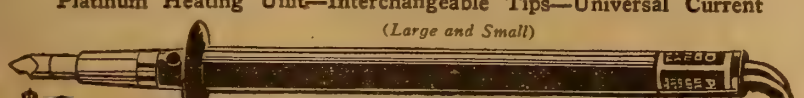

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CONDENSERS

3 Plate	Variable; value, $1.75	$1.05
13 Plate	Variable; value, 2.50	1.20
23 Plate	Variable; value, 3.50	1.35
43 Plate	Variable; value, 4.50	1.95
13 Plate	Vernier; value, 5.50	3.75
23 Plate	Vernier; value, 6.00	4.00
43 Plate	Vernier; value, 6.50	4.25

Honeycomb Coils, 50 turns mounted	.95
Honeycomb Coils, 75 turns mounted	1.00
Double Coil Mountings	2.45
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A Recommendation

Hartford, Conn., June 4th, 1923.

Willard Radio Co.
New York City.
Dear Sirs:—

I received the Flewelling Circuit complete and wish to thank you. It is a beauty. I set it up in one hour and a half, but I have to get batteries so I wish to thank you again, also for the present that you sent me.

I have priced the machines here in Hartford and find that they cost anywhere from $35 to $190. I do not see how you can sell them so cheap.

I will close now but if I want anything in the future, you will have my order.

Again I wish to thank you.
I remain
Yours truly,
CHAS. W. HIGLEY.

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Hartford, Conn.

AUDIO FREQUENCY TRANSFORMER. Designed for use with W. D. 11 tubes; list, $4.50; price	$2.75
VARIOCOUPLER—Litz Wire Wound Secondary; value, $4.50; special	2.25
Ball Bearing Inductance Switch; value, 75c; special	.30
V. T. Sockets, nickeled, brass, sleeve, composition base; value, $1.00; special at	.40

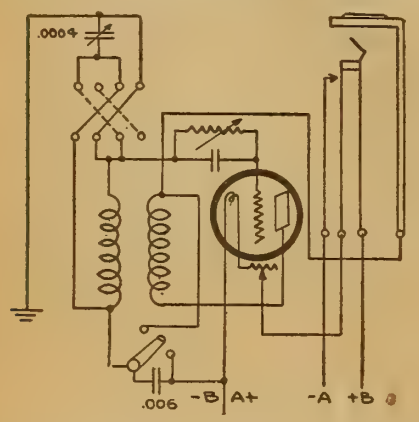
Every article advertised above is guaranteed by the manufacturer and by us. Mail orders filled immediately. Transportation PREPAID on all orders of $5.00 or over, east of the Mississippi River. All others include postage.

Flewelling Circuit in Portable Set

Makes Ideal Apparatus to Use on Camping Trip

As will be seen by the halftones the entire portable Flewelling outfit is assembled in a cigar box which measures 9 inches long, 6½ inches wide and 2½ inches deep. This box was finished with a good coat of insulating varnish inside and outside. The varnish used was made by dissolving ordinary phonograph records in alcohol.

The coils are one 50 and one 75-turn, but I believe a 45-turn coil for the tuning inductance would be better, as the 360-meter stations don't come in very well



with the 50-turn coil. The condenser has .0004 mfd. capacity. The tube used was a VT-2. The set also is equipped with a variable leak and grid condenser. In the upper right corner is the automatic filament jack while a current adjuster controls the current flow to the filament.

I obtain the best results using only one connection, that is either using the ground or one side of the 110-volt line on the aerial binding post. Equal results were obtained by using a telephone ground.

The first time I tried the set I was dumfounded by hearing KFI Los Angeles, and with only the ground connection. It seemed incredible. I could hardly believe my ears, WMC, WEAF, WLAG, KSD, WOC, WOAW and several others also come in so loud as to be audible several feet from the phones. It truly is a wonder-box and it is nothing short of miraculous the way they come in.—Francis W. Lovgren, Virginia, Minn.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 West Madison St., Chicago, Ill.

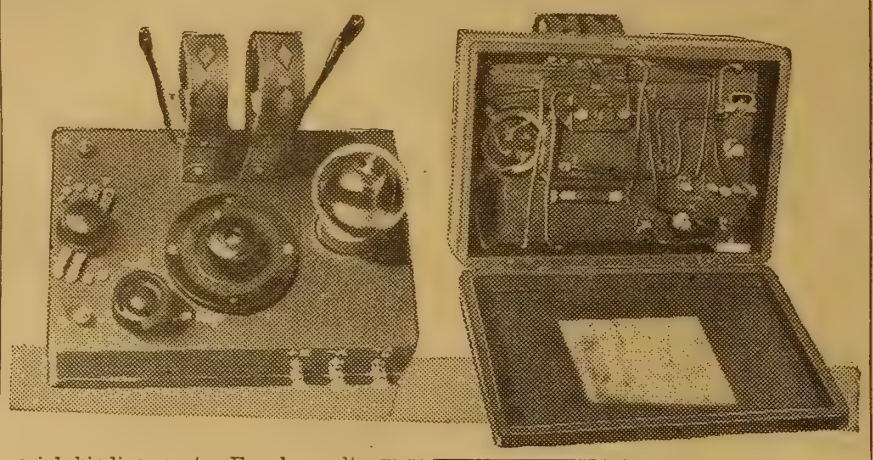
"A" Battery Condition

A storage battery of the lead-acid type when fully charged and on open circuit should have a potential of 2.2 volts per cell and a specific gravity of 1.260 to 1.280. When placed in service and used under normal operating conditions a fully charged battery has a potential of 2.0 volts per cell and a specific gravity of 1.225. When the potential of the battery has fallen to 1.8 volts per cell with a specific gravity of approximately 1.175 it should be placed on charge. When a battery is connected to the charging source, the positive terminal of the battery must be connected to the positive lead of the charging power supply.

Grid Leak Resistance

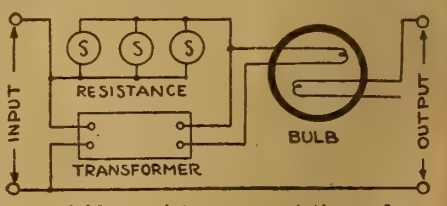
In vacuum tube receiving sets employing grid condenser and leak, it is found in some cases that broadcast signals are received clearly when the set is placed in operation, but suddenly cease after a short interval. Disconnecting the plate battery and then reconnecting it causes the signals to be resumed for another period and then cease abruptly as before. This condition results from the use of a grid leak having too high a resistance, thus allowing the accumulated charges to choke the tube. Disconnecting the plate battery for a time permits the charge to leak off and allows the set to function for a short interval until the charge builds up and again chokes the tube. The remedy is to draw a few pencil lines across the grid condenser. These lines should make good electrical contact at each end with the terminal posts of the condenser, thus reducing the resistance of the grid leak.

CIGAR BOX HOLDS FLIVVER SUPER



Double Filament Globe Makes Battery Charger

Electrolytic rectifiers are usually used where small direct currents are required, such as for charging B batteries. However, this type of rectifier is troublesome and dirty and therefore not very desirable. A far more efficient instrument is shown in the illustration. It consists of a double filament automobile headlight bulb used for the rectifying unit and a step down transformer having the proper secondary voltage to light one filament of the globe. The other filament is not lighted, but used in place of the plate common to bulbs made for this purpose.



A variable resistance consisting of a water rheostat or a lamp bank is placed in series with the bulb to bring the voltage down to the required pressure. When large currents are required it is advisable to connect three or four of these bulbs in parallel.—D. Y. Solandt, Toronto, Ont.

HOOK-UP BLUE PRINTS WITH ALL PARTS' VALUES GIVEN FOR—

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3—Cockaday Four-Circuit
4—Single Tube Reflex
5—Three Tube Reflex
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CRL Variable Grid Leak	1.85	1.35
Remler Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.80	.40
2 Remler Coil Mounts with Straps	1.20	.80
1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
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11 Plate Cuni Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Freshman Variable Grid Leak and Condenser Combined	1.00	.75
8 Binding Posts	.80	.40
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Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
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Complete Parts for Ultra Audion Circuit, $11.90
(Known as the Wonder Circuit)

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CRL Grid Leak	1.50	.95
.0005 Micon Condenser	.35	.25
2 Switch Levers	.70	.50
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Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in schematic form but are drawn so that any one without any technical knowledge can follow with ease. Our Price $11.90

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7x10 Formica Panel or Other Suitable Size	$1.05	$0.85
High Ratio All-American or Thordarson Transformer	4.75	3.95
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2 Howard Rheostats	2.20	2.00
2 Remler Bakelite Sockets	2.00	.90
3 Double Pacent Jacks	3.00	1.50
13 Binding Posts	1.30	.65
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Wiring Diagram, with Complete Instruction for Drilling and Assembling Panel Our Price $12.45

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Cunningham C301-A Tube	9.00	5.95
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Erla Radio Frequency Transformer	4.50	3.45
All-American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
2—.001 Micon Condensers	.70	.50
1—.002 Micon Condenser	.45	.35
Howard Potentiometer	1.50	1.35
Howard 25 Ohm Rheostat	1.10	1.00
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9x10½ Formica Panel	1.42	1.20
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How to Make a Camper's Portable Reflex Set

Part I—Carrying Case and Built-in Loop

By H. J. Marx

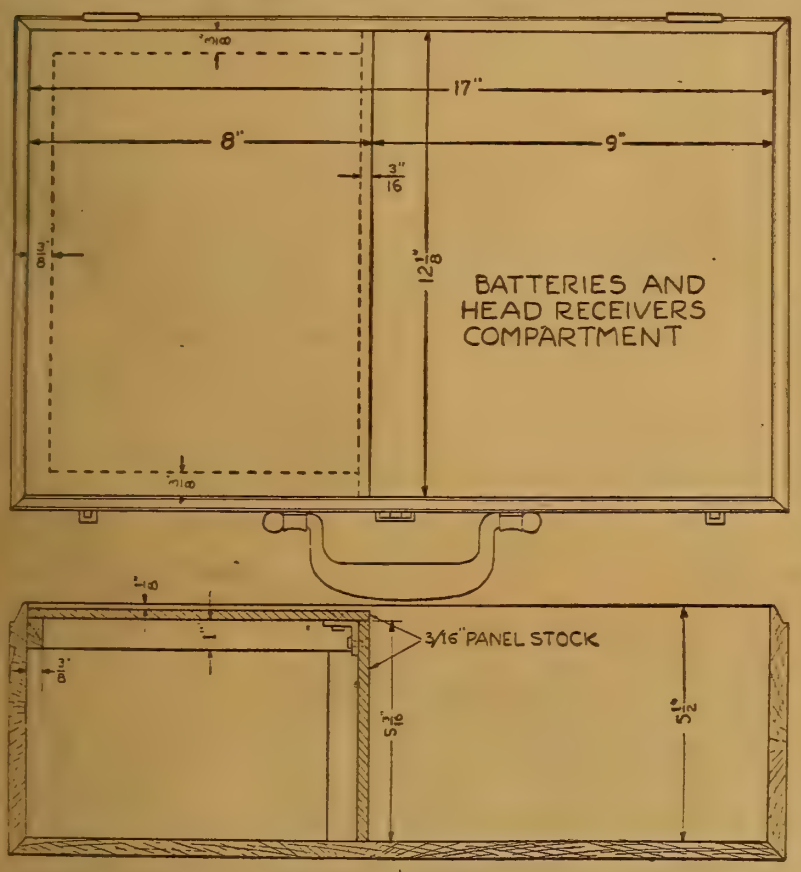
ONCE a Radiophan—always one! Yet there are times when using the Radio set may present some difficulties. Probably the biggest vacation problem is to keep down the necessary luggage to be taken along. Few of us are experienced enough travelers to be able to keep the necessities to a minimum.

Taking all this into consideration, the dyed-in-the-wool Radiophan stops to think twice when he considers taking his Radio set with him on his vacation.

First and foremost—he surely can't cart around a storage battery. But, the advent of dry cell tubes has solved that difficulty.

Aerial Problem

Second, the question of aerials has been a big drawback. There are two ways of solving this problem. One is to use a wire aerial that can be temporarily rigged, and



the other is to use a loop aerial with a type of circuit that will build up the strength of signals sufficiently. Loop aerials always offer the additional attraction that they are less susceptible to interference than the usual straight wire aerial. With loops the value of reflex circuits becomes more apparent.

If everything can be self-contained in a small traveling case—then the question of luggage space has been considerably simplified.

Choice of Three Hook-Ups

In the set to be described everything except the loud speaker is carried in a fiber sample case the inside dimensions of which are 17x12⅝x5½ inches. Three hook-ups will be placed at the option of reader. These are the two tube, three tube and four tube reflex circuits. These have all been tested and present another interesting little development in reflex design. The four tube circuit has already been assembled in the case to be described, so the fan need have no fears regarding the possibility of enclosing all the apparatus in the limited space available. If properly arranged there is a distinct advantage in compact layouts of reflex circuits; connecting lead lengths are reduced to a minimum.

Description of Fiber Case

The case itself is made up of ⅜-inch wood and covered on the outside with fiber. It has the usual assembly of brass corners, straps, clips and locks. The cover has a wooden frame with fiber over it.

Cases of exactly the same size and make may be difficult to obtain. If an approximately similar size is available, the layout of the apparatus can be altered to suit. Undoubtedly a number of fans will want to construct the cabinet or case themselves. In that event the use of finished quartered oak ⅜ inch thick is suggested. The brass corners and straps can be purchased at 5 and 10 cent stores.

The inside dimensions of the body of the case were 17x12⅛x5½ inches deep. The body is divided into two sections, one for the set itself and one for the batteries and head receivers.

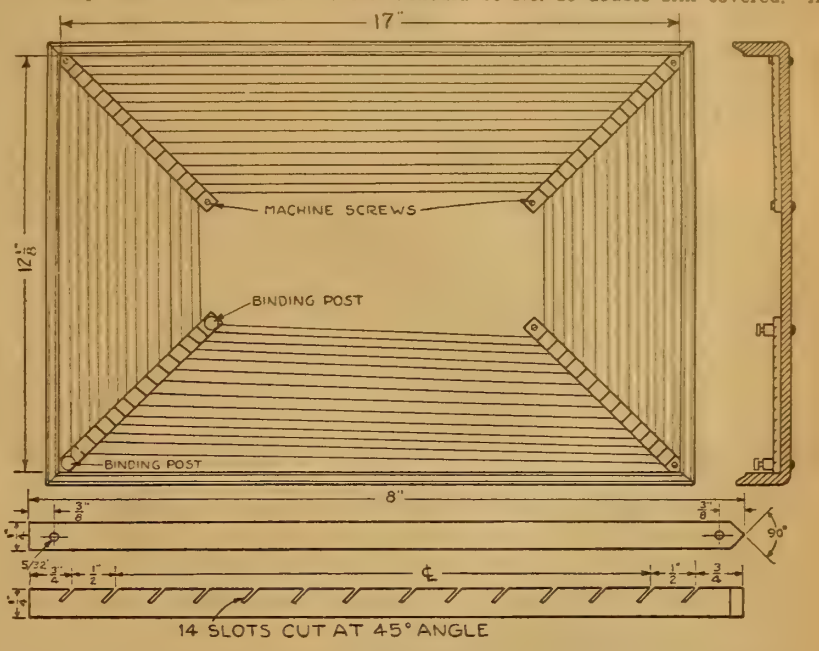
Need Two Panels

Two panels are required, one measuring 12⅛x8x$\frac{3}{16}$ inch thick for the top, and one for the side 12⅛x5$\frac{7}{8}$x$\frac{3}{16}$ inches thick. Wooden strips ⅜x1 inch are fastened on the inside of the body for supporting the panels. Both top and side panels are used for mounting the instrument. In addition two angles are used for fastening the two panels together. These, with the details for mounting the panel, will be described in detail later.

After apparatus space has been accounted for, an ample space 12⅛x9x5½ inches is left for the batteries and head receivers.

Loop Aerial in Top

The cover of the case has been utilized for the loop aerial. As shown in the illustration, four strips of fiber or panel stock ¼x¼x8 inches long are slotted to carry the wire. These are fastened at an angle of 45° in the four corners of the cover by means of machine screws and nuts. The one in the lower left side next to the apparatus compartment is fastened by means of the two machine screws running into the binding posts. The start and finish of the loop wire is in these two posts which are later connected to the set itself.



The cover is 1 inch deep so that ample room is provided for clearance of the dials and the loop. If properly located the binding posts will not interfere with any of the dials.

The wire used for winding the loop should be No. 18 double silk covered. A half pound spool will be all that is necessary for the loop.

The layout of the apparatus for the various circuits will be taken up later.

(TO BE CONTINUED)

Have a hook to put your telephones on after you have stopped listening in. If laid on the table they might land on the floor.

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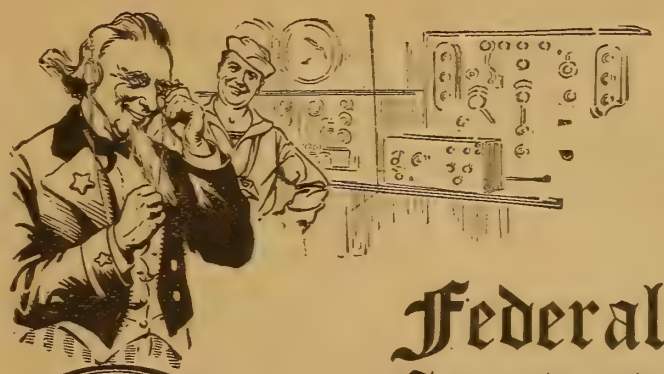

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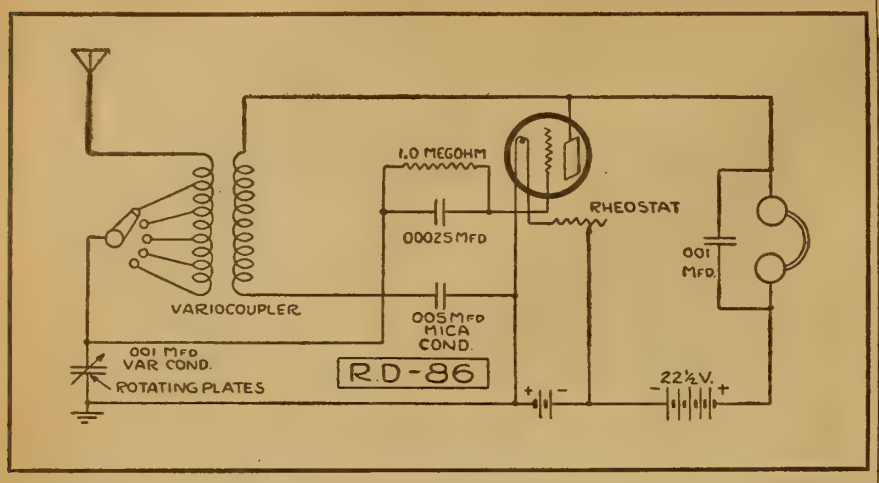
SELECTIVITY IN PORTABLE R.D.-86



THERE is an unlimited field for good single tube portable set curcuits. Any regenerative type of circuit will give good volume on a single tube. The main problem is to use a type of tuning unit that will permit maximum selectivity. In hook-up R.D.-86 a variocoupler is used in conjunction with a variable condenser for the tuning unit—the rotor supplies the feed back of the plate circuit.

The circuit is not primarily intended for loop aerial reception although one end can be connected to the antenna post, the other end left open, and a regular ground connection is used. When so connected, some very good results are possible. If a straight wire aerial is used, a length of 50 feet can be thrown over a convenient tree. Of course this will not give the best results. If time is available, the wire should be suspended between insulators.

A copper rod driven into moist ground will give sufficient ground connection. This can be improved by soaking the ground around the rod with salt water.

The tuning condenser should have a capacity of .001 microfarad, to cover the increased wave length range. The rotating plates should be connected to the ground side. A blocking condenser of .005 microfarad capacity is inserted in the rotor circuit so as to avoid short circuiting the batteries through the plate circuit.

The grid leak can be of the variable type but this is left to the option of the maker. The tube is a detector, although hard tubes such as the C301A can be substituted. In such a case it may be advisable to increase the plate battery voltage. A cushion mounting for the tube socket is recommended as a portable set gets considerable knocking around that does not help preserve the tube filament.

The rheostat resistance will depend on the type of tube used. If a UV199, C301A, or UV201A is used a 20 to 25-ohm rheostat is required. Otherwise the standard 6-ohm rheostat is sufficient.

FIRST STEPS IN RADIO

(Continued from page 11)

into the circuit the screw is run in slowly forcing the points on the silver plate through the mica and making contact with the iron pyrites. When the loudest signals are heard the detector is left adjusted and will continue to function indefinitely. This is as near perfect a fixed detector as it is possible to construct.

As with galena, iron pyrites used in a stand with a pointed piece of antimony fitted to the cat whisker for a contact, gives excellent results and is an arrangement recommended to users of the adjustable type of detector stand.

There are numerous other crystals advertised at present, the greater number of which are compounds of lead or silver and sulphur.

Synthetic Crystals; Clipping Contact.

One method of making these synthetic crystals is to bury two dimes in flowers of sulphur for a week or so. On removing one of the dimes it will be found covered with black silver sulphide and will function as a detector crystal. After using for a week the second dime can be brought into service and the first replaced in the sulphur for renewal. Thus the two are used alternately and will last indefinitely. This is worth trying.

When a metallic wire is used as a contact on the crystal it oxidizes rapidly and poor reception is often blamed on the crystal when it is the fault of the cat whisker. The obvious cure is to clip the end of the cat whisker when the signal strength falls off so a clean, fresh surface of the metal is presented to the crystal.

An enclosed form of detector is advisable when the apparatus is subject to dust or moisture and not only reduces the oxidizing of the cat whisker, but protects the crystal as well.

Restoring Sensitiveness of Crystal.

Handling a crystal has been said to destroy its sensitiveness when as a matter of fact the sensitive points have been covered with a fine film of oil from the fingers and will not function in that condition. The crystal can be restored to its original sensitive state by washing with pure alcohol or ammonia, scrubbing the surface with an old tooth brush. Allow the crystal to dry without wiping and the crystal will be found as good as ever. When completely insensitive, simply cleaving the surface of the crystal with a knife or cutting pliers will usually uncover more sensitive spots and make the crystal still of value.

Using Battery With Crystal

There is sometimes a slight advantage in using a battery in connection with a crystal detector and for the benefit of those who care to experiment with this arrangement a method of connecting the battery and potentiometer is shown so slight currents may be impressed on the detector by adjusting the potentiometer.

Two or four dry cells may be used with a 400-ohm potentiometer, opening the battery circuit while the set is not in use. The method of procedure is to first adjust the detector to maximum sensitiveness with the potentiometer at the center point and then by turning it one way or the other a slight current of the proper potential is applied to the detector.

Use of Condenser

Maximum signal strength can only be obtained when the condenser used across the phones is of a good grade. Use a mica condenser, or better still, one with air as the dielectric. Receivers will work without a condenser but it will be found the phone cords form a small condenser and thus permit reception.

There is still a wide field open for experimenting on crystal detectors or some similar rectifying device. A peculiar fact about any pair of contacts that will rectify high frequency currents, such as galena and silver, iron pyrites and brass, silicon and brass and so on through the list of crystals, is that one of the substances has photo-electric properties while the other has not. That is, one of them emits negative electrons under the influence of light, the other does not. Whether this has any bearing on the phenomena of rectification is still an open question, the solution of which may lead to some very important discoveries.

(TO BE CONTINUED)

The problem of tuning your set to best advantage will have to be worked out for yourself, as each set is a little different.

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Reviews of Books

Radio Experimenter's Handbook. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Amateur Radio Call Book. Fourth edition just out. A complete list of amateurs, special amateurs, technical and training stations of the United States and Canada. How to construct and operate a Reinartz tuner, detector and one step amplifier. Large two color map included. Price $1.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

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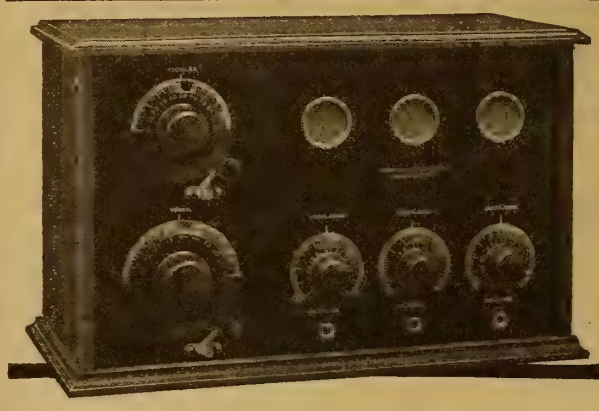

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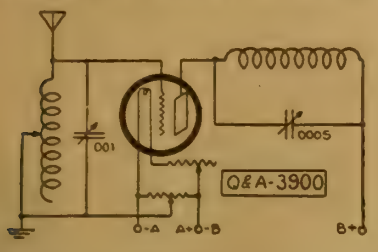
Questions and Answers

Radio Frequency Amplifier

(3900) HRH, Ft. Leavenworth, Kas.

I have been a reader of your paper for some time and have patiently waited for a Radio frequency hook-up to work on my tube CR No. 9, but so far I have not seen it. Hence this letter.

Could you send me a hook-up of 2 stages that would work on my set, preferably where it will not be necessary to change the set I now have, in fact, one



which would work like the one for the Flewelling you published May 12, 1923, page 13? Would like to have the diagram plainly marked as to capacity of different parts, etc.

A.—Complying with your request we are illustrating on this page a diagram showing method of adding one stage of Radio frequency amplification to Grebe CR No. 9. No changes in present circuit will be required. If desired additional stages of Radio frequency may be added in the usual cascade manner.

Output coil is placed in inductive relation to the tuner on the set. This output coil can be of the honeycomb type 25 to 75 turns, depending on the wave length desired.

Best Broadcast Receiver

(2863) ARL, Reading, Pa.

I wish to thank your Q. and A. department for previous questions answered. They may be interested in knowing that I have found the cause of my A.F. amplifier trouble to lie in the UV-201 tubes. It appears as though the plate current leaks through the tubes, the quantity depending on the degree to which the filaments are lighted. In one case, through the range of off to full brilliancy, the plate voltage dropped from 190 to 170.

What do you consider the best broadcast receiver from the standpoint of selectivity mainly but with as much volume as possible?

The two circuits you seem to be specializing on at present are the Reinartz and Flewelling, and I have read or heard that the Reinartz is not well adapted to phone. In answering this question, however, do not confine your consideration to those two only.

I presume the super-heterodyne is superior but there is some doubt in my mind as to whether the large amount of apparatus and tubes required warrants their use. What is your opinion of a capacatively coupled tuner? I have recently finished calculations for one in which I figure I can obtain a 4-meter variation in the .0006-.00004 mfd. range of UC-1820 condenser, but have not started making same and have no idea what volume to expect.

Is it possible to use the Flewelling circuit for longer wave lengths and if so, what coils should be used?

A.—We are gratified to note that you have located difficulty which was disturbing the effectiveness of your circuit.

It is our opinion that the Armstrong three-circuit regenerative receiver is the most consistent and practical, aside from experimental interest. This circuit is hardly comparable with the super-heterodyne, which, however, is more intricate and difficult of operation by less than an expert.

Noting your reference to the Reinartz circuit, advise that it is as well adapted to phone as any other set.

We would not advise a capacitively coupled tuner as being selective.

The Flewelling circuit is not adapted for wave lengths over 800 meters.

Variocoupler Winding

(2608) RLT, Columbus, Ohio.

Would you kindly give me information on how to construct a variocoupler for the Flewelling circuit?

I have been following each and every one of his articles and note that he says for everyone to stick to the parts that he uses or the builder might be disappointed. He spoke of a variocoupler with 75 turns for a rotor and 50 for the stator.

As I travel for a construction company I would like to have this set portable, so I can carry it about with me, but with honeycomb coils the set is bulky to assemble for carrying.

Would like to have the size of tube and rotor, numbers of turns of wire, also size and kind of wire. I also ask you if the Variadon condenser manufactured by Dubilier Condenser and Radio Corp. is vernier enough in adjustments sufficient to use with this circuit instead of using the plate condenser?

A.—Answering your inquiry with reference to the variocoupler; use fifty-six turns of number twenty-two wire tapped every seventh turn for the primary and seventy-five turns of number thirty wire for the secondary. Wind on a standard size rotor and stator. Connect in Flewelling circuit in the same manner as the honeycomb coils, primary as tuning inductances and secondary as tickler.

In our opinion, honeycomb coils would be much less bulky and will certainly be more efficient. Would advise adherence to specifications as nearly as possible.

The condenser suggested should serve effectively.

Ground Hum

(2888) JFT, St. Louis, Mo.

I made a socket aerial as per instructions in your magazine of February 24. I think it's just great, outside of one fault that I found with it, which is a loud buzzing sound that is so strong as to prevent me from hearing some of the local broadcasting. I have a crystal set and would appreciate very much if you will kindly inform me as to how I can overcome this annoyance?

A.—The annoyance of hum occasioned can often be overcome by grounding the minus side of the A battery in a tube set, but do not believe that there is any way of eliminating it with a crystal set.

Reinartz Circuit

(2474) JNS, Jacksonville, Fla.

Kindly advise me concerning the Reinartz circuit, on the following points: What covering should the wire have, S. C., D. C., silk, enamel or cotton and enamel?

It being difficult to obtain fibre board for winding the spider web coils on, what can be substituted instead?

What kind of insulating enamel gives the best results on these coils, or others?

A.—Use DCC wire. Cardboard, very thin wood, old phonograph records may be used for spiderweb coil winding.

We would not advise the use of enamel. Coils may be coated with a very thin shellac to guard against moisture.

Calcutta on a Loop

(2579) GBV, Quincy, Ill.

A friend of mine states that twice last week he got Calcutta, India on a loop set, using three stages of Radio frequency and two stages of audio frequency, hearing voice and music.

The writer is not exactly familiar with what distances these signals may be picked up so I am not sure whether he is kidding me or kidding himself. I really believe an article in your excellent paper, of which the writer is a subscriber, covering this subject, including the possibilities with present day apparatus of hearing voice and music at great distances would be of interest as there are a great many readers who would appreciate enlightenment on this subject.

A.—We are reluctant to dispute the word of your friend in stating that he has been in Radio communication with Calcutta, India, but a high regard for facts as they are bids us to assure you that he is spoofing you or kidding himself.

Radio communication beyond the range of the United States and Canada is not as yet achieved except under experimental tests under all favorable conditions of operation and equipment as recently accomplished in the Trans-Atlantic tests in which stations in England were received by a limited number of operators.

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Radio Illustrated

Appiication for Radio to the summer vacationists in supplying music and entertainment while in camp or on the road. It is just the thing to keep those away from home in tune socially with the city world
© Travellette

Picking up a message at a stop on the road while en route to the camp. A portable set is a part of the camp equipment for the entertainment of the party. The antenna this party used was stretched from the car to a high tree and it effectively gathered in distant stations © K. & H.

While in the woods Marie Stover, Maybelle Basett and Marguerite Ball of Chicago are entertained with a portable receiving set which they have taken along with them to the camp. You can never be so far away but what you can be at home for a few minutes with a good receiving set and loop aerial

At the right is shown a $10,000 tourist sleeper sedan. Photo shows G. A. Beauchamp, owner, who, with his family, is making a two-year tour of the country. The big car is equipped with a long distance receiving set that it is believed will pick up many stations

JUL 5 1923

Neutrodyne 2 R.F.; 3 Reflex Portables; Flewelling

Radio Digest

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Vol. V | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, JUNE 30, 1923 | No. 12

CAN RADIO STOP AUTO?

Alyce Mills, winner of many beauty contests, heard over WJZ recently. Miss Mills played a leading role in "A Wife in Name Only" theater-Radiophans will recall Digest Photo

AMERICAN AUTHORITIES FOR AND AGAINST GERMAN STUNT

Dean C. C. Winn, Detroit Institute of Technology, Believes Possible—Chicago Engineers Express Doubt—Say Nauen Couldn't Do It

By F. J. Huntley

DETROIT.—C. C. Winn, dean of the College of Engineering of the Detroit Institute of Technology, has a vision of future warfare by Radio with gigantic towers hundreds of miles apart shooting at one another from their antennae powerful magnetic fluxes with a view of neutralizing one another's demagnetizing powers.

Prof. Winn expressed this idea while discussing recent information from Berlin that twenty automobiles recently had left that city, each using the magneto method of ignition, with the only instruction to follow the leading car, and with the anticipation that something unusual was going to happen.

When the party reached the Duchy of Mecklenburg every car stopped suddenly, as if something had happened to its engine.

(Turn to page 2)

The Wildflower Girls of Woodland, in the Adirondacks, New York, practice dancing outdoors. Peggy Stohl (right) teaches Betty Nevins (center) new steps while Muriel Harrison (left) tunes in © K. & H.

CFCN FANS TO HEAR JACK-TOMMY FIGHT

BIG MATCH WILL BE FIRST EVER BROADCAST

Sensitive Microphones to Be Placed at Arena—Sound to Be Relayed to Calgary Plant

By Jeffrey J. Dingman

CALGARY, ALTA.—For the first time in the history of Fistiana and for the first time in the history of the Radiophone, the details of a battle between two nationally-famous men for the crown denoting the possession of the heavyweight boxing championship of the world, will be sent over the ether waves by a Radiophone broadcasting station.

When Jack Dempsey, world's heavyweight champion, and Tommy Gibbons, challenger, meet in the giant arena in the boom town of Shelby, Montana, on July 4, Independence Day, the details of that memorable contest will be sent broadcast all over the world through the medium of CFCN, the Radiophone broadcasting station of the W. W. Grant Radio, Ltd., at Calgary, it has been announced by W. W. Grant.

Will Relay to Station

Plans for CFCN broadcasting the fight are now being made. It is probable that three or four highly sensitive microphones of the type employed for vaudeville and cabaret work, will be placed at the arena, sound relaying to the station at Calgary.

(Continued on page 4)

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SPECIAL REWARD OFFER
Coupon Number 5

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Questions in the letters of the numerous Digest readers taking advantage of the Special Reward Offer coupons, indicate that some points are not yet clear. One query is, "How many consecutive series of coupons will be accepted?" The answer is simple. There is no limit.

With only four coupons published, many letters containing the four, sixty cents remittance, and a selection request for some article in Class B, have been received. These Radiophans, of course, have already been sent the apparatus they selected.

The simplicity of the method of getting the many standard and valuable parts and accessories for sets, in practically every case has appealed to the enthusiastic readers. All that is necessary is to clip the consecutive coupons appearing weekly on page two, and send them, accompanied by the necessary remittance for the selected item, to the Digest.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Electrad Grid Leak (with clip mountings); Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 inch black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-20 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH).

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.);

(Continued on page 9)

AN EVENING AT HOME WITH THE LISTENER IN
(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440	10:00-11:00				11:30- 1:30		11:00- 1:00
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	10:00-12:00		10:00-12:00		10:00-12:00		9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00		10:00-11:00		9:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00		8:00-12:30	8:00-10:00	
KYW, Chicago, Ill.	345		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30		7:15- 9:30			
WJY, New York, N. Y.	405		5:30- 9:30		5:30- 9:30	5:30- 9:30		
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:00
WKAQ, San Juan, P. R.	360		6:30- 8:00				6:30- 8:00	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas	400		9:30-10:30		7:30- 8:30			9:30-10:30
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00				6:00- 9:00		
WOR, Newark, N. J.	405	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	5:15- 6:30	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		7:30- 9:00

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

Flewelling on a Loop Aerial—a dandy set for the summer. Read about this clever adaption of the Flivver Super in next week's Digest, page 12.

Simplex Radio Hook-Ups—Beginning next issue the first of this series of hook-ups will appear. Each piece of apparatus is pictured, as well as shown in symbol, and named. Readers fooled heretofore by the complex conventional diagrams will be surprised at the simplicity of the new series which has been deliberately designed to stop the confusion of Radio symbols. Stories about each circuit will accompany.

First Steps for Radio Beginners—by Thomas W. Benson, next week, will be devoted to an explanation of the regenerative tube detector. Regeneration isn't hard to understand or control, if you learn the fundamentals.

A New Super Regenerative Circuit Worth Knowing—Watch for R.D.-88 Hook-Up Diagram in the July 7 issue. This super employs but one tube, one 500 and one 1000-turn duo-lateral coil in combination with parts ordinarily included in a single circuit tube receiver.

Many Requests for a Repeat of the Reinartz Radio Frequency Circuit—will be satisfied by its republication next week. This hook-up shows how to add two steps of R. F. to your Reinartz set.

Portable Set Series, Part III—will be devoted by H. J. Marx to panel layouts for the three different circuits given in Part II this week.

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RADIO STOPS AUTO?

(Continued from page 1)

As if by command, the twenty drivers left their cars simultaneously to make an examination. Their efforts to start proved futile, and why they could not tell. Not one of the engines would spark.

Motors Stopped by Radio

At that point the driver of the leading car explained that the experiment was over and that it had been a complete success, since the German Radio station at Nauen had succeeded in bringing each of the twenty cars to a stop by demagnetizing its magneto with the aid of a new form of Radio wave.

"Startling, indeed, and yet perfectly plausible and quite in accordance with contemporary scientific research in the Radio field is this experiment," declared Dean Winn.

"This mysterious power transmitted through equally mysterious waves is, perhaps, not so much a new discovery as the perfection of a method of transmission of power by Radio, over which scientists in Europe and America have been working for some time. It may mark only a new step in the line of invention, wihch has enabled the United States navy to operate vessels in the open sea from Radio stations on shore."

Similar Experiments Made Here

"Similar experiments as the one here explained have been carried out successfully even in the laboratory of the Detroit Institute of Technology," Dean Winn declared.

While unwilling to regard this power as mysterious or to describe the German experiment as something new, Dean Winn expressed full faith in the reported experiment and has great hopes in the future development of Radio transmission of power, and its possible revolution of the methods of modern warfare.

"The same waves which brought to a standstill the twenty German automobiles could," Dean Winn says, "bring to a halt batteries of artillery, tanks, fleets of ships and squadrons of airplanes. "It is premature," Dean Winn says, "to speak definitely of future warfare in the light of this new development. Development in two directions may, however, be expected, especially since experimental work in both directions has been started.

Other Developments Expected

"There may be further developments in the direction of self-ignition engines, which would do away entirely with the magnetos and electrical appliances which go with the machinery of warfare. So, on the other hand, there may come new developments in the construction of powerful Radio stations capable of generating magnetic fluxes of tremendous strength, not only to demagnetize war engines, but also to neutralize demagnetizing Radio stations.

"No one can tell what the future may bring, but it seems to me quite plausible that to the deadly gas duels and bacteria duels of the future war, the apparently harmless duel of electric waves, shot from high towers, will have to be added, in view of the German experiment.

American Expert Skeptical

According to an automobile ignition expert, most makes of American cars are equipped with single ignition systems—depending upon generator-charged storage batteries and not upon magnetos for ignition. These would not be stopped by this mysterious Radio wave, granted that the thing that does the stopping is temporary paralysis of the magnetic field of the magneto. Most European cars are magneto-equipped, as are certain American cars.

The device, if able to stop magneto-equipped motor cars, would also be able to stop most airplane engines, according to flyers, because of the fact that similar equipment is used. The Liberty engine, operating with a special ignition system, which may be used with a storage battery, would be able to continue operation, because the temporary paralysis of the magnetic field, if that is the cause, would not stop the flow of current from the battery.

Say Invention Buncombe

Several Chicago electrical experts belittle the invention. They say that it is effective for stunt purposes only, and then co-operation of the proposed victim probably would be necessary.

Followers of Radio development, who have been discussing the reported invention, share the theories of Paul Nearl, engineer, who said the device can be easily "beaten" by encasing the magnetos in an iron shield and grounding the shield.

"Your Move"!—Radio Chess Latest Steamer Pastime

NEW YORK.—Radio chess as a pastime for ship passengers has been inaugurated by the steamships Western World and American Legion, in the South American service. The Western World arrived recently with reports of a three-man match between teams on the two ships, which passed each other a few days ago.

The game was called when the steamers were 1,200 miles apart, because their transmitters wouldn't carry any farther. As both teams claimed the victory, decision has been left to the Buenos Aires Chess Club.

WORD SCRAMBLER ASSURES PRIVACY

NEW "TALK BRIDGE" BALKS LISTENERS-IN

Invention Makes Conversation Unintelligible to Outsiders; Clarifies Tones for Recipient

By Evelyn Lanzius

NEW YORK.—Privacy has been made possible in Radiophone conversations through a device that "scrambles" words at the sending end, so that to any one listening in they are unintelligible, and clarifies the tones to the person for whom the message is intended, it was announced recently by the American Telephone and Telegraph Company.

The invention has been used successfully, it was said, over a thirty-mile stretch of ocean between Los Angeles and Catalina island.

The problem of obtaining privacy in Radio conversation was solved by engineers of the Bell system, it was asserted, partly as a result of the post-war scarcity of cables for undersea use.

Two Way Talking Possible

"The Radio 'talk bridge,'" said an engineer of the company, "which has given satisfactory transmission across the thirty-mile gap of water night and day since 1920, was designed to permit two-way talking between the mainland and the island.

"Heretofore talks over the Catalina island Radio link have been 'picked up' by amateur receiving stations in the region. The privacy system was designed to remedy this. It is not claimed that the new system is absolutely secret. An ingenious person might devise a set which could listen to the system, but such a set would be much more complicated than the ordinary set.

Island Connected to U. S.

"The new Radio attachment before putting the messages on the air will distort or 'scramble' them, and no receiving set which is not specially designed to 'unscramble' them can obtain anything intelligible.

"At the time the apparatus was installed a submarine cable could have been laid joining the island and mainland, which would have supplied a better grade of service at less expense, but the conditions at that time, which grew out of the war, were such that the manufacture of cable would have involved a long delay."

1,100 MUSICIANS GIVE CONCERT FROM WJAX

Station Broadcasts Massed Bands at Grotto Conclave

CLEVELAND.—"Music filled the air" literally and figuratively, when twenty-five Grotto bands got together recently in Public Hall, and their offerings were broadcast by WJAX, the powerful station of the Union Trust Company.

The occasion was the annual conclave of The Grotto, with Cleveland as host to 50,000 Prophets and their ladies. Twelve thousand people were in immediate attendance at Public Hall and the rest of the United States listened in and compared the band from Boston with those of New Orleans and Kansas City. E. G. Johnson, the "man with the million dollar voice," was the announcer.

Special circuits were arranged between the studio and Public Hall and credit is due Chief Operator J. M. Thorburn, who had his broadcasting apparatus tuned so nicely that even the applause and comments of the audience in the immense auditorium were floated out on the crest of "The Wave from Lake Erie." So the "stay at homes" got an earful and were with the Prophets in thorough enjoyment of the program.

Weak signals in a Radio receiver are sometimes due to poor ground connection.

POLICE MATRON BUYS OUTFIT FOR LOST KIDS

HOBOKEN, N. J.—Lost children who find their way to Hoboken will find little time to cry for their mothers from now on. Mrs. Mary Garrick, police matron at Hoboken police headquarters, who has mothered more than a thousand lost children since she has been a police attendant, has bought a Radio outfit for the purpose of entertaining lost kiddies until their mothers arrive.

PHILLY HAS ITS FIRST 'BROADCAST WEDDING'

PHILADELPHIA.—This city had its first broadcast wedding recently when Frank Nickel, Jr., assistant operator of Station WIP, and familiarly known the country over as announcer "DX," took Miss Lillian Louise Everit for his bride. It was solemnized at the Holy Trinity Chapel, Twenty-second and Spruce streets. The church is well-known to Radiophans, as church services are broadcast from it.

FISHING ON THE ETHER BANKS

You can't beat fishing for the stray DX plants, even with a fishing rod. Eleanor Osgood, New York City, however, cannot decide which sport is best, so does both at the same time. Eleanor has the right idea, you'll agree, or did you ever wait for a bite? © K. & H.

SEE STATIC WATERLOO IN VERTICAL ANTENNA

Experimenters Test Scheme with Kite Balloon Aerial

BURBANK, CALIF.—Is it possible that the vertical antenna may solve the problem of static interference?

This question is prompted by tests recently made here by R. W. Coburn and Roy Knabenshue, who sent up a kite balloon to which they had attached an antenna wire to their receiving set.

With the balloon up 200 feet, the experimenters say they heard several broadcast concerts with a singular absence of the familiar grating noises commonly resulting from atmospherics.

Coburn and Knabenshue intend to construct a larger balloon and send it up higher for the purpose of experimenting further with the vertical antenna, both in transmitting and receiving.

Coast Guard Praises Air Compass

WASHINGTON, D. C.—The reports from the various vessels of the Coast Guard indicate that the Radio compass is a valuable aid in locating their positions at sea. The Radio compass has proven invaluable to the Coast Guard in making contact with other vessels, especially those in distress calling for assistance.

DETECTS PAIN OF INJURED FLOWER

SUPER SET ALSO RECORDS HUMAN DISEASE

Delicate Instrument Delivers "Message" of Cancer; Horn Squawks When Leaf Is Torn

SAN FRANCISCO.—The pain experienced by a flower when it is torn, detection of presence of diseases, and other astounding performances have been recorded by use of the super Radio set, Dr. Albert Abrams, who pioneered the use of Radio activity, declared here recently.

The super Radio used by Dr. Abrams in a series of tests here is attached to what he calls a reflexophone, which, Dr. Abrams explains, catches from the air the vibrations of diseases and records them by means of delicate tuning methods.

On a table were arranged the neat boxes of the reflexophones with their dialed covers. Wires connected the reflexophone to tiny instruments arranged on a board, whereon three lighted bulbs glowed warmly, and from which rose a magnavox horn. The super Radio was equipped with an antenna, a delicate looking rod attached to the set by a black cord.

This machine, Dr. Abrams believes, will some day be perfected to the point where it will stand on street corners and in stores, so that those who care to may drop a coin in the slot and ascertain what ails them.

Cancer Radiates Waves

The first test performed by Dr. Abrams was to record the vibrations of cancer. The moment the antenna rod approached a bottle containing a cancer in alcohol, the horn gurgled audibly. When the bottle was removed and the rod adjusted, the horn squawked again, but after a magnet had been passed over the spot the Radio failed to respond.

The Radio recorded the message broadcast by the cancer, Dr. Abrams explained. "The cancer communicated a portion of its energy to the spot where the bottle had stood, hence the same reaction. The magnet 'sterilized' the spot, hence the reaction."

When the leaf of a nasturtium was torn the horn responded. Dr. Abrams then cut the leaf, and there was no reaction. Another leaf, held over the mouth of a chloroform bottle, was similarly torn and cut, but without the Radio recording the action.

"Plants broadcast waves of Radio activity," Dr. Abrams explained. "Tearing hurts the leaf, cutting is painless. When the plant is influenced by chloroform it feels no pain."

Quaker City Goes Back to Her Silent Nights

Stations Return After Fans Clash Over Issue

PHILADELPHIA.—When the new wave lengths went into effect the matter of silent nights was left alone because it was felt that with the wide difference in local wave lengths owners of tube sets would experience little difficulty in tuning in distant stations. It is claimed that some selfish fans, whose sets are not selective enough to tune in outside stations, have deluged several newspapers with letters claiming that Philadelphia broadcasting stations are "hogging the air." One newspaper printed all the letters, which brought in a deluge of letters from those who wish silent nights and those who do not.

The upshot of the entire affair is that Station WIP has announced that it will have silent night every Thursday at 9:30 p. m. Stations WOO and WDAR will begin a new schedule, and will broadcast only two nights a week. Station WFI is considering a summer schedule and announcement will be made soon.

THE ANTENNA BROTHERS — Spir L. and Lew P. — A Suggestion for the Fourth

RAID REVEALS RUM RUNNERS' AIR PLOT

SEIZE RUM, AMMUNITION, RADIO SET

Dry Agents Convinced Law Breakers Used Ether Phones to Keep Watch on Authorities

NEW ORLEANS, LA.—Law breakers, always abreast of the times, are reported by police and federal dry agents to have employed Radio as a means of learning the whereabouts of prohibition enforcement officials, of communicating with rum ships at sea and of keeping in touch with confederates along the Gulf of Mexico, the almost impenetrable bayous of Louisiana and their supposed headquarters in New Orleans.

That was declared to have been proven with the seizure of a complete Radio set, a vast amount of liquor, arms and ammunition and the arrest of a man giving his name as D. H. Kirkley, 27 years old, 1325 Pyrtania street, New Orleans. Kirkley was arrested late Friday on the shell road near the Kenilworth plantation in St. Bernard parish.

Agents report they arrested Kirkley after an exciting race and that they found thirty-five quarts of whisky in his car. They then raided a camp on De La Croix Island, where the Radio set was reported to have been discovered.

Radio Seized at Camp

Police say Kirkley obtained his supply of liquor at the camp, where they said they discovered thirty-nine cases of whisky, two shotguns, a lard pail filled with loaded shells and the Radio set.

Residents of De La Croix were questioned. They said every day or so some one would appear at the camp and operate the Radio, but they said they doubted if they could identify the mysterious visitors.

Federal agents believe the Radio set was used not only to communicate with rum runners in the Gulf, but on Lake Ponchartrain, access to which is possible by numerous obscure bayous and passes, is attractive to smugglers operating between Cuba and other points and New Orleans. Once safely in the lake, the liquor is said to have been brought to the camp, where it was distributed in automobiles and trucks.

While only one arrest was made, others are expected.

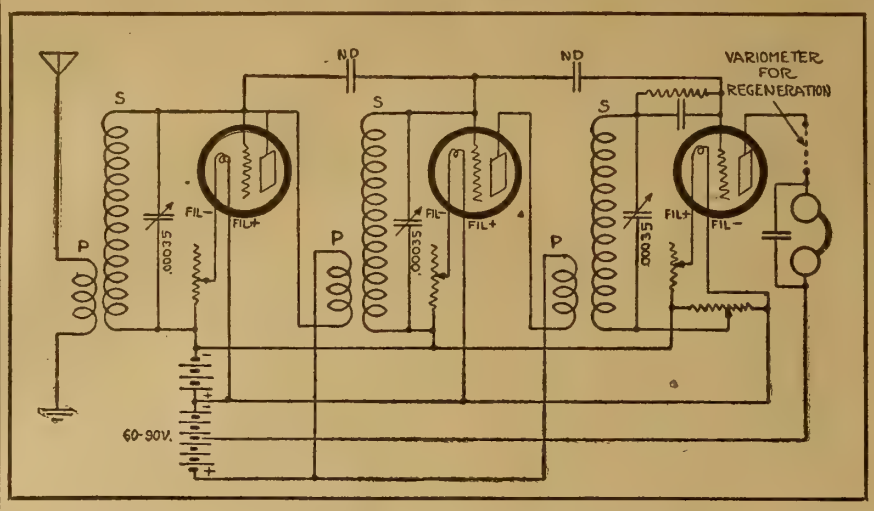
CFCN TO PHONE FIGHT

(Continued from page 1)

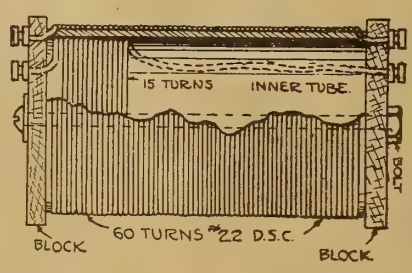
a distance of more than 230 miles, and broadcast from there.

At the present time directors of the fight and those in charge of arrangements and advertising are conducting a thoroughly efficient and extensive campaign of publicity for the battle, one of the biggest sporting events of the decade on the American continent. And again Radio has leaped into prominence in this respect. These publicity agents, ever on the alert for some new and novel means of bringing their wares to the attention of the wide world, are capitalizing Radio for this purpose.

NEW HAZELTINE NEUTRODYNE PRINCIPLE MAKES GOOD TWO STEP RADIO FREQUENCY AMPLIFIER



A RECENTLY developed circuit, known as the Hazeltine Neutrodyne, is credited by its originator to be capable of developing an amplification ratio of one million to one, using two stages of Radio frequency amplification. The principle is adaptable to all hook-ups in which Radio frequency amplification may be used. Regeneration may be used and all howling from the Radio frequency amplification eliminated. The secret of the hook-up centers in the construction of the three "neutroformers" (R. F. transformers) and the "neutrodons," a form of small condenser shunted between the grids of the three tubes. These neutrodons tend to neutralize the grid-to-plate capacity between the grids and plates of the tubes and thus eliminate the danger of oscillation or howling.



The neutroformer consists of two cylindrical tubes, either fiber or composition, 3½ inches in diameter by 3 inches long and 3 inches in diameter by 3 inches long. Fifteen turns of No. 22 double silk covered wire are wound on the small tube and 60 turns of the same size wire on the large tube. The small tube is then placed inside the larger one, so that the windings of both are parallel and in the same direction. The coupling between the two coils is fixed. In order to keep the two tubes in place, a block is placed at both ends and a fiber rod, threaded at both ends, passed through both blocks and tightened down by means of two nuts.

The construction of the neutrodons is very simple. Obtain a foot or two of No. 8 copper wire and some hard rubber tubing in which the wire will fit tightly. Two pieces of wire are inserted in the tube, as shown by the diagram, and a brass sleeve fitted over the hard rubber tube. Care should be taken to see that the two pieces of wire do not touch each other inside of the tube, and the brass sleeve should be free to move.

In hooking up the various parts, great care should be exerted to see that the diagram is strictly carried out. The neutrodons must be isolated from the rest of the apparatus, so that no capacity or inductive coupling will exist between them and the rest of the apparatus. The neutroformers should be offset at an angle of 45 degrees to eliminate any possibility of inductive relation existing between them.

To set the values of the neutrodons, light all the tubes and tune in a loud station. Then turn off the filament of the first tube and adjust the brass sleeve of the first neutrodon until no signals can be heard in the phones. Turn up the first filament and go through the same procedure with the second tube. Finally it will be well to seal the adjustments of all three neutrodons by means of a few drops of hot sealing wax.

UV-201 tubes are recommended and a fairly high plate voltage used: 60 to 90 volts. The detector, however, is tapped off at 18 volts.

If regeneration is desired, a variometer may be inserted in the plate circuit of the detector tube.

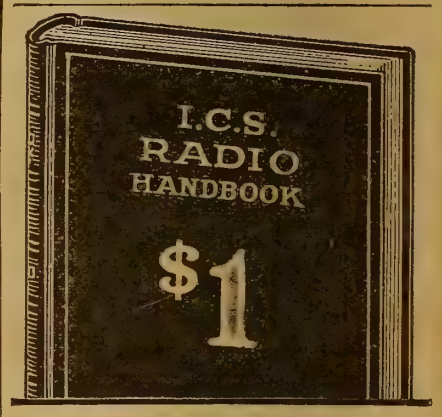
The dimensions given for the neutroformer are for broadcast reception. If it is desired to receive amateur work, the number of turns should be reduced to 10 and 40.

A word about tuning. The adjustment of the second stage and detector variable condenser is usually the same, while that of the first stage will vary as the capacity and inductance of the antenna being used. To tune in a station, the second stage and detector are set and the tuning done with the condenser of the first stage. A final adjustment is accomplished by tuning the detector circuit, second stage, and first stage in the order given. The potentiometer in the detector circuit is almost indispensable for good results. The set is very constant, and once the adjustments are found they will remain the same for any length of time.

Noise in Paris Jars Time Devices to Inaccuracy

PARIS.—The international time of day is broadcast twice a day from the Paris Observatory, located not far from the Latin quarter.

But the noises of the city are so great and the vibrations from street traffic so noticeable that the requisite accuracy is becoming impossible, and the director of the institution says he must move his instruments to the peace and quiet of the country.



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Technically edited by F. H. DOANE

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P. S.: Its Radio Golf Record is 119,000 miles.

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New Grebe CR-12 BROADCAST RECEIVER

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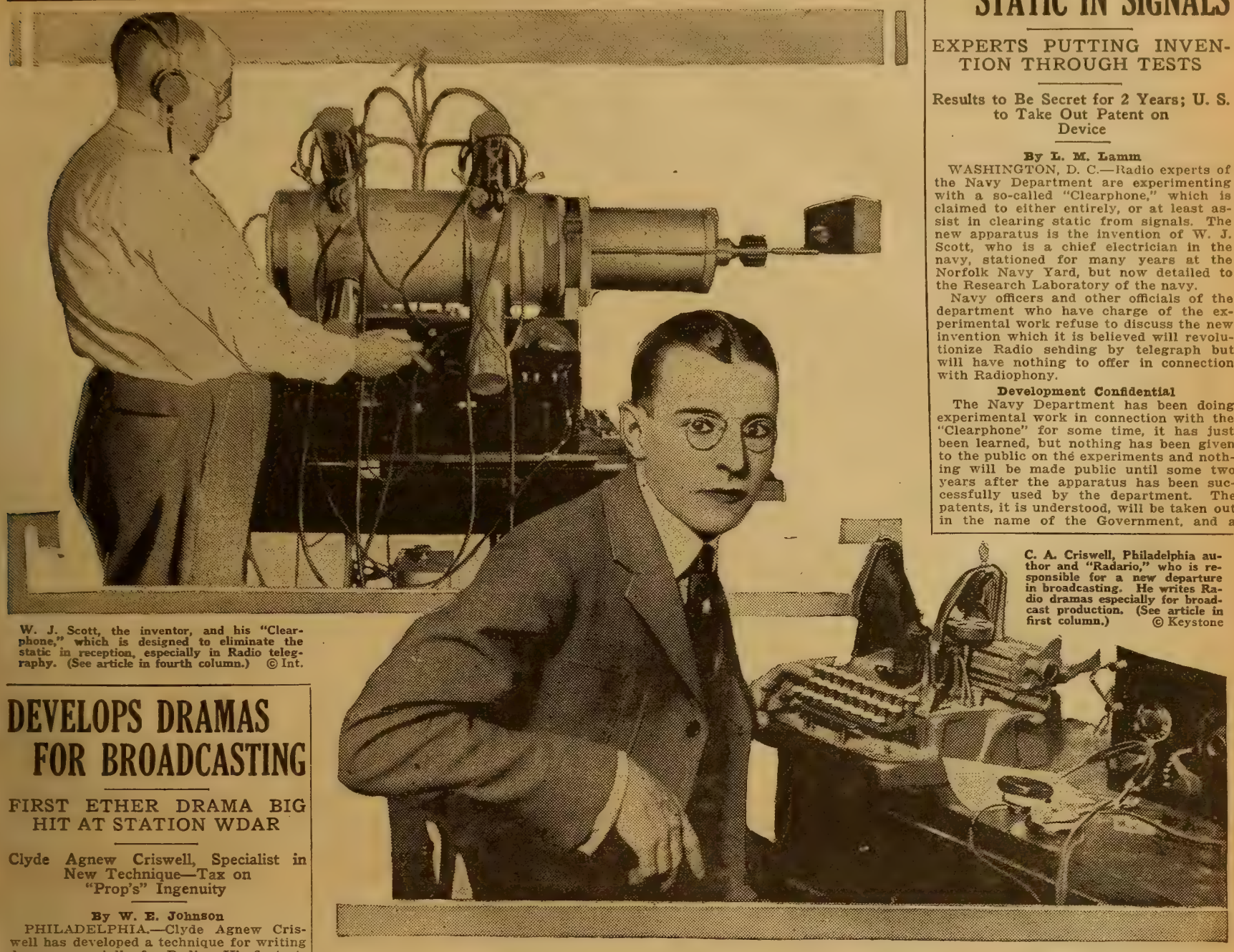
A SILK-COVERED WIRE but 20 feet long, supplied with this Receiver, does the work of the unsightly outdoor antenna, or loop. This wire may be concealed behind the picture moulding or run along the baseboard.

Ask your Dealer, today!

"CLEARPHONE" AND "RADARIO" NEW DEVELOPMENTS



W. J. Scott, the inventor, and his "Clearphone," which is designed to eliminate the static in reception, especially in Radio telegraphy. (See article in fourth column.) © Int.

C. A. Criswell, Philadelphia author and "Radario," who is responsible for a new departure in broadcasting. He writes Radio dramas especially for broadcast production. (See article in first column.) © Keystone

DEVELOPS DRAMAS FOR BROADCASTING

FIRST ETHER DRAMA BIG HIT AT STATION WDAR

Clyde Agnew Criswell, Specialist in New Technique—Tax on "Prop's" Ingenuity

By W. E. Johnson

PHILADELPHIA.—Clyde Agnew Criswell has developed a technique for writing dramas especially for Radio. His first attempt, "The Secret Wave," a three-act play of the melodramatic type, was broadcast from WDAR, Lit Brothers, in Philadelphia. Mr. Criswell says the play pleased so well that the station has received more than 1,000 letters asking for more. He is credited with having written the first Radio drama, and holds a copyright on it.

"Radio dramas," he said, "will find a permanent place on broadcast programs in the future. When the moving picture was invented it was found that dramas written for the stage were not suited for filming, and new ideas had to be used.

New Technique Needed

"Until such time as the moving pictures and Radio have been synchronized, and this time is bound to come, this new technique will have to be used. A dialogue must be used that will convey to the listeners-in exactly what is taking place. Each sentence must convey a move or action. In the stage play, the audience sees every move, and also hears; in the motion picture the audience sees and also reads the captions or sub-titles, but the Radio audience, which is invisible, must follow the action of the play by words. Everything must be through suggestion.

"Everything," Mr. Criswell said, "must be conveyed so forcibly that the listener in really beholds the characters and knows what sort of setting is used."

Property Man Originates

The Radio drama has developed a new type of genius, thinks Mr. Criswell. He is the Radio property man.

"Just as the movies and the legitimate stage have property men, so, too, must the Radio drama or play have a property man. And I think his job is much harder, because he must adapt himself to the new art.

"For instance, many amusing things happened while we were broadcasting tests of 'The Secret Wave.' We found that by discharging a regular type revolver it gave a long whistling noise instead of the sharp staccato sound that was wanted. What we did was to blow up a paper bag and burst it. In the third act was a revolver duel, and to distinguish between the two shots, we had to use the paper bag stunt for one shot and burst a toy balloon for the other. This gave the listeners in the conception of two different shots."

Automobile Sounds Faked

There is also an automobile in this act. The part required closing of the door, blowing the horn, starting the motor, shifting the gears and using the auto cut-out. "Of course," he said, "the blowing of the horn was easy, but we were put to our wits' end to get the other necessary sounds. This is how we did it. For slamming the door of the auto we had a regular automobile door; for starting the motor we used a vacuum cleaner in front of the microphone; for shifting gears, we had a regular Ford gear-shift in front of an electric fan to give the engine effect, while for using the cutout, we held a stiff piece of cardboard against the electric fan.

"These stunts are known as graphic sound, and the property man has a hard job on his hands to have everything record exactly as it should sound."

Mr. Criswell claims that you must "walk on eggs" to please the Radio audience with a drama. In the regular theater the man has the choice of picking a play from a number, and it is the same with the movies. The minister will go to the show that pleases him, while the gambler will go to a play that attracts him. All of the objections must be taken into consideration, because in Radio everybody listens in.

WBZ Employes Organize Station's Own Orchestra

SPRINGFIELD, MASS.—Station WBZ of the Westinghouse Company, now has its own orchestra, known as the WBZ Concert Orchestra. This will supplement concerts given from the station by artists of Springfield and vicinity, and is composed of employes of the Westinghouse plant here. It is directed by S. J. Fairfield, who has been a conductor of bands and orchestras for twenty-five years. At present it is planned to give concerts three times weekly, the programs being arranged as dinner concerts, Monday, Wednesday and Friday, from 6 to 7 P. M., Eastern Standard Time.

CLEARPHONE KILLS STATIC IN SIGNALS

EXPERTS PUTTING INVENTION THROUGH TESTS

Results to Be Secret for 2 Years; U. S. to Take Out Patent on Device

By L. M. Lamm

WASHINGTON, D. C.—Radio experts of the Navy Department are experimenting with a so-called "Clearphone," which is claimed to either entirely, or at least assist in clearing static from signals. The new apparatus is the invention of W. J. Scott, who is a chief electrician in the navy, stationed for many years at the Norfolk Navy Yard, but now detailed to the Research Laboratory of the navy.

Navy officers and other officials of the department who have charge of the experimental work refuse to discuss the new invention which it is believed will revolutionize Radio sending by telegraph but will have nothing to offer in connection with Radiophony.

Development Confidential

The Navy Department has been doing experimental work in connection with the "Clearphone" for some time, it has just been learned, but nothing has been given to the public on the experiments and nothing will be made public until some two years after the apparatus has been successfully used by the department. The patents, it is understood, will be taken out in the name of the Government, and a policy has been adopted at the Navy Department which precludes the giving of any experiment to the public until after two years has elapsed.

In addition to the work which the navy experts have done on the "Clearphone" it is understood that Mr. Scott worked for several years on it before bringing it to the attention of the navy officials. The experiments so far, it has been learned, look as though the apparatus would be a success.

Standard Waves for Set Check-up

WWV to Enable Amateurs to Calibrate Wavemeters so as to Check Transmitting Outfits

WASHINGTON.—In an effort to permit Radio operators and fans to check their wavemeters and instruments on standard waves, the Bureau of Standards will transmit standard wave lengths commencing at 10:55 p. m., Eastern time, each night, on July 17, August 15, September 13 and 28 and on October 7.

On the last date, WWV will enable amateurs to calibrate their receiving and transmitting sets, since the land covered will be from 222 to 150 meters, the signals being sent between 1:50 a. m. and 3:41 a. m.

The schedule follows:

Date—	Kilocycles, Frequency	Wave Length, Meters
July 17	425-1500	705-200
Aug. 15	425-1500	705-200
Sept. 13	425-1500	705-200
Sept. 28	500-1700	600-176
Oct. 7	1350-2000	222-150

In continuation of the established practice, the Bureau will transmit the call signals "WWV" both in Radiotelegraph and Radiotelephone, each wave length occupying about nine minutes of time.

Gold-Mounted Receivers Are Royal Wedding Gift

LONDON.—Among the countless wedding presents received by the Duke and Duchess of York was a wonderful gold-mounted Radio receiving set. It is a portable loop receiver, mounted on a mahogany tea wagon, complete in every detail, with loud speaker and even a charger for the storage battery on the shelf beneath.

Never place a lightning switch indoors.

"RADIO BABY" NAMED FOR BROADCAST PLANT

WGY, Schenectady, Is Honored by Wisconsin Family

SCHENECTADY, N. Y.—WGY, located here, has been honored by a Wisconsin family. A brand new baby has been named after it. He is Wallace Gordon Yadon and he lives in Delavan, Wis. His father has written the station:

"We have a baby called the 'Radio Boy,' because we have named this child after your station, which indicates that not only the child is a favorite but that your station is our favorite. We only hope that you would broadcast twenty-four hours daily.

"The boy's name is Wallace Gordon Yadon. The receiving set has been placed at the hospital for the last five weeks, and even the little fellow is getting so he can recognize the announcer."

France Leads Europe with Most Powerful Equipment

PARIS.—While the United States has been carrying on an intensive campaign in broadcasting and the use of Radio by amateurs, France has been hard at work developing its commercial Radio business through private enterprise. Today France has the largest, most efficient and most powerful equipment in Europe. Unlike England, France took the opportunity during the war of developing this new means of communication.

YANKS AND JAPS IN RADIO RIGHTS MESS

HARBORD MEETS OFFICIALS AT WASHINGTON

Minister Schurman Remonstrates with China for Expulsion of Yank Firm

WASHINGTON, D. C.—G. Harbord, president of the R. C. A., was in recent conference with state department officials, and, while no statement as to the nature of the conversation was forthcoming, it was understood to have had to do with efforts of the Federal Telegraph Company to obtain from the Chinese government authority to complete and put in operation its Radio stations in China.

The only authoritative statement made at the department was that there had been no recent Chinese development. It was understood that the Washington government has as yet been unable to induce the Chinese authorities to grant equal opportunity and land rights to the Federal Company, although the latter has invested more than $15,000,000 in its Chinese enterprise.

Japs Can't Jump Ocean

A Japanese Radio company is also at work in China but has not yet established communication across the Pacific owing to mechanical difficulties with its equipment. Pressure from this source via Tokyo is generally credited with having caused the Peking authorities to defer action on the request of the Radio Corporation for the granting of privileges necessary to the completion of its projects in China.

There is reason to believe that Minister Jacob G. Schurman has remonstrated with the Chinese authorities over what amounts to an expulsion of the American company in favor of the Japanese concern and that he has pointed out that the Washington government expects the Peking government to adjust matters so that there can be equal opportunity in development of trans-Pacific communication and the furtherance in commercial intercourse with China.

Use Remote Control to Send Out Calgary Music

CALGARY, ALTA.—CFCN is now broadcasting every Monday night the Military Band at the Capitol theater here. The concert is broadcast by a system of remote control which has been perfected by W. W. Grant. The orchestra is located in the heart of the city and the broadcasting station located on Crescent Heights, a mile and a half distant. Cable lines run from the theater to the station.

The London Daily Mail has a broadcasting station at The Hague, Holland, and it has been reported as heard in this country. The call letters are PCGG.

SOMETHING NEW

A real loud Talking Detector made of "B" Metal. 100% superior to any crystal. Puts new life into your set. Guaranteed for one year. It's the cheapest in the long run.

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Sold by all live dealers, or can be ordered from the

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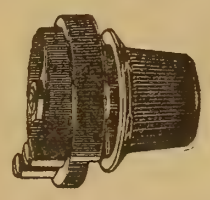

Guarantee an unusually uniform and steady contact.

For base or panel mounting.

Condensite base, high-grade resistance unit, attractive knob. Adjustable shaft to any thickness panel.

6 Ohms.....$1.00; with dial.....$1.25
20 Ohms..... 1.25; with dial..... 1.50
(For UV-201A Tubes)
50 Ohms..... 1.30; with dial..... 1.55
(For UV-199 Tubes)

At All Good Dealers

AMSCO PRODUCTS, INC.
Broome & Lafayette Sts., New York City

PORTABLE RECORDS? SEND 'EM IN—

By the Contest Editor

WHAT do you think of this list of portable set records? These Radiophans are not going to let the summer heat keep them from listening in. They have their outdoor sets all ready for the summer and it looks as if they are not going to miss any of the interesting programs to be broadcast this season. If you have a portable set, read over the rules given below, and send in your records. Let other Radiophans know what you are getting on your outdoor set.

The first list of portable record holders appears below:

Single Tube

Station—Miles Away—Who Heard It

CFAC—1775, M. A. Acheson, Houston, Tex.
CJCA—1975, M. A. Acheson, Houston, Tex.
CJGC—1225, M. A. Acheson, Houston, Tex.
KFEY—1650, M. A. Acheson, Houston, Tex.
KGG—1825, M. A. Acheson, Houston, Tex.
KDKA—350, W. R. Clark, Jr., Bridgeport, Conn.
PWX—1375, W. R. Clark, Jr., Bridgeport, Conn.
WBU—750, W. R. Clark, Jr., Bridgeport, Conn.
WCAE—350, W. R. Clark, Jr., Bridgeport, Conn.
WCAU—1350, M. A. Acheson, Houston, Tex.
WCAX—1600, M. A. Acheson, Houston, Tex.
WCAY—1050, M. A. Acheson, Houston, Tex.
WDAK—1525, M. A. Acheson, Houston, Tex.
WDAP—750, W. R. Clark, Jr., Bridgeport, Conn.
WDAY—1200, M. A. Acheson, Houston, Tex.
WFAG—1525, M. A. Acheson, Houston, Tex.
WGL—1350, M. A. Acheson, Houston, Tex.
WHAL—1100, M. A. Acheson, Houston, Tex.
WHAS—675, W. R. Clark, Jr., Bridgeport, Conn.
WIP—1350, M. A. Acheson, Houston, Tex.
WJAP—1225, M. A. Acheson, Houston, Tex.
WJAR—1600, M. A. Acheson, Houston, Tex.
WKC—1275, M. A. Acheson, Houston, Tex.
WKY—1373, W. R. Clark, Jr., Bridgeport, Conn.
WLAW—1450, M. A. Acheson, Houston, Tex.
WMAC—1425, M. A. Acheson, Houston, Tex.
WOC—900, W. R. Clark, Jr., Bridgeport, Conn.
WPAL—1000, M. A. Acheson, Houston, Tex.
WPG—975, M. A. Acheson, Houston, Tex.
WSAI—800 K. N. Sapp, Tampa, Fla.
WSB—775, W. R. Clark, Jr., Bridgeport, Conn.
WSL—1475, M. A. Acheson, Houston, Tex.
WSY—900, W. R. Clark, Jr., Bridgeport, Conn.
WWAY—975, M. A. Acheson, Houston, Tex.

Crystal Set

KDKA—1175, M. A. Acheson, Houston, Tex.
KFAF—875, M. A. Acheson, Houston, Tex.
KFFQ—825, M. A. Acheson, Houston, Tex.
KFI—1350, M. A. Acheson, Houston, Tex.
KHJ—1350, M. A. Acheson, Houston, Tex.
KPO—1600, M. A. Acheson, Houston, Tex.
KSD—700, M. A. Acheson, Houston, Tex.
KYW—975, M. A. Acheson, Houston, Tex.
KZN—1200, M. A. Acheson, Houston, Tex.
PWX—950, M. A. Acheson, Houston, Tex.
WAAP—575, M. A. Acheson, Houston, Tex.
WDAF—650, M. A. Acheson, Houston, Tex.
WDAP—970, M. A. Acheson, Houston, Tex.
WGI—1625, M. A. Acheson, Houston, Tex.
WGM—700, M. A. Acheson, Houston, Tex.
WGV—325, M. A. Acheson, Houston, Tex.
WGY—1500, M. A. Acheson, Houston, Tex.
WHA—1000, M. A. Acheson, Houston, Tex.
WHB—650, M. A. Acheson, Houston, Tex.
WLAG—1075, M. A. Acheson, Houston, Tex.
WMC—500, M. A. Acheson, Houston, Tex.
WOC—875, M. A. Acheson, Houston, Tex.
WOS—650, M. A. Acheson, Houston, Tex.
WSB—725, M. A. Acheson, Houston, Tex.
WWJ—1125, M. A. Acheson, Houston, Tex.

ERLA DUO-REFLEX SET

Complete parts for Erla Reflex Circuit, consisting of the following parts: 1 23-plate Vernier Var. Condenser; 1 Variocoupler; 1 Cunningham 301-A Tube; 1 Erla Reflex R. F. Transf.; 1 Marle Audio Freq. Trans.; 1 Gold Grain Detector; 1 Howard 25-ohm Rheostat; 1 Socket; 2 3-inch Dials; .001 and .002 Micadon Condensers; 12 Switch Points; 4 Stops; 2 Switch Levers; 8 Binding Posts; 7x12 Radion Panel; 7x12 Mahogany Cabinet; Buss Wire; Erla Blue Print, drawn to scale, covering every detail of construction. Regular price $42.25.
Our Price, Postpaid..... **$27.95**

List Price		Our Price
$ 9.00	Cunningham 301-A	$ 5.70
9.00	UV-201-A	5.75
6.50	UV-199	5.85
75.00	RADIOLA SENIOR, (Phones and Tube)	$52.50
68.00	RADIOLA SENIOR Amplifier (Tubes)	$52.50
70.00	TUSKA TYPE 222 (3 Circuit)	$55.00
97.50	RADIOLA II (Batteries and Phones)	$81.95
9.00	Kellogg Variocoupler	7.50
8.00	Kellogg Variometer	7.10
1.50	LOADING COIL (Add 200 meters)	$0.65

"B" Batteries (Never over 5 days' old.)
1.75—Eveready 22½ Volt No. 763..... .95
3.00 Eveready 22½ Volt No. 766..... 2.10
5.50—Eveready 45 Volt No. 767..... 3.95
Everything guaranteed as firsts. Send for Special Price List. We pay postage.

254 W. Stiegel St. **RADIO SUPPLY STORES** Manheim, Pa.

Freshman Fix-O

A Fixed Resistance Leak Combination—4 in One

Freshman Condenser
Leak Mounting
Freshman Fixed Leak
SAFE-T HANDLE
Price Complete **65c**

Furnished in Any Value of Resistance from ½ to 10 Megohms.

Separate Condenser and Mountings, 40c.
Separate Leaks with Safe-T Handle, 30c.

At your dealers, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVE., NEW YORK

Portable Set Contest Rules

The rules to follow in the contest are but few and easily followed. They are:

1. Amateurs who are able to beat the records given, or who can claim with good evidence, distance receiving records of 300 statute miles or more for Radiophone broadcasting stations found in the "Broadcasting Station Directory," page 8, of three consecutive issues, may send in such records. These must be made with a portable set and when records are submitted, the contest class it falls in must be told. These three contest classes are: Single tube receivers, sets using a loop aerial and having three tubes or less, and crystal sets.

2. Distances must be measured AIR-LINE and expressed in statute miles. Disregard of this rule may cause amateurs to be declared ineligible.

3. Call signals of station heard, its location and the mileage, as defined in Rule 2, must be given in reporting record. Otherwise record will not be considered.

4. Distances are verified by the contest department of this publication, using a Geo. F. Cram Co. standard Radio map of the United States. Owing to much variance in maps, the distances are only given to the nearest 25 miles and are claimed accurate only within 50 miles.

5. There are no prizes awarded. The only compensation record holders receive is the distinction of recognition through the columns of RADIO DIGEST.

WSY "Official" Broadcasts Increase Farm Stations

BIRMINGHAM, ALA.—WSY of the Alabama Power company is now broadcasting all government matter along with their regular program. Weather reports, department of agriculture matter, lectures and other government information are broadcast. The station is also broadcasting market reports. Many farmers all over Alabama, Mississippi, Tennessee and Georgia are putting in receiving stations since this service has been started by WSY, saying the service is of great value to them and is worth many times the cost of a receiving station.

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BROADCASTERS TO OBTAIN OWN MUSIC

Decision Is Outcome of Convention Held Recently in Chicago

CHICAGO.—The Radio public is to be furnished with an endless stream of high grade musical selections, it was announced by Paul B. Klugh, executive chairman of the National Association of Broadcasters, at a meeting of the executive committee held recently at Chicago.

The National Association of Broadcasters, which was formed as a result of the American Society of Composers, Authors and Publishers' demands for a license fee for the privilege of using selections copyrighted by their organization, has adopted a definite policy of refusing to use any of the society's selections. This decision is based not on the grounds that to so use them would be public performance for profit, but that in using them, the broadcaster would be rendering a service in popularizing the pieces that should be paid for by the music publisher who draws his profits from mechanical rights and sales of sheet music.

The broadcaster association, on the other hand, underwritten by some of the most influential broadcasters in the country, is ready to furnish music written by well-known composers so that the Radiophan will not miss the music of the American Society.

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The Week's Advance Broadcast Programs

Tuesday, June 26

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert. "Egmont," Star Orchestra; "Pale Moon," Kate Jackson, contralto; "Out of the Dusk," W. Woods, cornetist; "Pulcinello," orchestra. "The Swallows," Kate Jackson, contralto; selection from "Katinka," orchestra. "I Love You More," W. Woods, 'cellist; "Serenade," orchestra. "Bonnie Sweet Bessie," Kate Jackson. "Mignonette," orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Mary Christine Albu, pianist; 2:30-3:30 P. M., Matinee musicale; 6:45-7:30 P. M., Children's hour: Harry J. Beardsley, baritone. Bedtime stories, Uncle John; 8:00-10:00 P. M., Concert. Fleming's Californians Orchestra.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Dance music, Cope Harvey's Orchestra. 8:58 P. M., Musical program, Lucille Westerfield, soprano, Harriet Weeber, pianist; Mrs. D. B. Hayden, reader, Russell Longmire, baritone.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Fred Calhoun's Texas Hotel Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., Musical selections; Talk, "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray. 8:30-9:30 P. M., Concert. Netto Quartet of Male Singers. 11:00-12:00 P. M., Musical recital arranged by Sanger Bros.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Song recital; 6:20 P. M., Baseball scores; 6:30 P. M., Meyer Davis Bellevue-Stratford Concert Orchestra; 7:00 P. M., Safety talk, Stanley Cowman; 8:00 P. M., Boy Scout period; 8:30 P. M., Musical selections; 10:30 P. M., Meyer Davis Bellevue-Stratford Dance Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Business report, Roger W. Babson; Amrad Players with Amrad Orchestra.

WGY (Eastern, 380), 1:00 P. M., Talk, "Indian Folk Lore and Legends," Mrs. Katherine V. Steers; 7:35 P. M., Talk, "Establishing the Pheasant," Justin T. Mahoney, State Conservation Commission; 7:45 P. M., Musical program, courtesy of Albany Music Teachers' Asst.; "Minuet," instrumental ensemble; "Scherzo in B Flat Minor," Mary Hoefflich, pianist; "Elsa's Dream," from "Lohengrin," Mary Whish, soprano; "Adagio," "Rondo Allegretto," from "Seventh Concerto," David Harris, violinist; "The Wood Pigeon," Katherine Crumney, singer; "Pony Race," Ruth Feinburg, pianist; "Will Ye Remember," "I Must Down to the Sea," Chester Gilligan; "The Nightingale," Marion Conklin, pianist; "Scene de Ballet," Alice Cooper, violinist; "Valse Eroica," Fredericka Phelps, saxophonist; "Sonata Pathetique," First Movement, Genevieve Peter, pianist; "The Springtime of the Year," "Irish Folk Song," Marjorie MacFarland, singer; "Hungarian Rhapsody," No. 12, Stanley Hummel, pianist; "Air for G String," Violin choir.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie Jones, conductor; 7:30-9:00 P. M., Concert, Franklin's Dance Orchestra; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00-4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talk; 9:00 P. M., Song recital; 10:10 P. M., Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Central, Daylight Saving, 309), 10:00 P. M., Concert, Ilse Huebner and pupils; Playlet, "Nevertheless," Amber Wharton, Ralph Haberton and Alvin R. Plough.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Babson report; Miriam Aaron, soprano; 9:15-10:00 P. M., Musical program arranged by Mrs. Elizabeth Otis Roeker, violoncellist.

WMC (Central, 400), 8:30 P. M., Concert, Memphis Male Quartet.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 7:30 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; Mrs. Harriett E. Wray, soprano, D. M. Vint, tenor; Robert & Paul Smith, baritones.

Wednesday, June 27

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert. "Ruy Blas," Star Orchestra; "Anethama," Alex. Elder, baritone; "Viennese Melody," Mannie Roth, violinist; "L'Extase," orchestra; "How Can I Comfort Ye," Alex. Elder; "Serenade," orchestra; "Chanson Arabe," Mannie Roth; "Dance of the Hours," orchestra; "Fill a Glass with Golden Wine," Alex. Elder; "Turkish March," orchestra.

KHJ (Pacific, 400), 12:30-1:15 P. M., Concert, Hawaiian Orchestra from the S.S. "Calawaii." 2:30-3:30 P. M., Musical matinee, Hawaiian Orchestra; Lecture, Rae N. Victor; 6:45-7:30 P. M., Children's Hour; music and bedtime story, Uncle John; 8:00-10:00 P. M., Program arranged by Downey Women's Club.

KSD (Central, 546), 8:00 P. M., Recital: Mrs. Hector Paamezoglu, soprano; Olga Hambuechen, contralto; Harvey W. Ramsay, tenor; Raymond Koch, baritone; Paul Friess, pianist; Address, Mayor Henry Kiel of St. Louis, F. W. A. Vesper, president St. Louis Chamber of Commerce.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Dance music, Cope Harvey's Orchestra; 8:58 P. M., Musical program; Florence Kramp, soprano; Mary Welch, contralto; Mark Love, baritone; Howard Neumiller, accompanist; Charles Blum, harmonica.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Texas Melody Boys' Dance Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Features from Stanley Theatre; 4:30-6:00 P. M., Song recital; 7:30-8:00 P. M., Dream Daddy; 8:00 P. M., Musical program, Howard Lanin's Arcadia Cafe Dance Orchestra.

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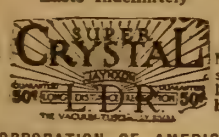

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WFAA (Central, 476), 12:30-1:00 P. M., Musical program by Melba Theatre talent.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Concert; 3:45 P. M., Song recital; 6:20 P. M., Baseball scores; 6:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 7:00-7:30 P. M., Bedtime stories, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 6:45 P. M., Girls' Hour, Eunice L. Randall; 8:30 P. M., Talk, "Science Up to Date," Scientific American Magazine; Concert, Mabel Mulrey, soprano; Irene Mulrey, pianist; Mrs. Maud Dunnan, reader.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; 7:30-900 P. M., Musical program, Richard Wymond, violisist; Ruth Sharp, pianist; Bryan Holloway, baritone; Billy Hinkle, guitar; Mandolin and guitar duet, Jean Kohlhepp, Billy Hinkle; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Musical program; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Central, Daylight Saving, 309), 8:00 P. M., Aichele Novelty Orchestra; Swimming Lesson No. 4, Stanley Brauninger; Sam Ward, comedian; Al Zef, entertainer; Talk, T. C. O'Donnell; Songs, Lavergne Sims; Aichele Orchestra; "Come, Beloved," "Pleurez, Pleurez Mes Yeux," Leah Fred; Zither duets, Ruth Hohe, Chas. Hohe; "A Dream," "O Sole Mio," "Last Rose of Summer," Leah Fred; Zither duet, Ruth Hohe, Chas. Hohe; "Beloved, It Is Morn," "Bitterness of Love," "Carmena," Leah Fred; Zither duets, Ruth Hohe, Chas. Hohe; Aichele Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Stories, Georgene Faulkner; Talk on Chemistry, J. A. Hynes, chief chemist, U. S. Customs Laboratory; 9:15-10:00 P. M., Musical program, Elizabeth Lay Newman, soprano; Alfred Newman, baritone; Thos. Pither, tenor.

WOC (Central, 484), 3:30 P. M., Educational talk, D. K. Kirk, 8:00 P. M., Recital, Erwin Swindell, organist; Mrs. John Rolling, soprano; 10:00 P. M., Gladys Muerling, Louise Bolia, Grace Lindberg, Clara Slorin, Adeline Howkisson.

WOO (Central, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt; 7:30 P. M., Baseball scores and sporting results; 7:45 P. M., Dinner music, Adelphia Hotel Orchestra; 8:30 P. M., Song recital; 9:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 7:30 P. M., Concert, News Orchestra; Mrs. Grace George, soprano; Mrs. C. B. Davis, pianist; Greta Maedel, soprano.

What Time Is It?

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, June 28

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert. "Spanish Dances," Star Orchestra; "Cavalleria Rusticana," Lyona Hunt, soprano; "Berceuse," Jacques Stern, 'cellist; "Mignon," orchestra; "Eili, Eili, Eili," Lyona Hunt, soprano; "Espagnole," orchestra; "Ave Maria," Jaques Stern, 'cellist; "Il Trovatore," orchestra; "As I Went a-Roaming," Lyona Hunt; "Praeludium," orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Matinee musicale, Naomi Sweeney Brown, whistler; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., "A Night in the Trenches," The California Hut.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of Inland Elec. Co.; Dance music, Cope Harvey's Orchestra; Wendell W. Hall, KYW's Music Maker; 9:05-9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. J. Dept. of English, Loyola University.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Fort Worth Police Band.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Musical program; Talk, "Affairs of the Heart," Betsy Logan; 4:30-6:00 P. M., Song recital and short talks, 7:30-8:00 P. M., Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "How General Should Laws Be Made?" O. O. Touchstone, president Dallas Bar Assn.; 8:30-9:30 P. M., Musical program, Wednesday Morning Choral Club; 11:00-12:00 P. M., Recital, arranged by D. L. Whittle Music Co.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Song recital; 3:45 P. M., Concert; 6:20 P. M., Baseball scores; 7:00 P. M., Short talks; 8:00 P. M., Musical program.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Songs, Dean Winslow Hanscom, tenor; Talk, "Rental and Housing Conditions," L. E. Dierdorff; Concert, Amrad Pianoforte Club.

WGY (Eastern, 380), 1:00 P. M., Talk, "Mental Hygiene—What New York State Is Doing for the Mentally Defective," Eleanor A. Gray, N. Y. State Dept. of Education; 7:45 P. M., Musical program; "March of the Gladiators," Cyprus Temple Shrine Band of Albany, N. Y., W. Elmore Slack, director; "Rival Overture," band; "My Laddie," Alice Brown, soprano; "Forest Whispers," "Ballet Music," band; "O, Dry Those Tears," Alice Brown; "Sounds from the South," "The Bandman's Delight," band; "The Little Damozel," Alice Brown; "Lustspiel," "Coronation March," band.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra. 7:30-9:00 P. M., Concert, Warren Memorial Church Choir Quartet; Mary Anderson Theatre Orchestra; Sunday School Lesson, Dr. E. B. Patterson, Talk, Miss M. L. Speed.

WIP (Eastern, Daylight Saving, 509), 3:00-4:30 P. M., Recital; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Musical program.

WJAX (Eastern, 390), 8:00 P. M., Concert, Hotel Cleveland Orchestra.

WLW (Central, Daylight Saving, 309), 8:00 P. M., Concert, Budd Rudd's Collegian Dance Orchestra; "In the Days of Knighthood," "Gipsy Serenade," Carlo Mastropaolo, violinist; "Norwegian Dance," "Valse Caprice," Rosina Arrico, pianist, "Lucian Polka," Corea Swartz, cornetist, Violin duet, Carlo Mastropaolo, Erwin Breustle; Selections by orchestra; "Cavatina," "Calm as the Night," Erwin Breustle, violinist; "Sabestrian Love Song," Rosina Arrico, "Commodore," Corea Swartz, cornetist; Violin duet, Carlo Mastropaolo, Erwin Breustle, orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Talk on Auto Trails, Rockwell Stephens. Talk to Boy Scouts, Gilbert Butler; Talk, "Our Northern Neighbors," Capt. J. Milton State; 9:15-10:00 P. M., Mixed quartet.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Chisca Philharmonic Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:30 P. M., Baseball scores.

WWJ (Eastern, 517), 7:30 P. M., Concert, Schmeman's Band; 8:30 P. M., News Orchestra; Marie Bloe, pianist; Frank Hawkes, pianist; Anne Curran, soprano; Edgar Hagel, saxophonist; 10:00 P. M., Dance program, Peacock Orchestra.

Friday, June 29

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Lohengrin," Star Orchestra; Mary Bothwell, contralto; "Canzonetta," Harry Adaskin, violinist; "La Czarine," orchestra; Mary Bothwell, contralto; "Sleeping Beauty Waltz," orchestra; "Songs My Mother Taught Me," Harry Adaskin; Mary Bothwell; Selection from "The Country Girl," orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Matinee musicale, 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Program, arranged by Lillian Martin.

KSD (Central, 546), 8:00 P. M., Opera, "Die Fledermaus" (The Bat), Municipal Open Air Theatre.

KWY (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of Lyon & Healy Concert Dept.; Cope Harvey's Orchestra; 9:05-9:25 P. M., Book reviews, Llewellyn Jones.

WBAP (Central, 476), 9:30-10:30 P. M., Concert, Original Johnnies Jolly Jazz.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Song recital; 4:30-6:00 P. M., musical program; Talk, "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Dream Daddy; 8:00 P. M., Short talks, musical selections, dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Address,

(Continued on page 9.)

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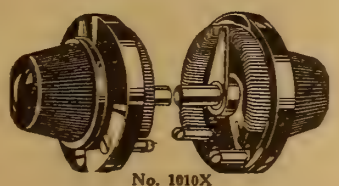

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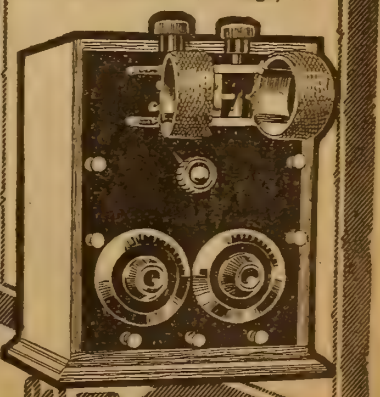


only 50¢

Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the third part will appear next week.)

KUY, El Monte, Calif. 360 meters. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Calif. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 360 meters. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 360 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYQ, Honolulu, Hawaii. 360 meters. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 345 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central. Daylight Saving.

KZM, Oakland, Calif. 360 meters. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 360 meters. 1,000 mi. Desert News. Slogan, "The Center of Scenic America." Daily ex Sun, 8-9:30 pm, music, news, bedtime stories, etc. Mountain.

KZV, Wenatchee, Wash. 360 meters. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 435 meters. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3 (Tues. only), Dept. Interior: 3:25-4:40, 5:05-5:20, markets, weather 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 meters. 1,500 mi. International Tel. & Teleg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAAB, New Orleans, La. 268 meters. Valdemar Jensen.

WAAC, New Orleans, La. 360 meters. Tulane Univ. Mechanics Inst. No regular schedule.

WAAD, Cincinnati, O. 360 meters. 200 mi. Ohio Mechanics Inst. No regular schedule. Central, Daylight Saving.

WAAF, Chicago, Ill. 286 meters. 300 mi. Chicago. Daily Drovers Journal. Daily ex Sat and Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Central, Daylight Saving.

WAAH, St. Paul, Minn. 360 meters. 500 mi. Commonwealth Elec. Co. Slogan, "From the Land of Ten Thousand Lakes." Temporarily discontinued.

WAAK, Milwaukee, Wis. 280 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 11 am-2 pm, 8-10:30, music. Eastern.

WAAN, Columbia, Mo. 250 meters. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAW, Omaha, Neb. 278 meters. 500 Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 8, market reports; 8:15-9 pm, music. Central.

WAAY, Youngstown, O. 360 meters. 500 mi. Yahrling-Rayner Music Co. Tues, Thurs, Sat, 8-9 pm, music, reports. Eastern.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABA, Lake Forest, Ill. 266 meters. Lake Forest College.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABC, Anderson, Ind. 229 meters. Fulwider-Grimes Battery Co.

WABD, Dayton, O. 283 meters. Parker High School.

WABE, Washington, D. C. 283 meters. Y. M. C. A.

WABF, Mt. Vernon, Ill. 234 meters. Mt. Vernon Register-News Co.

WABG, Jacksonville, Fla. 248 meters. 50 mi. Arnold Edwards Piano Co. Daily ex Sun, 3-4 pm, concert. Mon, Thurs, 8-10 pm, concert. Eastern.

WABH, Sandusky, O. 240 meters. Lake Shore Tire Co.

WABI, Bangor, Me. 240 meters. Bangor Ry. & Elec. Co.

WABJ, South Bend, Ind. 240 meters. The Radio Laboratories.

WABK, Worcester, Mass. 252 meters. First Baptist Church.

WABL, Storrs, Conn. 283 meters. Connecticut Agri. College.

WAI, Dayton, O. McCook Field, U. S. Army.

WAJT, Marshall, Mo. 360 meters. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. 360 meters. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Irregular schedule.

WBAD, Minneapolis, Minn. 360 meters. Sterling Elec. Co.

WBAF, Moorestown, N. J. 360 meters. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. Slogan, "The Silk City of America." 244 meters. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9-11:30 am, 12:30-5:30 pm. Sat morn, only. Sun, 10-12 am, 2-5 pm, 7:30-10:30. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram Club, "Radio Truth League." Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 3:45-4, markets; 5:30-5:45, 6:30-6:45, 8, sports. Daily ex Sat, Sun, 9:30-10:30 pm, concerts. Sat, 7-7:20 pm, bible lesson. Sun, 11 am-12:15 pm, church; 3:30-4:30, concert. Central.

WBAU, Hamilton, O. 258 meters. Republican Pub. Co. Temporarily discontinued.

WBAV, Columbus, O. 390 meters. 500 mi. The Ernor Hopkins Co. Slogan, "We Broadcast a Variety." Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. 246 meters. Marietta College. Temporarily discontinued.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBBA, Newark, O. 240 meters. Newark Radio Lab.

WBBC, Sterling, Ill. 229 meters. Sterling Radio Equipment Co.

WBBD, Reading, Pa. 224 meters. Barbey Battery Service.

WBL, Anthony, Kans. 261 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun 11-12 am, music; 1-2:15 pm, reports; 2:15-2:30 pm, music, reports. Tues, Thurs, Sat, 7:30-9:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Slogan, "Queen City of the South." Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 286 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAB, Newburgh, N. Y. 360 meters. Temporarily discontinued

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 326 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 268 meters. 200 mi. Clyde R. Randall. Daily ex Sun, 6:45-7 pm, news, time. Thurs, 8:30-10 pm, concert. Central.

WCAH, Columbus, O. 286 meters. 500 mi. Entrekin Elec. Co. Slogan, "The Heart of Ohio." Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, bedtime stories. Thurs, 9 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Slogan, "Where Eighteen Railroads Meet the Sea." Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. Mon, Fri, 7:30 pm, college extension courses. Tues, 7:30 pm. Thurs, 11 pm. Sat, 12 m, music. Tues, Thurs, Sat, 9:40 am, chapel, sports, news. Sun, 8:30 pm, church services. Central.

WCAM, Villanova, Pa. 360 meters. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-12:20 pm, 5-5:20, Mon, Wed, 8-9 pm. Eastern.

WCAR, San Antonio, Tex. 360 meters. 1,000 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 360 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Slogan 'From the Flour City of the World." Mon, 9:30-11 pm, music, lectures. Mon, Wed, Thurs, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 240 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 286 meters. 500 mi. Durham & Co. Daily 11:45 am. Tues, Fri, 7:30-8 pm, concert. Sun, 10:55 am, church services. Eastern Daylight Saving.

WCAV, Little Rock, Ark. 360 meters. J. C. Dice Elec. Co.

WCAW, Quincy, Ill. 360 meters. 300 mi. Quincy Elec. Supply Co. (Quincy Herald). Daily ex Sun, 5 pm, music. Wed, 7-8:30 pm, concert. Sun, 11 am, church services, 2:45 pm, special programs. Central.

WCAX, Burlington, Vt. 360 meters. Univ. of Vt.

WCAY, Milwaukee, Wis. 261 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Tues, 10:30-11:30 pm, dance music. Sun, 7:30-9 pm, church services. Central.

WCAZ, Carthage, Ill. 360 meters. Carthage College.

WCBA, Allentown, Pa. 280 meters. Chas. W. Haimbach. Wed, Sat, 2-12 pm. Sun, 2-4 pm, 8-10. Eastern.

WCBB, Greenville, O. 240 meters. K. & K. Radio Supply Co.

WCE, Minneapolis, Minn. 360 meters. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. 360 meters. Univ. of Tex.

WCN, Worcester, Mass. 360 meters. 100 mi. Clark Univ. Daily, 11:15 am, 5:15 pm, weather. Evening program, irregular. Eastern.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Slogan, "The Call of the Motor City." Club, "Red Apple Club." Daily ex Sun, 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, 4:30, 4:50, 6:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert, Tues, 10-12 pm, Club, Sun, 10:30 pm, 7:15 pm, church services. Central.

WDAC, Springfield, Ill. 360 meters. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Club, "Nighthawks." Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. 263 meters. J. Laurance Martin. No regular schedule.

WDAH, El Paso, Tex. 360 meters. Trinity Methodist Church South. Wed, Thurs, Sun, 7:30-8:30 pm. Mountain.

WDAI, Syracuse, N. Y. 246 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Wed, Sat, evening concert. Eastern.

WDAJ, College Park, Ga. 360 meters. 2,000 mi. A. & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 261 meters. 150 mi. Hartford Courant. Sat 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex., 360 meters. 300 mi. Automotive Elec. Co. Daily, 1-1:30 pm, 7:15-8. Central.

WDAP, Chicago, Ill. 390 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central Daylight Saving.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros. Club, "Good Morning Glory." Daily ex Sun, 12-12:55 pm, music; 2-3 pm, 4:30-6, music, talks; 7:30-8 pm, Dream Daddy. Mon, Wed, 8-11 pm, entertainment. Fri, 8-10:50 entertainment; 1 am, Club. Eastern Daylight Saving.

WDAS, Worcester, Mass. 360 meters. Samuel A. Waite

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern Daylight Saving.

WDAX, Centerville, Iowa. 360 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert.

WDAY, Fargo, N. D. 244 meters. 300 mi. Fargo Radio Electric Co. Slogan, "The Biggest Little City in the World." Daily ex Sun, 9:30 am, weather. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church services; 4-5 pm, music. Central.

WDBC, Lancaster, Pa. 258 meters. Kirk Johnson & Co., Inc.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York City, N. Y. 405 meters. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 278 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. 360 meters. 200 mi. Fallain & Lathrop. Slogan, "The Vehicle City." No definite schedule.

WEAB, Fort Dodge, Ia. 360 meters. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 9:40 am-1:20 pm; 5:15 pm, 7-8 music; 8:35 markets; 9:45, weather. Sat, 10-11:15 pm, dance music. Sun, 10:30 am, 4:30 pm, 7:30, church services. Central.

WEAD, Atwood, Kan. 268 meters. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. 360 meters. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Slogan, "A Voice to the Millions." Daily ex Sun, 11-12 am, 4:30-5:30 pm, 7:30-10. Sun, 3:15 pm, 5:15, 7:15-10. Eastern Daylight Saving.

WEAG, Edgewood, R. I. 231 meters. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 360 meters. 500 mi. Lander Radio Co. Daily ex Sun, 9:40 am, 10:40, 11:40, 12:40 pm, 2, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. 286 meters. Cornell Univ.

WEAJ, Vermilion, S. D. 360 meters. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Daily ex Sun, 5:15-6 pm. Central.

WEAM, North Plainfield, N. J. 252 meters. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 360 meters. 50 mi. The Shepard Co. Daily ex Sun, Mon, 12-1 pm, 4-5, 6-8, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern Daylight Saving.

WEAO, Columbus, O. 360 meters. 1,000 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4:30, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 360 meters. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAU, Sioux City, Ia. 360 meters. 300 mi. Davidson Bros. Co. Slogan, "The Heart of the Corn Belt." Daily ex Sun, 9 am, 10, 11, 1 pm, 5, markets, news. Mon, Wed, Fri, 8-9 pm, concert. Sun 7-9 pm. Central.

WEAV, Rushville, Nebr. 360 meters. 200 mi. Sheridan Elec. Service Co. Wed, Fri, Sun, 8-9 pm. concert, news, etc. Mountain.

WEAX, Little Rock, Ark. 360 meters. T. J. M. Daly. Bros. Co. Daily ex Sun, 10 am, 11, 2, 5 pm, reports, markets, news. Mon, Wed, Fri, 8 pm, concert. Sun, 7 pm, church service. Central.

WEAY, Houston, Tex. 360 meters. 1,500 mi. Will Horwitz (Iris Theater.) Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Daily ex Sun, 9-9:40 am, 12-12:45 pm, 3-4. Wed, 7-9 pm, Central.

WEH, Tulsa, Okla. (300 S. Main St., Eldorado, Kans.) Midland Refining Co.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 261 meters. 100 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WEY, Wichita, Kan. 360 meters. 500 mi. Cosradio Co. (Wichita Beacon.) Daily ex Sun, hourly, 8:40 am-12:40 pm, stock markets. Daily, 10:45 am and 4:30 pm, weather; 8-10 pm, sports, concert, lecture; 10:45 weather. Sun, 8:10 pm, church service, concert. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Slogan, "Working for All Alike." Daily, 10 am, reports; 12:30-1 pm, address; 6:15-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 234 meters. 100 mi. C. F. Woese. No definite schedule.

WFAC, Superior, Wis. 360 meters. 400 mi. Superior Radio Co. Daily, 7-7:45 pm, news. Central.

WFAF, Poughkeepsie, N. Y. 273 meters. H. C. Spratley Radio Co. Temporarily discontinued.

WFAG, Waterford, N. Y. 360 meters. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 360 meters. 300 mi. Hutchinson Elec. Service Co. Slogan, "The Gateway to the Ten Thousand Lakes of Minn." Daily, 11:57-12:20, time, weather. Tues, Wed, 8:30 pm, concert. Sun, 2:30 pm. Central.

WFAQ, Cameron, Mo. 360 meters. 300 mi. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri 11 pm, concert. Central.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10:00 am, 12:40 pm, weather. Mon, Thurs, 7 pm, lectures. Thurs, 8 pm, concert. Central.

WFAZ, Charleston, S. C. 360 meters. 400 mi. S. C. Radio Shop. Daily ex Sun, 12 m, reports, news, music. Tues, Thur, 8-10 pm. Eastern.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sun, 10 am, reports; 1 pm, news; 2, music; 3-4:30, concert; 7-7:30 children's hour. Tues, Thurs, Sat, 8 pm, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital. 7:30, church services. Eastern Daylight Saving.

WGAF, Tulsa, Okla. 360 meters. Goller Radio Service.

WGAL, Lancaster, Pa. 248 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of U. S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAM, Orangeburg, S. C. 360 meters. 150 mi. Orangeburg Radio Equipment Co. Daily ex Sun, 10 am, markets, weather; 11:55, time; 4 pm, Radio talk, markets, sports; 6, music, lecture; 10, time, weather, entertainment. Sun, 11 am, church service; 11:55, time; 10 pm, time, weather, music. Eastern.

WGAN, Pensacola, Fla. 360 meters. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. 360 meters. Southwest America.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. 261 meters. Ernest C. Albright.

WGAX, Washington C. H., O. 360 meters. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 11:30, news; 1 pm, Univ. activities; 4:30, news. Sun, 10:30-12 am, sermon. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 360 meters. Register and Tribune. Slogan, "The Convention City." Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Slogan, "Amrad, the Voice of the Air." Daily, 5-6:45 pm, Children's Hour, reports, codes. Daily ex Sun, Mon, 8:30 pm, concert. Tues, Fri, 3 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 9, concert. Eastern Daylight Saving.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern Daylight Saving.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 319 meters. 1,000 mi. Federal Tel. & Telg. Co. Slogan, "The City of Opportunity." Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2, 3, 4, 5, music, reports; Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern Daylight Saving.

WGV, New Orleans, La. 350 meters. 400 mi. Interstate Elec. Co. Slogan, "Where the Mighty Mississippi Makes a Crescent Near the Gulf." Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 11:30-12 m, 5, 10, reports, time, sports. Mon, Tues, Thur, Fri, 1-1:30 pm, 7:45 concert. Sat, 8 pm, special. Fri, 10:30 pm, special. Sun, 9:30 am, 3 pm, 6:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Daily ex Sat, Sun, 7 pm, lectures, news. Mon, Thurs, 7:30 pm, agriograms, concerts, sports. Sat, 12:15-1 pm, music, codes. Sun, 1:30-2:30 am, concert. Central.

WHAA, Iowa City, Ia. 263 meters. 200 mi. Univ. of Iowa. No regular schedule. Central.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Thurs, Sat, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 360 meters. 100 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAE, Sioux City, Ia. 200 mi. Automotive Elec. Service Co. Daily ex Sun, 12:30-5:30 pm, music, reports. Thur, 7:30 pm, music. Central.

WHAG, Cincinnati, O. 222 meters. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 360 meters. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. 360 meters. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 248 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. 360 meters. Univ. of Rochester.

WHAO, Savannah, Ga. 360 meters. 100 mi. Frederick A. Hill. Daily, 8-9 pm. Eastern.

WHAP, Decatur, Ill. 360 meters. 100 mi. Otto & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 242 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 730-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the State." No definite schedule.

WHAW, Tampa, Fla. 360 meters. 200 mi. Pierce Elec. Co. Temporarily discontinued.

WHAY, Huntington, Ind. 360 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m-12:30, weather, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Staion Located at the Oldest School of Engineering." Club, R. P. I. Mon. 9-10:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Tractor School. Slogan, "Heart of America." Daily, 10 am, 3 pm, 5, weather. Daily ex Sun, 2 pm, ladies' hour; 7, bedtime stories. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 390 meters. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30-2 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:45 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Associated Broadcasters, Inc. Slogan, Station of the Sunrise Trail." Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 360 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm. music. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 360 meters. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 254 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAE, Vinton, Ia. 360 meters. 75 mi. Zimmerman Radio Co. Tues, Thurs, Sat, 9 pm, music, news. Wed, 8 pm, band concert. Sun, 2:30 pm, music. Central.

WIAF, New Orleans, La. 234 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Sun, 10:45-12 m, church services. Central.

WIAI, Sprignfield, Mo. 360 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. 360 meters. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 453 meters. 200 mi. School of Engineering. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. 360 meters. Chronicle Pub. Co. Evening Sun. Slogan, "Howdy Folks, This is WIAR, a real Live Wiar." Daily 5-6 pm, sports. Central.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Daily ex Sun, 3:30-4 pm, reports, news, music, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. 360 meters. Leon T. Noel.

WIAU, Le Mars, Ia. 360 meters. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. 360 meters. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 224 meters. 200 mi. Woodward & Lothrop. Daily ex Sun, 10-11 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Mon, Sat, 8-10 pm, concert.

WIK, McKeesport, Pa. 360 meters. 500 mi. K. & L. Elec. Co. Daily ex Sun, 630-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 360 meters. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm. music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 11 am, church services, starting June 3, every alternate week; fill in weeks, 4:30 pm, concert. Central Daylight Saving.

WIZ, Cincinnati, O. 360 meters. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central Daylight Saving.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

(The third part of the station schedules will appear next week.)

ADVANCE PROGRAMS

(Continued from page 7)

"Leaders of the Old Testament." Dr. Robert S. Hyer Southern Methodist University; 8:30-9:30 P. M., Musical program, Walter J. Fried, violinist, and assisting artists.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Concert; 6:20 P. M., Baseball scores; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00 P. M., Stories, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 6:30 P. M., Silversmith series, David M. Cheney. "Oliver Ditson Night." Amrad Choral Club; Amrad Banjo-Mandolin Club, Amrad Orchestra.

WGY (Eastern, 380), 1:00 P. M., Talk, "Oilcloth Laborsavers for Summer Homes." 7:35 P. M., Talk, "Swimming Its Dangers and Benefits," State Dept. of Health; 7:45 P. M., Radio drama, "It Pays to Advertise." WGY Players. 10:30 P. M., Musical program, "Susan Jane," "The Yaller Gal That Winked at Me," WGY Orchestra; "Nobody Knows the Trouble I've Seen" Calhoun Colored Trio, "High Jinks," Kitty Meinhold, pianist; "Go, Mary, Toll the Bell," trio; "Darling Nellie Gray," Edward Rice, violinist; "Steal Away," trio, Walter Kane, "Chime Selection," Kitty Meinhold; "All the Way to Calvary," trio; "Pickles," Kitty Meinhold; "Old Ark Amoverin," trio, "Southern Overture," orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; 7:30-9:00 P. M., Concert, Manning Hawaiian and Jug Orchestra

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Dance program, 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Stories, Jessie G. Van Cleeve; Musical lecture, Mrs. Marx Oppenheimer; 9:15-10:00 P. M., Musical program, Apollo Male Quartet.

WMC (Central, 400), 8:30 P. M., Concert, Walter Moore Mixed Quartet; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilson; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:30 P. M., Sporting results 7:45 P. M., Musical program; 8:00 P. M., WOO Orchestra, Robert E. Golden, director; 9:00 P. M., Organ recital, Mary E. Vogt; 10:00 P. M., Dance music, from Adelphia Roof Garden, Walter Miller, director.

WWJ (Eastern, 517), 7:00 P. M., Concert, News Orchestra; Alverna Haas, pianist; Mrs. A. V. Cluff, soprano; Joseph T. Korsenicwski, baritone.

Saturday, June 30

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Rosamunde." Star Orchestra; "Arensky Trio," Star Trio; Arthur Fisher, baritone; "Mary of Argyle," W. Woods, cornetist; "Berceuse," orchestra; Arthur Fisher; "Valse des Fleurs," Orchestra; "Ye Banks and Braes," W. Woods; Arthur Fisher, baritone; "Sempre Fidelis," orchestra.

KHJ (Pacific, 400), 2:30-3:30 P. M., Matinee musicale; Pasadena Boy Scouts; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Musical program, Maybelle Strock, soprano; Isabel Nare, pianist.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of W. W. Kimball Co.; Cole Harvey's Orchestra; Wendell W. Hall, KYW's Music Maker; 9:05-9:25 P. M., Under the Evening Lamp "Youth's Companion."

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum First Methodist Church.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Arcadia Concert Orchestra; Song recital, 4:30-6:00 P. M., Dance program; 7:30-8:00 P. M., Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Concert, J. J. Wright's Male Quartet; 11:00-12:00 P. M., Musical program, Ruth Fabian and assisting artists.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Concert, Strawbridge Male Quartet; 6:20 P. M., Baseball scores; 6:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 7:00 P. M., Safety talk, Stanley Cowman; 8:00 P. M., Song and piano recital.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk on New England Business Problems, Arthur B. Curtiss, Concert.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; 7:30-9:00 P. M., Myrtle Stinger, soprano; Mrs. Rose Knasel Howe, reader; Hiram Shelley Summers, tenor; Mrs. John T. Quinn, soprano; Margaret Hammerstein, pianist; Mary Anderson Theatre Orchestra; Clifford Gorman, organist.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00-4:30 P. M., Dance program; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talks; Recital; 10:10 P. M., Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WMAQ (Central, Daylight Saving, 447), 7:00-8:00 P. M., Musical program, Thelma Smithpeter, soprano; Cornelius Shugarman, reader; 9:15-10:00 P. M., Recital, Mme. Ella Spravka, pianist; Prof. Boza Oumiroff, basso.

WMC (Central, 400), 8:30 P. M., Concert, Alexander's Five Aces.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert, 8:00 P. M., Talk, J. E. Gorman, president of Chicago, Rock Island and Pacific Railway; 9:30-10:30 P. M., Dance music, P. S. C. Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:30 P. M., Sporting results.

WWJ (Eastern, 517), 7:30 P. M., Concert, Schmeman's Band.

Sunday, July 1

WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, teacher; 9:30-10:00 P. M., Sacred recital, Haskell Ave. Methodist Church; 10:00-11:00 P. M., Concert, William C. Hallbo-k's Orchestra.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., "Adventure Hour," Youth's Companion, Concert, Miriam Stanley Carleton, soprano and violinist, 8:30 P. M., Talk on World Unity, conducted by Mass Federation of Churches; 9:00 P. M., Musical program.

WGY (Eastern, 380), 9:30 A. M., Church services, First Baptist Church, Rensselaer, N. Y.; Sermon, "The God Man Christ Jesus," Rev. William S. Y. Robinson. 6:30 P. M., Church services, First Baptist Church, Sermon, "What Does the Cross of Christ Mean to You?" Rev. William S. Y. Robinson.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church services, Fourth Ave. Presbyterian Church, Rev. Dr. Charles W. Welch, pastor; William E. Couch, organist. Mrs. Newton G. Crawford, soprano. Mrs. Virginia Shafer Herrick, contralto; H. Archer Culmer, tenor; Peter Schlicht, baritone; 4:00-5:00 P. M., Concert under auspices of Nina Hazelrigg.

WIP (Eastern, Daylight Saving, 509), 11:00 P. M., Church services, Holy Trinity Chapel; Ernest Felix Potter, organist.

WMC (Central, 400), 11 A. M., St. Mary's Episcopal Cathedral services.

WWJ (Eastern, 517), 7:30 P. M., Church services, St. Paul's Cathedral; 2:00 P. M., News Orchestra; 3:00 P. M., Concert, Schmeman's Band.

Monday, July 2

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Recital; Talk, "Affairs of the Heart," Betss Logan; 4:30-6:00 P. M., Musical selections; 7:30-8:00 P. M., Dream Daddy; 8:00 P. M., Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Concert; 6:20 P. M., Baseball scores; 6:30 P. M., Meyer Davis Bellevue-Stratford Concert Orchestra; 7:00 P. M., Stories, Cousin Sue.

WGY (Eastern, 380), 1:00 P. M., Talk, "How to Deal with the Clothes Moth," courtesy of Modern Priscilla; 7:45 P. M., Musical program; "Deux Polonaises," Helen K. Ryan, pianist; "The Old Sweetheart of Mine," Anne F. Brubaker, reader; "Robin Sing a Merry Tune," Beulah Daughirtai, soprano; "Serenata," Raymond F. Rooney, violinist; "Calls," Anne F. Brubaker; "Etude Japonaise," Helen K. Ryan; "A Heart of Gold," "Birth of Dawn," Beulah Daughirtai; "Spanish Dance," Raymond F. Rooney; "Little Boy Blue," "Teddy Bear," Anne F. Brubaker; "My Sunshine," Beulah Daughirtai; "Impromptu," Helen K. Ryan.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theatre Orchestra; "Just Among Home Folks," Courier-Johrnal; Clifford Gorman, organist.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 4:00-4:30 P. M., Song recital; 6:00-6:45 P. M., Dinner music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Gayoso Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:30 P. M., Baseball scores; 8:30 P. M., Musical program.

SPECIAL OFFER LIST

(Continued from page 2)

Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A).

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $1.80 the following will be sent: 1 Acme Pot-Rheo (potentiometer and Rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Decima Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variodon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 2 Ratio.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Decima 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B.

FLEWELLING ANSWERS

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Winding Variocoupler Rotor

(Submitted by A. W. O., Winnipeg, Canada.)

Question.—In making the variocoupler for the Flewelling Super I find that it is impossible to place 100 to 130 turns of No. 28 or 30 DCC wire on the rotor if I use the standard size ball. Should I bank-wind the coil or should I use fewer turns?

Answer.—The rotor may be wound to the required number of turns by the use of smaller wire. The size will have no practical electrical effect and one may as well use small sized wire as large. As the space is small the small sized wire would naturally be preferable, because if larger wire is used it will necessitate bank winding the coil and this only adds much work without any compensaring returns. If the builder has a standard variocoupler I would recommend that the hook-up be tried before changing the coupler. The Super will work with a standard coupler unchanged and while the results will be below par, yet one will become more familiar with the action without so much work. After this has been done you will know what to expect when you rewind the coupler and will be more sure of yourself.

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Blitz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.

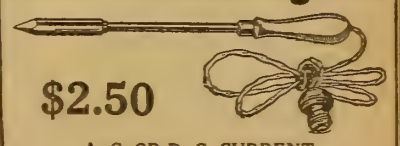
The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Electric Soldering Iron



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A. C. OR D. C. CURRENT

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THE LARGEST RADIO STORE IN AMERICA

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ACCORDING TO OUR INSTRUCTIONS
RESULTS GUARANTEED—PANELS ON ALL SETS DRILLED—
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Complete Parts for Knocked-Down Receiving Set $17.95

CONSISTING OF	Reg. Price	Our Price
2 Variometers	$10.00	$3.90
1 Variocoupler	5.00	1.75
3 Bakelite Dials	3.00	.75
Remler Bakelite Socket.	1.00	.45
Howard Rheostat	1.10	.80
Cunningham C-300 Detector Tube	5.00	4.45
Mahogany Cabinet	4.50	2.75
Genuine Formica Panel	2.25	1.75
8 Binding Posts	.80	.40
Switch Lever	.50	.25
12 Switch Points	.40	.20
Freshman Grid Leak and Condenser Combined	1.00	.75
Complete Drawing for Assembly and Wiring	1.00	.50
Regular Price	$30.85	Our Price $17.95

Complete Parts for Reinartz Sets $11.45

CONSISTING OF	Reg. Price	Our Price
7x18 Formica Panel	$1.89	$1.70
Remler Bakelite Socket.	1.00	.45
Howard Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cuni Variable.	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points.	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Freshman Variable Grid Leak and Condenser Combined	1.00	.75
8 Binding Posts	.80	.40
25 Feet Tinned Wire..	.30	.20
Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$21.69	Our Price $11.45

Complete Parts for 2 Step Amplifier $12.45

Can be used to amplify Reinartz, Flewelling, Short Wave Receiver, Crystal, Ultra Audion or any Receiving Set so that Loud Speaker or Phonograph can be used in place of Head Set.

CONSISTING OF	Reg. Price	Our Price
7x10 Formica Panel or Other Suitable Size.	$1.05	$0.85
High Ratio All-American or Thordarson Transformer	4.75	3.95
Low Ratio Thordarson or All-American Transformer	4.50	2.95
2 Howard Rheostats	2.20	2.00
2 Remler Bakelite Sockets	2.00	.90
3 Phonele Pacent Jacks.	3.00	1.50
13 Binding Posts	1.30	.65
Baseboard for Mounting	.30	.15
Regular Price	$20.10	
Wiring Diagram, with Complete Instruction for Drilling and Assembling Panel	Our Price	$12.45

Complete Parts for Flewelling Circuit $12.45

CONSISTING OF	Reg. Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Remler Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.80	.40
2 Remler Coil Mounts with Straps	1.20	.80
1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
1 Bakelite 3" Dial	1.00	.25
8 Binding Posts	.80	.40
1 Baseboard for Mounting	.30	.20
1 Blueprint with Complete instructions for Assembly and Wiring.	1.00	.50
Regular Price	$22.16	Our Price $12.45

Complete Parts for Ultra Audion Circuit, $11.90
(Known as the Wonder Circuit)

CONSISTING OF	Reg. Price	Our Price
9x10½ Formica Panel.	$1.42	$1.20
23 Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, plain or bank wound with tape	3.00	1.95
Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser.	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
8 Binding Posts	.80	.40
Genuine Solid Mahogany Cabinet, size 9x10½, with hinged top.	5.00	2.95
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Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in schematic form but are drawn so that any one without any technical knowledge can follow with ease. Our Price $11.90

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Radion Loop Aerial	8.50	5.95
Cunningham C301-A Tube	9.00	5.95
Grewol Glass Inclosed Detector	2.00	1.65
Erla Radio Frequency Transformer	4.50	3.45
All-American 5 to 1 Radio Audio Frequency Transformer	4.75	3.95
2—.001 Micon Condensers	.70	.50
1—.002 Micon Condenser	.45	.35
Howard Potentiometer	1.50	1.35
Howard 25 Ohm Rheostat	1.10	1.00
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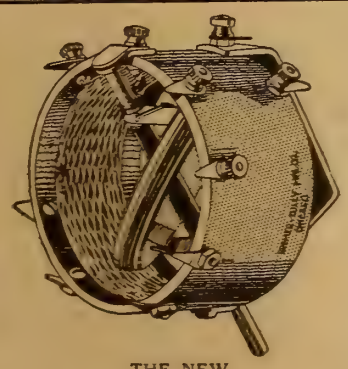

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, June 30, 1923 No. 12

Farmer Needs Weather Forecast

Aids in the Care of and Disposal of Crops

THERE are many operations on the farm that depend on weather conditions. If the farmer has a receiving set he now can learn the weather forecasts almost as quickly as they are formulated at the weather bureau. Spraying, haying and shipping produce are some of the questions that may be answered by the bureau. Until recently this information was transmitted to the farmer mostly by telegraph and telephone. Often it happened that the more isolated farmer received the information a day or so too late to do him any good. Now the bureau has developed the service until it practically covers the entire country. Special bulletins from the department, treating on various agricultural subjects are also sent out from the stations as often as they are issued.

Refinement of Speech Required

Looks Not Necessary in Broadcast Oratory

SOME of the artists who have taken part in broadcast concerts have told of acute attacks of stage fright. This in spite of the fact that they had for years faced great audiences in the theaters and opera houses. It was a great unknown element in their new audiences that faced them, the fact that their effort was being received by the people at unknown points and with unknown characteristics, for the Radio audience runs from the small boy who makes his own to the most distinguished critic.

Then again, broadcasting personality is badly handicapped. Facial expressions are lost and personal magnetism, other than that of the voice, is lost. It is easy for one who has faced critical audiences to imagine most any kind of listener; to see in the mind's eye someone unsympathetic, someone who does not understand or someone who is cynical and is saying at the distant point, "rotten."

The voice wears few decorations and there are people in the audience measured by the thousands who would much rather hear a good speaker who is a truck driver than a poor one who is a judge or president.

Bugbears Have Vanished

Most of Last Season's Troubles Only History

CONSIDERABLE speculation exists among Radio dealers and fans regarding the extent to which the present tremendous Radio interest will hold the next few months. Thousands of people throughout the United States, who have become Radiophans during the long winter months, will want to keep their interest in this newest of arts and enjoy its benefits during the summer.

Manufacturers and users are co-operating to make Radio suitable for the city dweller as well as for the man or woman who takes to the field and stream or the mountain when their vacation arrives.

Radio is a most fascinating pastime and the thought of each fan is to contrive a way to move his set to the lake shore home, lodge or camp, to his automobile while touring, or to a canoe for a trip through the lakes to the north. The farmer who caters to the summer boarders, is not going to be without a set this season for with interest in markets increasing and programs getting better and better, he will want it for his own use and as an inducement to city dwellers to remain at his home for the evenings.

The lightning and static bugbears are little mentioned this year. The use of the loop aerial eliminates the difficult construction for reception and reduces the static. If the installation is set up beside a lake, fair distances can be covered when the antenna wire, which must be insulated, is submerged. The correct length of the wire in this case must be determined by experiment.

Many sets now use little or no aerial and it is not difficult to receive messages from a portable set at any location. The requirements are few and the entertainment great—take your set with you.

RADIO INDI-GEST

NAME PRIZE EXHIBITION ALMOST STARTS RIOT AT INDIGEST STUDIO

WALLA WALLA.—Swarming multitudes of sun-osculated, dusky natives nearly precipitated a riot yesterday at the studio of Indigest's great broadcaster here when Mike and Izzy, trained Chimpanzee antenna raisers, brought forth for all to see, the beautiful, genuine brass, bevelled edge, round switch point, the prize to be awarded the lucky Indigest listener fortunate enough to submit the call letters which will be used in all the station's hair-raising broadcasts. The police force of Walla Walla, having been cured of his rheumatism by floating on ether waves, was called out with his uniform on to dispel the confusion. Seeing that he had his badge and that he was in dead earnest, the natives retired. (They retire early in Walla Walla.) The chief head official announcer, Bambdin Bray, and musical director, Wattle Knees, however, held a tete-a-tete at four o'clock while teaing and decided that it was in the best interests of Walla Walla that wide publicity be given the marvelous prize offer and inasmuch as Indigest is read by everybody everywhere, why that naturally would be the place to press agent the prize. So that is the reason, after all, my dear children, that the little brown Chimpanzees, Mike and Izzy (sure, he is), have drawn a little teenie picture of the prize for you. Now, everybody look, here it is—

●

Great interest has already been shown in the naming of the world's best broadcaster. WHO WILL WIN THE PRIZE FOR THE BEST CALL?

In Quest of the Kanoofis

Part III—In Egypt

"So this is Egypt? Mummy Land. Kanoofis, where art thou? *(Here, Kanoofy, Kanoofy.)*
We've searched and searched a King's domain. What luck will we have now? *(Chuck-a-luck.)*
Look, yonder is the pyramid, they say the Irish Micks *(Glory be to the Irish.)*
Contend that it was built by them, from ancient Irish bricks." *(Some builders, these Irish.)*
When the shades of night were falling and the sky got black as pitch, *(That's kinda dark.)*
We laid down on the sand to sleep, and woke up with the itch. *(What kind?)*
We were itching to know why we couldn't find that pesky part, *(The little devil.)*

And itching for the U. S. A. from where our search did start. *(Who said Chicago?)*
"Today we'll go to Cairo, they say that in that place, *(Some berg.)*
The girls wear nothing but a smile and a piece of fancy lace. *(Oh, boy.)*
It seems that in our search to find just what we're looking for, *(You know.)*
We cannot find Kanoofises, but find a whole lot more. *(Egypt, my Egypt.)*
We stayed in Cairo just one night, but that was quite enough. *(Too much is enormous.)*
We did not like the maidens there, they treated us too rough. *(Can you imagine such Shebas?)*
So we packed our little grips again, and started on our way, *(Good-bye, girls.)*
But just before we left there, we heard one of them say; *(This is news.)*
She told us if we travelled North, until we reached the West, *(Howcom?)*
We'd find what we were looking for and that would end our quest. *(Now, there's a friend for you.)*
We'd reach a little island, Walla Walla is its name. *(Sounds cannibal like.)*
It might take years to find it, but we'd get there just the same. *(The boy can look for it after I'm gone.)*

—THIS VERSE BY GOOFEY.

(Note: This poem may be sung to the tune of "The Wearin' of the Green." In singing it is considered best form to leave off the remarks at the end of each line. The next edition of Indigest will conclude this epic of contemporary American literature.)

A-B-C Lessons for Indigest Beginners

Chapter II—Th' Battrees f'r T'day Are—

BY GOSH

BIS for battery,
Most necessary critter,
That will run down now and then
And leave you hot and bitter.

We Beg to Acknowledge

the following contribution, varied in a very few minor degrees, from most all of our regular contributors, including Spider Webb, eZra hecht, Z & VK, Alogonquin Tonsils III, Polly W., Imp, etc. It runs something like this, if one strikes an average:

"After stalling the wife out of going to the movie and working half the night to make one of your Stebbins Degenerative Circuits, we got H——L."

For the purpose of clearness it should be elucidated that the two capital letters separated by two hyphens, represents the call of a very warm station on the other side of the Styx.

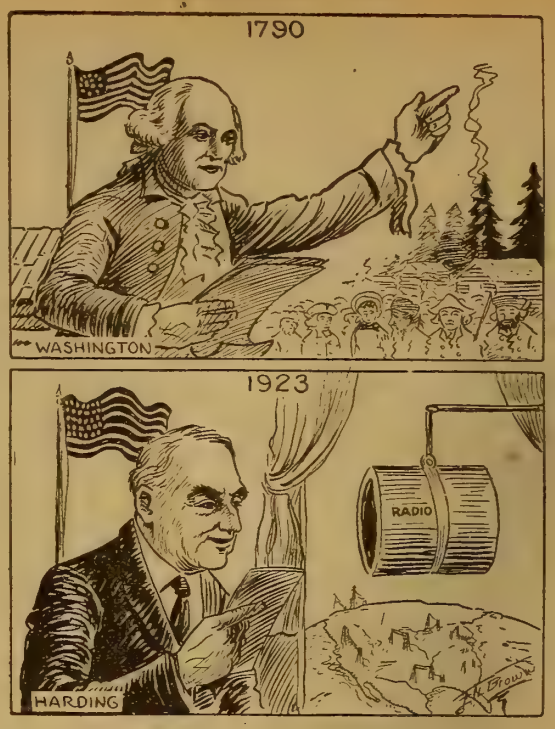
Who Invited You, Anyway?

Dear Indi: Very sorry I came back too soon to enter your Sooper contest. I was on a vacation to Walla Walla, where I lamped the erection of your broadcasting station, and must say the isolation is great. I had my 500-watt portable crystal set with me and I heard the cheering and shouting from Lillian G. and her gang (when the Lem. Stebbins prize winners were announced) very silently. E. B. S.

Yes, We Have No Flag-Staff

Indigest's station will be closed down on the Fourth of July at the suggestion of Imp, who says we should put up our flag on the cocoanut trees, and adds that no self-respecting station should use their antenna towers to hold up aerials on the birthday of Independence. Oh, yes, that's the reason we are using flags instead of dashes, too.

Independence Day



Condensed

By DIELECTRIC

Even three thousand people packing a hall to hear noted speakers and singers does not impress one as it once did. That number would have seemed a large audience before the days of Radio broadcasting, but now! When four great stations picked up the sounds from Carnegie Hall gathered in a single microphone, and sent the address of Mr. Barnes and the sons of Anna Case out into space, so vast an audience heard that those seated in the hall became but a very small part of the whole of listeners-in. What of the future?

Another gem in the Radio Crown of America. This one merits its place from the fact that the Leviathan will carry the greatest Radio equipment of any ship afloat. We purpose to maintain our supremacy on sea as on land in this new field. Not only code messages, but speech as well may be transmitted from this big liner to either shore of the Atlantic; in addition to which, two of her capacious lifeboats will be completely fitted for using Radio.

Station WJAX is well known to the majority of Radiophans in this country by the excellence of their programs. A new and distinctive feature is to be added to their broadcasting rooms which will serve to put the announcer in complete touch with the operator without interfering at all with the work of the artists. Should either of these men be color blind, of course the plan would fail, as the system to be used consists of signal lights of different colors. A phone booth in the studio will permit these two to talk with each other at any time and neither you nor the artists hear them.

To the average person living in the United States the birthday of a king is something which concerns him not at all. He is to be excused for neglecting to keep these monarchic dates in mind. However, many of us were reminded of the fact that King Alfonso, of Spain, celebrates his natal day this time of year through hearing speeches and music broadcast from PWX, Havana, Cuba. It was a celebration in his honor held in the Spanish Casino.

If other cities would copy the plan being put into effect by the Detroit Welfare League we would see many more afflicted ones made happier despite their trouble. Every blind person in the Michigan city is to be supplied with a Radio set, and, as Miss Davis says, "No one can realize what a blessing Radio is to persons without sight." I should like to see a move made in every community in this country with just such an object in view. Who will follow?

And now we have the news of two ships a thousand miles apart on the Pacific ocean treating their passengers to the novel experience of talking with each other from their staterooms, using the ordinary telephone in the room which was plugged in to the Radiophone circuit. These Radio switchboards permit one to talk over his phone to friends aboard ship, or vice versa. It will soon be possible to talk from anywhere to anywhere and—then what?

Perhaps the strongest argument to advance against the claim of those who decry broadcasting of church services is to call attention to Dr. van Etten's custom, and its development. His church in Pittsburgh, Pa., was the first to give to the Radio world regular weekly services. Just recently a bronze tablet was unveiled in the Calvary Episcopal Church, the donors of which were the many who listen in and take part in the Sabbath worship. Nearly five thousand persons gave toward this Radio memorial tablet whose homes are scattered all over America, and even on the high seas.

First Steps for Beginners in Radio

Chapter VII—Vacuum Tube Detectors

By Thomas W. Benson, A. M. I. R. E.

IN describing the action of the vacuum tube detectors it might be well to discuss briefly the underlying principle of rectification that takes place in tubes containing a heated body and a cold electrode. It was first noticed by Edison, in working with the electric lamp, that the globe blackened after use and on experimenting on the action, discovered that when a cold plate was mounted inside the lamp, a current would flow from the cold plate to the filament but not from the filament to the plate. This is due to the fact that a heated filament throws off negative electrons; thus when a battery is connected to the filament and plate with the positive of the

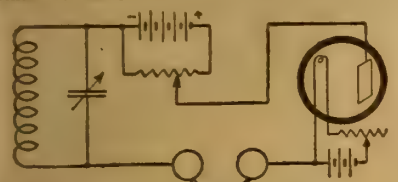


Figure 31—Fleming Valve as Used with Plate Battery

battery connected to the plate a current will flow.

Tube as a Rectifier.

Recalling the action of a crystal detector and its use to rectify the high frequency Radio currents, it would appear that where the secondary tuning circuit of a Radio receiver is connected to the plate and filament of a simple two element tube, a current will flow from the plate to the filament when the plate is positive, but no current will flow when the plate is negative, thus rectifying the current. Fleming tried this experiment and found it worked out satisfactorily and termed his device the Fleming valve. The diode tube is but a modern type of tube employing the same principle. However, the amount of current flowing between the filament and plate through ionized gases does not follow Ohm's law exactly.

It has been found that up to a certain point the current flow varies directly as the voltage between the plate and filament. Beyond this point, termed the **saturation point**, a slight increase in the voltage on the plate causes a decided increase in plate current. The obvious thing to do then is to maintain the plate at a voltage just below the saturation point, by means of a battery, so that the in-

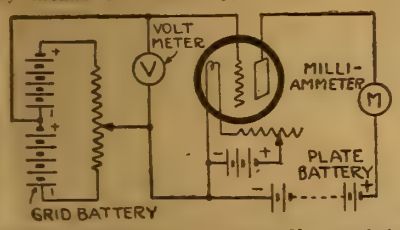


Figure 32—Circuit to Determine Characteristics of Vacuum Tubes and Demonstrate Effect of Inserting Control Element Between Filament and Plate

crease of voltage on the plate by the high frequency current will be sufficient to push the potential over the saturation point and get the maximum response in the phones. A circuit employing this principle is shown in Figure 31 where a potentiometer connected across the plate battery enables the operator to work the tube at its highest efficiency.

The three element vacuum tube is a similar arrangement but has in addition a grid mounted between the filament and plate to act as a control element and changes the entire action of the device. It should be borne in mind that all three element tubes, comprising a heated filament, a grid or control element, and a cold

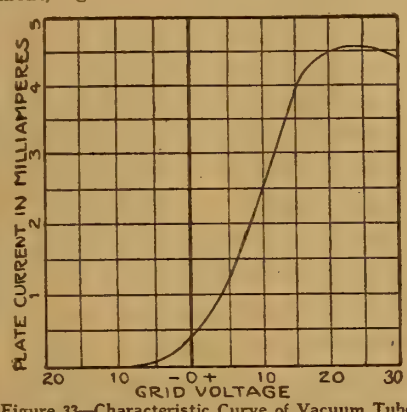


Figure 33—Characteristic Curve of Vacuum Tube Detector Showing Relation Between Changes in Grid Voltage and Current in Plate Circuit

electrode or plate, act in the manner to be described when used as detectors.

The filament is used as a source of negative electrons. A tungsten filament is used in tubes that light up brightly, such as the UV 200, UV 201, DV6 and others, while those that just glow red, such as the WD 12, have a filament coated with a chemical that causes them to emit electrons at a lower temperature. The grid is a control element and may be mounted outside the tube as in the peanut tube which, by the way, was the first form of control element tried by De Forest, but it is best to place the grid between the filament and the plate. The plate or anode completely encloses the grid and filament in the best types of tubes although it is mounted above the filament when an external control element is used.

Controlling Current.

Now let us consider a three element tube connected as shown in Figure 32. Here we have a constant voltage, say 22 volts, applied to the plate and a potentiometer and battery connected to the grid to change the voltage of the grid with respect to the filament. With the filament lighted and brought up to full brilliancy, the electrons are thrown off from the filament and act to allow a certain plate current to flow. With the potentiometer lever moved to the positive end of the battery, the milliammeter will indicate maximum plate current. This is due to the positive charge on the grid helping to draw the electrons off the filament by electrostatic attraction. Consequently more electrons pass through the grid despite the fact that some strike the grid, increasing the plate current.

As the potentiometer is moved towards the negative end, the plate current will fall off as the positive charge on the grid is decreased. As the neutral point is passed and a negative potential is applied to the grid, the current flow from the filament to the plate further decreases because the negative charge on the grid repels the negative electrons and will not permit as many to pass through to the plate. The current keeps on decreasing as the negative potential increases till a point is reached at which no current flows from the filament to the plate. At this point the negative charge on the grid is

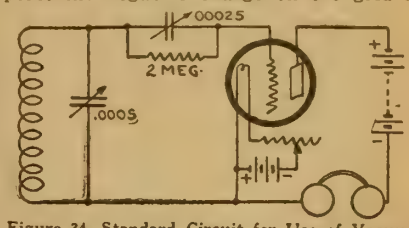


Figure 34—Standard Circuit for Use of Vacuum Tube Detector, Showing Average Values of Capacities and Battery Polarities

strong enough to repel all the electrons and shut off the current.

Were the current in the plate circuit plotted in the form of a curve with respect to the grid voltage, we would have a curve similar to that shown in Figure 33. It will be noted that the curve is flat at the ends and quite steep in the center. This shows that at the higher negative voltage and the higher positive voltage

(Continued on page 14)

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiophony. The articles yet to appear are:

Chapter VIII—The Regenerative Detector.
Chapter IX—Radio Frequency Amplification.
Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

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Add this long-distance wonderworker to your other summer pleasures and make the summer of '23 the happiest of your life.

Send for circular describing the wonderful **Michigan "Senior"** and **"Junior"** Regenerative Receivers, licensed under Armstrongs U. S. Patent No. 1,113,149 and pending letters patent 807,388 covering the fullest development of regeneration.

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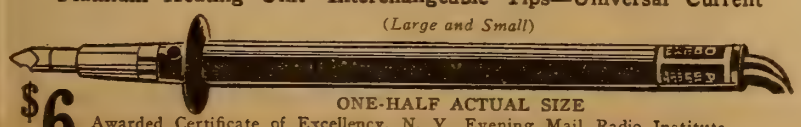

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Map Aid in Finding Station Distances

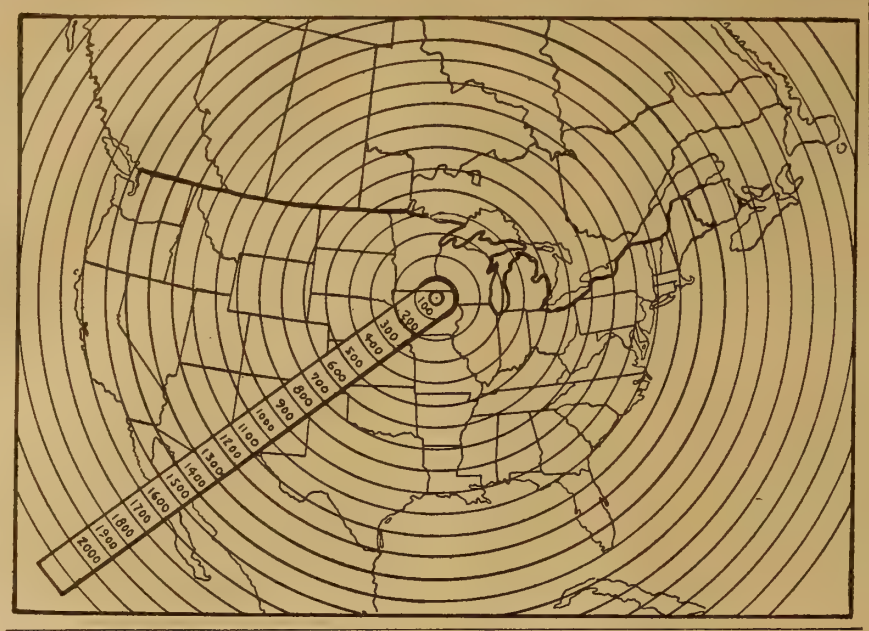
Chart Useful as Record of Broadcasters Heard

Have you any way of quickly finding the distance of any station heard? If not, the illustration shows a practical method. Procure a map of the United States. The pocket maps that sell at the book stores will do very well. Mount this map smoothly on heavy cardboard, building board or some other substantial material. After this is done make a scale from stiff cardboard about one inch wide and long enough to reach on the map from your own town to the farthest border of the United States.

At one end of this scale make a dot and then measure back from this dot equal distances according to the scale upon which the map is drawn, usually about 125 miles to the inch, to show 100 miles for each division. When completed, stick a pin through the dot and pin the scale to the dot on the map representing your station.

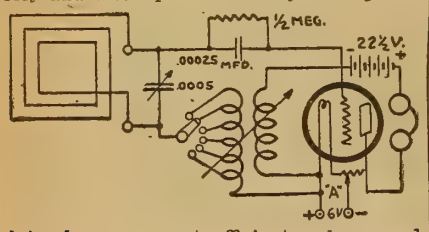
By rotating the scale, you can find instantly just exactly the distance from the station heard. You can also check up the distances claimed by the other chaps. By marking this map with colored crayon for every station you have heard you will have an interesting record to show your friends.—H. L. Petersen, Charles City, Iowa.

ROTATING STRIP PINS ON MAP



Distance Easy on Loop

The accompanying hook-up shows a splendid loop set with which I have heard New York, Schenectady, Atlanta, Kansas City and Davenport. So many Radiophans



claim loops are not efficient unless used with one or two steps of Radio frequency.

This set is very critical for tuning, but it is highly efficient. As will be noted the tuning is accomplished with a variocoupler with the rotor used for the tickler. A .0005 mfd. condenser—vernier preferred — is shunted across the loop. The vernier rheostat is also of great value.

Owing to extreme regeneration the set will hiss until filament is properly arranged. The grid condenser may be either .00025 mfd. with a ½ megohm leak or .0005 mfd. and a 1 megohm leak. Both were tried out with equal success. The diagram is self explanatory.—J. W. Mayfield, Cincinnati, Ohio.

Two Variometer Circuit

The capacitive feed-back method of obtaining regeneration is exceptionally efficient as a receiver of short waves. In a receiver of this type it is customary to connect one variometer in the plate circuit and a second variometer in the grid circuit, the transfer to energy between the plate and grid circuits being effected by utilizing the small capacity existing between the grid and plate elements of the tube itself. Both circuits must be in resonance, that is, tuned to the same wave length, and owing to the fact that variometers provide a continuously variable inductance, it is possible to obtain complete resonance. A condition of resonance is extremely important at high frequencies; that is, short wave lengths, and consequently this type of regenerative circuit is highly efficient for the reception of broadcast signals on wave lengths of from 200 to 600 meters.

Turns of Wire Per Inch

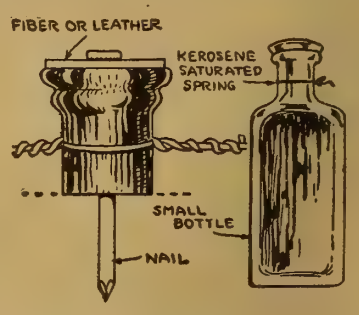
In the construction of single or double slide tuning coils, No. 18 enameled wire is commonly used, while for couplers and variometers either No. 22 or No. 24 double silk or cotton covered wire will give satisfactory results. The number of turns per inch are as follows:

No. 18 enameled, 23 turns; No. 22 double cotton covered, 28 turns; double silk covered, 32 turns; No. 24 double cotton covered, 33 turns; double silk covered, 39 turns.

Atlantic City is considering installation of loud speakers along the famous boardwalk, so that strollers can hear addresses by prominent men, baseball scores, and other entertainment as they promenade.

Necks of Bottles Make Ideal Small Insulators

It is easy enough to make any quantity of small glass insulators for your lead-in wire at practically no cost at all in the following manner: Remove the necks of small vials, such as vanilla or lemon extract come in, and put them on a nail and fiber washer. The latter, of course, is used to keep the insulator from slipping off the nail. Saturate a cotton string with kerosene and tie it around the neck of the bottle where it is to be cut off. Light the string and in burning the string it heats the bottle neck. When the fire is burned out, simply plunge the bottle into cold water and then tap the bottle lightly and your insulator will fall right off, cut neatly where you tied your string. I have made as many as ten of these in as many minutes and they are as efficient as those that are purchased.—B. P. Craig, Youngstown, Ohio.



WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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How to Make a Camper's Portable Reflex Set

Part II—Three New Reflex Circuits

By H. J. Marx

UNDOUBTEDLY a very small loop aerial with a condenser for the tuning element requires considerable Radio frequency amplification in order to properly build up the grid potential necessary for satisfactory detection and reception. This means that at least two tubes will be required, and, in order to save space, maximum possible results should be planned from these tubes. This naturally suggests the use of reflex circuits.

Since the apparatus required for these circuits should necessarily be of the best quality, the cost rapidly climbs. In order to permit the fan to adjust the cost of his set to balance with the Radio budget that his finances call for, three different forms of the same circuit are presented.

Portable reflex No. 1 is a two tube circuit equivalent to two stages of Radio frequency, detector and one stage of audio frequency.

Portable Reflex No. 2 is a three tube circuit equivalent to three stages of Radio frequency, detector and two stages of audio frequency.

Portable Reflex No. 3 is a four tube circuit equivalent to three stages of Radio frequency, detector and three stages of audio frequency. The last stage of audio frequency is not reflexed and a jack is added so that the phones or a loud speaker can be plugged in after the second stage of audio frequency.

Development of these Circuits.

Some interesting experiences were encountered in the development of these circuits. Although potentiometers are more

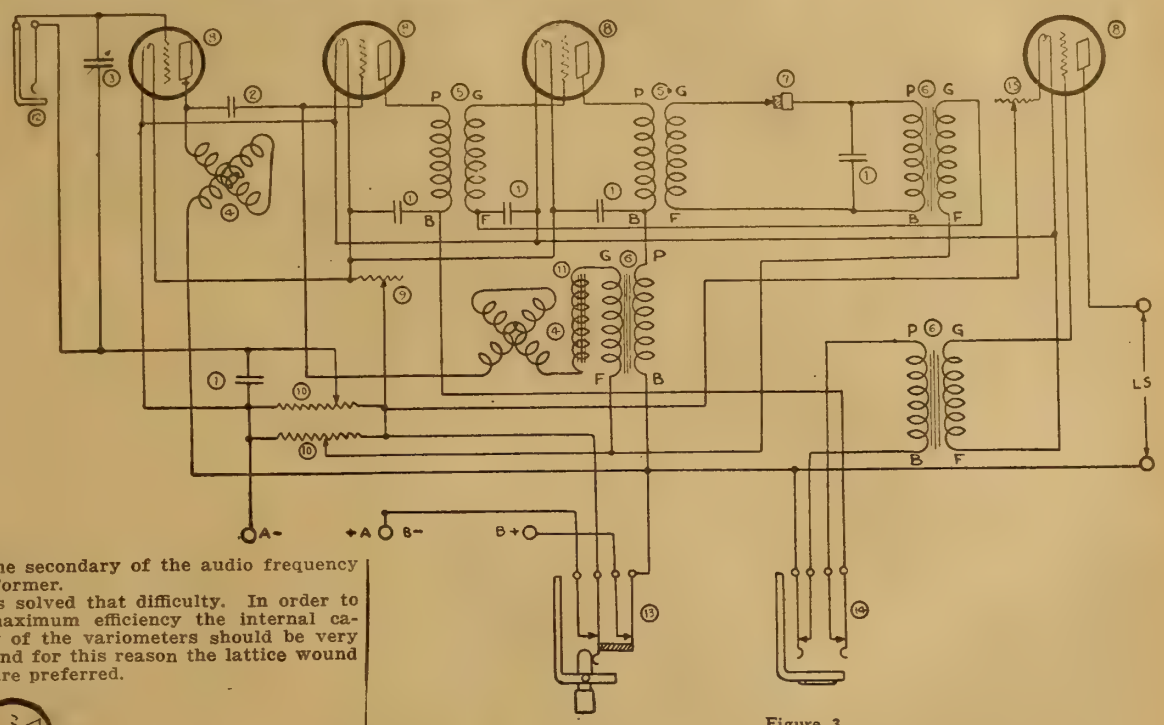

Figure 3

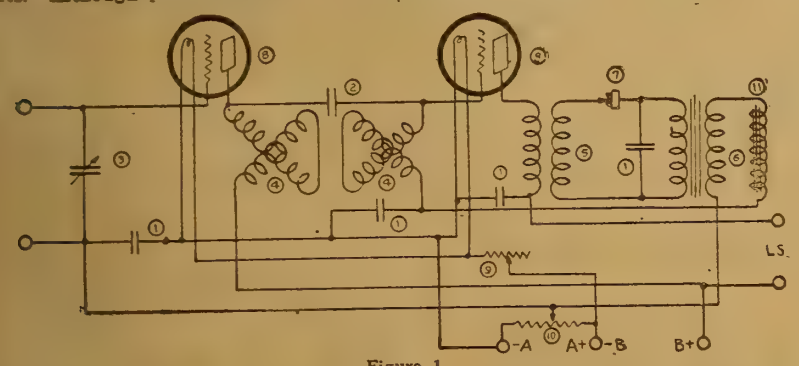

Figure 1

or less satisfactory for controlling the grid potential of the tubes, still there was something lacking when used to control the reflexing of the audio frequency currents back into the tubes the second time. Another noticeable disadvantage was the fact that when these audio frequency impulses were reflexed back into the grid circuits, passing them through the secondary windings of the Radio frequency transformers developed a decided loss in potential variation.

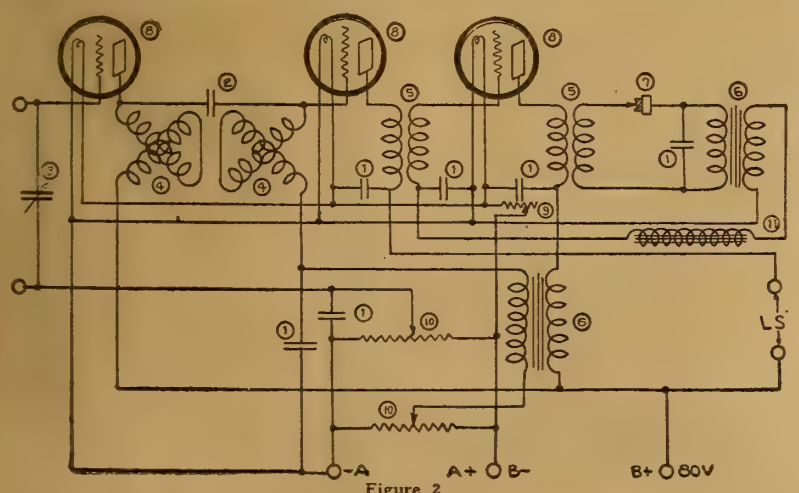

Figure 2

For this reason the variometer type of Radio frequency coupling was employed between the first and second tubes. The reflexed impulses were then tapped into the grid circuit between the condenser and grid. If three tubes or more are employed only one stage is coupled in this manner and the first stage of reflexed audio frequency followed the usual transformer coupling practice. The second stage of audio frequency, however, followed the method just outlined. In order to control the amount of energy fed into this circuit, a variometer is inserted in series as shown in each of circuits illustrated. This, however, introduced some peculiar actions in the circuit operation. There was a choking action that not only effected the modulation but also decreased the volume. This apparently indicated that some form of apparatus was necessary to prevent the Radio frequency impulses from feeding back in and through the variometers. A 100-milhenry iron core choke coil was inserted in series between the variometer and the secondary of the audio frequency transformer.

This solved that difficulty. In order to get maximum efficiency the internal capacity of the variometers should be very low, and for this reason the lattice wound type are preferred.

Identification of Apparatus

In order to identify the parts used in the three hook-ups—the various parts in the diagram can be identified by the numbers in the circles next to them. The lists of parts with the numbers for the different circuits are given.

Portable Reflex No. 1

No. 1—.002 mfd. fixed condenser (4 required); No. 2—.00025 mfd. fixed condenser; No. 3—.0005 mfd. variable condenser with vernier; No. 4—Lattice wound type variometers (2 required); No. 5—Radio frequency transformer; No. 6—Audio frequency transformer; No. 7—Crystal detector; No. 8—Amplifier vacuum tubes and sockets (3 required); No. 9—Power rehostat; No. 10—400-ohm Potentiometers (2 required); No. 11—100 M. H. iron core choke coil; Seven binding posts.

Portable Reflex No. 2

No. 1—.002 mfd. fixed condenser (6 required); No. 2—.00025 mfd. fixed condenser; No. 3—.0005 mfd. variable condenser with vernier; No. 4—Lattice wound type variometers (2 required); No. 5—Radio frequency transformer (2 required); No. 6—Audio frequency transformer (2 required); No. 7—Crystal detector; No. 8—Amplifier vacuum tubes and sockets (3 required); No. 9—Power rehostat; No. 10—400-ohm Potentiometers (2 required); No. 11—100 M. H. iron core choke coil; Seven binding posts.

Portable Reflex No. 3

No. 1—.002 mfd. fixed condensers (6 required); No. 2—.00025 mfd. fixed condensers; No. 3—.0005 mfd. variable condenser with vernier; No. 4—Lattice wound type variometers (2 required); No. 5—Radio frequency transformers (2 required); No. 6—Audio frequency transformers (3 required); No. 7—Crystal detector; No. 8—Amplifier vacuum tubes and sockets (4 required); No. 9—Power rheostat; No. 10—400-ohm Potentiometers (2 required); No. 11—100 M. H. Iron core choke coil; No. 12—Single circuit jack; No. 13—Double circuit jack type battery switch; No. 14—Double circuit jack; No. 15—Rheostat; Five binding posts.

Inasmuch as the tubes used will be dry cell type, to save weight and space, the tube sockets will require a resilient form of mounting. This will be taken up in the next article in conjunction with the panel layouts. Standard sockets are used throughout, and where necessary adapters can be used.

The choke coil used may be purchased at any good Radio dealer as there are a number of concerns manufacturing them. The variometers must be small in size in order to conserve the necessary space. A special form of very small audio frequency transformer known as the hedgehog type is used in the circuit. This permitted the very compact assembly which will be illustrated later.

(TO BE CONTINUED.)

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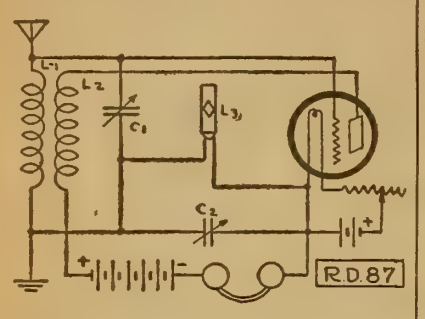

HOOK-UP R.D.-87 is a new single tube receiving circuit, known as the Nacireman. This circuit was developed in the laboratories of Wired Radio, Inc., during a series of experiments with a large number of receiving circuits. This new circuit is not suitable for wired Radio because of its tendency to re-radiate, but it is probably the last word in a simplified single tube set for receiving news and music from the present broadcasting stations.

Parts Required

1 Variometer or Variocoupler. L1 is the rotor winding. L2 is the stationary winding.
2 23-plate condensers, preferably with verniers (C1 and C2).
1 750-turn DL or honeycomb coil or its equivalent (L3).
1 Tube, WD-11, UV-201A, or other hard tube.
1 Tube socket.
1 Filament rheostat (R).
1 A battery, 1½ to 2-volt for WD-11 tube; 6-volt for other tubes.
1 B battery, 45 to 90 volts for WD-11; 45 to 135 volts for other tubes.
1 Pair phones.

The circuit is being published with full details in the interests of amateurs and the public who may wish to listen to the programs now in the air. The set is super-regenerative and full credit should be given to E. H. Armstrong for the discovery of this principle, of which this may be considered an extremely simplified form. The circuit requires a minimum investment in parts. Practically every amateur already has everything necessary to try out the circuit. It will be noted that all resistances, grid leaks and grid condensers have been eliminated and no filter circuits are required. Any amateur can connect up one of these sets in an hour or two and the results will surprise the most hardened Radiophan.

Almost any metallic structure which may be picking up Radio waves may be used as an aerial. Connection to a bed spring, wire window screen, steam radiator or fire escape is often all that is necessary. A short overhead aerial, a length of wire strung across the room, concealed behind the picture moulding or under the carpet, will also serve.

Tuning is accomplished by rotating the movable coil of the variometer or variocoupler until the tube oscillates. Then adjust condenser No. 1 until the station desired is heard, finally adjusting condenser No. 2 to the frequency of oscillation which brings in clear speech and music. A second fine adjustment all around will increase the volume and some regulation may be secured with the filament rheostat.

FIRST STEPS IN RADIO

(Continued from page 11)

quite a change in the grid voltage affects the plate current very little, but near the center of the curve a slight change in grid potential results in an appreciable change in the plate current and therein lies the secret of the vacuum tube as an efficient detector.

Function of Tube in Circuit.

Now let us consider how the tube functions when connected in a Radio circuit as a plain detector. The usual circuit is shown in Figure 34, which shows a variable condenser in the grid circuit with a grid leak connected across it.

If no Radio signals are acting upon the tube a steady current will flow from the plate to the filament and back through the phones depending upon the voltage of the plate and the temperature of the filament. When an incoming signal acts upon the inductance a current will flow in the grid circuit. When the direction of this flow is such as to put a positive potential on the grid, some of the electrons from the filament will be attracted to the grid, but when the potential is reversed, the electrons on the grid cannot escape being held there by the blocking condenser in the grid circuit. On the next reversal more electrons are attracted to the grid and hence at each oscillation the negative charge on the grid is built up to such a value that it repels the electrons from the filament and thus interrupts the plate current, causing a sound in the receivers.

Were the grid completely insulated from the rest of the circuit by the dielectric in the condenser, the negative charge thereon would constantly increase till it shut off the plate current completely and the tube would "block" or cease to function. However, a leak is connected across the condenser as shown and allows the charge to leak off slowly. The effect of this leak then is to prevent the condenser holding too much charge on the grid but should not be so small as to permit too much of the charge to escape quickly. Then by experimenting, the proper value of a leak is determined that will permit the potential of the condenser to rise and fall with the amplitude of the incoming waves and the varying negative charges on the grid thereby vary the plate current to reproduce the audio frequency waves impressed on the carrier wave at the transmitting station.

Changes in Grid Potential.

The curve in Figure 33 shows that it is to an advantage to work on the middle part of the curve so that slight changes in the grid potential will cause greater variations in the plate current and thus produce the loudest signals in the phones. It should be remembered that it is simply the amount of change in the plate current that gives the signals and not the amount of current flowing. To this end it is advisable to either regulate the constant potential of the grid or shift the curve by varying the plate voltage or filament temperature. Shifting the curve, as it is called, simply means that by varying the plate voltage the curve is moved to the right or left of the center line of the grid voltage. So with a fixed grid potential a change in voltage enables us to shift the steep part of the curve to suit that particular grid potential. That is the reason for variable B batteries for detector tubes.

Although not the usual practice, the highest efficiency is obtained from a tube detector when the grid condenser is made variable so that the potential of the condenser itself can be controlled. Those desiring the best results with tubes should use a small variable air condenser in the grid and use the best leak obtainable.

Hardness of Tubes.

The main difference between a detector tube and the amplifier tubes is their "hardness." A hard tube is one that has been pumped to a high vacuum; the soft tubes contain a very small amount of gas. A soft tube functions best as a detector for the following reason: When a slight amount of gas is present, the electrons emitted by the filament strike the molecules of gas and break them up into their electrical components and the gas is said to be ionized, that is, split up into ions, negative and positive. In this state the gas is conductive and a large plate current is obtainable with a low plate voltage. With the low plate voltage the attraction of the plate for the negative electrons is naturally lower and the smallest change in grid potential will affect the electronic stream.

On the other hand, the hard tube functions best as an amplifier because higher voltages can be impressed on the plate and since the grid potential changes are greater in the amplifier stages by reason of the step-up effect in the detector, the grid can control the heavy electron stream with the high plate voltage. A high voltage cannot be used on the detector because it would exert too much attraction on the electrons and small grid charges would not deflect them. Also, when the gas in a soft tube is ionized, a high plate voltage would force too heavy a current through the tube and it would give a blue glow and spill over.

We can see now that the function of the vacuum tube is to act as a sort of relay by means of which the weak incoming signal is made to control a local source of current and vary its intensity in accordance with the modulation impressed upon the incoming waves. The crystal detector uses only the received current to actuate the telephone receiver, while the vacuum tube controls current furnished by batteries to give louder signals.

In the next chapter we will see how this local battery can be made to react on the grid circuit of the tube to give regenerative effects and great signal strength.

The Reader's View

Calming Set

In your issue of March 10th there appeared a hook-up with an addition of two .001 mica condensers to prevent howling in a set. I have an Armstrong regenerative set with two stages of amplification and a Pathe loud speaker. I tried the condensers as shown and will say that they certainly calmed my set down as to whistles and cracks and do not diminish the volume of sound, as I have been unable to get stations WJZ or WOR without a whistle or howl—thanks to Mr. Joe McCormack of Godsen, Ala.

Am using 112 volts on the plate and every sound of voice or music is quite plain. I hope this compliment will be brought to the eyes of Mr. McCormack. —James Nolan, Jersey City, N. J.

P. S.—I have shown your magazine to quite a number of my friends, and I think your circulation will be increased in this section.

Amplifying Crystal Set

One or two stages of amplification may be added to a crystal receiver with good results, but if this installation is contemplated it is advisable to also use a vacuum tube to replace the crystal detector, as batteries for filament heating and plate voltage must be provided for the amplifying stages and are therefore available for use with a detector tube. Sometimes, however, the crystal detector is advisable to give clearer and less distorted reception.

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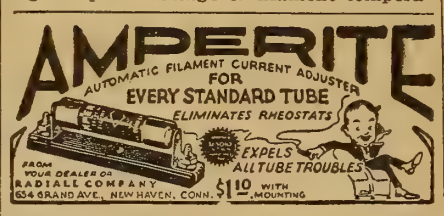

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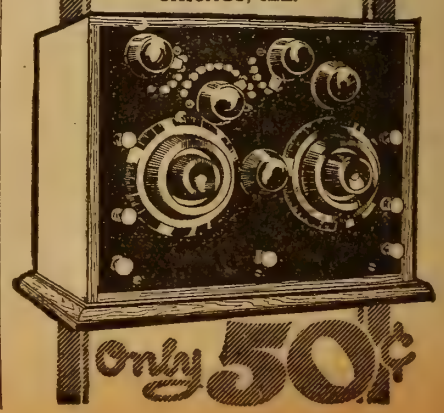
PANELS—3/16" Thick

	Hard Rubber	Bakelite		Hard Rubber	Bakelite
7x18	$1.65	$2.45	7x10	$0.95	$1.35
7x21	1.85	2.75	7x12	1.25	1.60
7x24	2.15	3.25	7x14	1.40	1.95

VT-2 TUBES—Genuine Western Electric Tubes THE BEST AMPLIFYING TUBES MADE $7.95

PERFECTION RADIO CORPORATION, 59 Cortland St., NEW YORK CITY
Add parcel post. Do not send stamps.

How to Make a Reinartz Receiver
Complete BLUE PRINTS
for the construction of a Reinartz Receiving Unit and two step amplifier.
INSTRUCTIONS FOR ASSEMBLY
Description of apparatus and accessories and details of tuning.
WINDING A REINARTZ COIL
Cabinet Dimensions
Panel Layouts
List of Parts
Send only money orders — no checks or stamps. Coins at your own risk.
Book Department
Radio Digest
123 West Madison Street
CHICAGO, ILL.



Questions and Answers

Pretty Good So Far

(2587) TB, Jefferson, Iowa.

I have built a Flewelling circuit and I am having nearly the desired results. Get a great many stations from far and near. Los Angeles to Atlanta-Schenectady, New Orleans to Regina, Sask., etc. All told over 100 stations.

Will say that she is sure a winner and believe I am far from possible results due to the fact that I am not fully acquainted with set. There are a few changes in wiring that I will work out in time.

The writer has adhered to the blue print and instructions purchased of the Radio Digest with one exception and therefore this letter.

In the detector circuit I am unable to use the wire connecting the phone condenser with the fixed grid leak of ½ meg. Without the above connection I have heard many stations.

When same connection is made it kills reception, and I hear a noise of frying and cracking like B battery or static. It seems like the B plus goes through the primary on transformer of first stage and through to condenser bank and negative A.

Wouldn't bother you with such fool stuff if I wasn't desirous of making this set step out to beat a friend who has a two variometer set which is best I ever heard. I believe I am equal to him now and just need that little something to get E. T. Flewelling results.

A.—Noting your splendid success and enthusiasm with results afforded with the Flewelling circuit we are delighted to congratulate you.

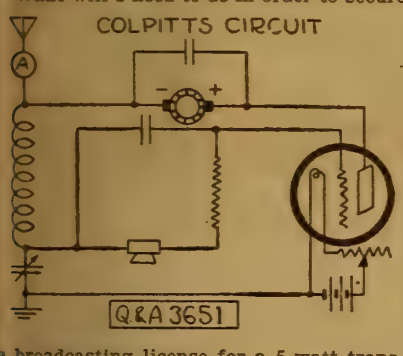
Noting the difficulty encountered it is indicated either that grid leak or one of the condensers in your bank is shorted. Would advise substituting another grid leak. A pencil line grid leak will serve. If no better results accrue, try another .006 condenser in place of the one which is across the grid leak. In our opinion one or the other of these details will solve your difficulty. It is difficult to determine without a personal inspection, but we believe it can be safely left to your skill to overcome the condition prevailing.

Three Transmitting Circuits

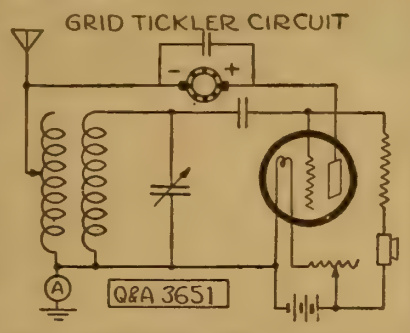
(3651) CK, Jefferson City, Mo.

What will I need to do in order to secure a broadcasting license for a 5-watt transmitting set for experimental use?

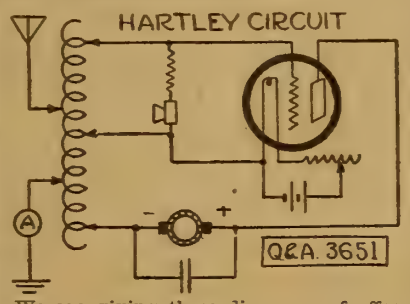
Send me a few good hookups for a 5-watt transmitting set. State what is necessary for the output.



A.—Answering your inquiry with relation to regulations governing broadcasting we are referring you to the United States Radio Inspector, 629 Federal Building, Chicago. Operator of such a station is required to hold a commercial operator's license.



For experimental station an amateur's license is necessary, for which examination is required to qualify.



We are giving three diagrams of effective circuits for five watt set, either phone or telegraph.

Super Regeneration

(2408) WHC, Chicago, Ill.

At present I am operating a standard regenerative double variometer hook-up with one stage of audio amplification, using W. D. 11 tubes and I am getting splendid results, often getting Ft. Worth, Texas, and all the Eastern and Southern stations. However, I would like to know if it would not be possible to make my set super-regenerative along the line of the Flewelling circuit. Would it be possible to hook in somewhere between the plate variometer and the grid variometer and the filament circuit, the proper condenser trap as shown in the Flewelling super circuit. Would it not be a good thing to ask Mr. Flewelling if this could be done? If it could be done, it would be a great boon to a lot of us Radio fans, as then we could convert our present circuits to that of the super regenerative class.

Do you think it could be worked out? Otherwise, I will be tempted to make a straight Flewelling circuit.

I would like also to ask your Radio expert which of the two circuits does he consider the most sensitive circuit, the one that is conductively arranged or one inductively arranged? My present double variometer circuit is an inductive circuit, there being absolutely no metallic connection between the primary or aerial ground circuit and the tube and plate circuit. However, I understand that the Aerola, Sr., is a conductive circuit, there being a direct connection between the grid and the aerial and ground. What I would like to know is, which is the most sensitive of these two circuits? I have always had an idea that the conductive circuit is more sensitive, but will not tune as close or fine and is more subject to interference from spark stations than the other one. Can you set me right?

A.—Noting your scheme for introducing super-regeneration in your present circuit will advise that this has been tried out in the manner suggested but has not afforded the results that might have been expected.

If it is volume that you desire to attain, why not add more amplification, rather than use any other circuit?

There is practically no difference in results attained through conductive and inductive coupling, although theory would have the single circuit to be the most efficient. However, on two sets, one of each type, working at the same time there is no difference noticeable. (Presuming, of course, that their only difference lies in tuning inductance.) The single circuit is not at all selective and it is difficult to keep separate broadcasting stations from interfering, and as for spark signals it is quite impossible to cut them out with any but a two circuit tuner such as you are using.

Homemade Tuner

(2850) RCV, West End, Ala.

As a beginner in Radio I wrapped 70 turns of No. 20 cotton covered copper wire around a cardboard tube 7 inches long and 3½ inches in diameter, making several connections. This was a double-slide tuning coil employing a crystal detector. Having had fine results with it, hearing WEAF, New York City, I wanted a nice set. I took much care this time, first winding the coil of No. 22 d.c.c. and then trying No. 22 enameled copper wire. Neither set was near as loud as the first and could not do any out of town receiving. What is my trouble?

A.—Noting your specifications and conditions encountered, and presuming that your coil was wound the same as in the first attempt, we venture the opinion that in changing your crystal detector from one set to the other you have in some way destroyed its sensitivity. It is difficult to determine conclusively just where the trouble may lie without inspection of each set.

PHANTOM-CIRCUIT

Build Your Own. This marvel of mystery, using no loop, no aerial and no ground, brings in music instead of interference. We have heard stations 950 miles distant on one tube. By using WD-11 tube set can be entirely self contained. Very easy to build from our instructions, use your own spare parts, nothing complicated like radio frequency or super regenerative. Only one tuning control. Complete instructions, with hookup and photo of circuit mailed to you for 60 cents. Stamps accepted.
VESCO RADIO SHOP, Box D-704, Vacaville, Calif.

TWO SUPERSENSITIVE CIRCUITS
(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.

S. A. TWITCHELL
1925 Western Ave. Minneapolis, Minn.

REFLEX
Erla Reflex Transformers
DEALERS: SEND FOR LITERATURE
HUDSON-ROSS
123 W. Madison St. Chicago

Carter "Tu-Way" Plug
Takes 1 to 4 head sets and all types tip terminals; no tools necessary. New list price, $1.00.
Write for Bulletin on the Carter Line of Products
CARTER RADIO COMPANY, 209 South State Street, CHICAGO

FORMICA
A Laminated Phenolic Condensation Product
SHEETS TUBES RODS
RADIO PANELS
POLISHED BLACK FINISH
CUT PERFECTLY SQUARE TO ANY SIZE

1/32" THICK	½¢	PER SQ. INCH
1/16" THICK	¾¢	PER SQ. INCH
3/32" THICK	1¢	PER SQ. INCH
1/8" THICK	1½¢	PER SQ. INCH
3/16" THICK	2¢	PER SQ. INCH
¼" THICK	2½¢	PER SQ. INCH
3/8" THICK	4¢	PER SQ. INCH
½" THICK	5¼¢	PER SQ. INCH

SEND FOR COMPLETE PRICE LIST
PROMPT ATTENTION TO MAIL ORDERS
DEALERS PRICES ON APPLICATION
STARRETT MFG. CO.
519 SOUTH GREEN ST. CHICAGO

WILLARD RADIO COMPANY
291 Broadway *"The Best for Less"* New York City

FLEWELLING CIRCUIT
Every part complete, including drilled panel and book of diagrams and instructions $11.95

REINARTZ CIRCUIT
Every part complete, including drilled panel and book of diagrams and instructions $10.95

Two-stage Audio-Frequency Amplifier. Every part complete for above circuits at $11.00

CONDENSERS

3 Plate Variable; value, $1.75	$1.05
13 Plate Variable; value, 2.50	1.20
23 Plate Variable; value, 3.50	1.35
43 Plate Variable; value, 4.50	1.95
13 Plate Vernier; value, 5.50	3.75
23 Plate Vernier; value, 6.00	4.00
43 Plate Vernier; value, 6.50	4.25

Honeycomb Coils, 50 turns mounted	.95
Honeycomb Coils, 75 turns mounted	1.00
Double Coil Mountings	2.45
Triple Coil Mountings	3.35
Reinartz Coil increased wavelength, and mounting	1.75
Jacks, Single Circuit; value, 65c, special at	.30
Double Circuit; value, 90c; special at	.45
Multiple Point Inductance Switch with Knob and Dial (15 Switch Points)	1.45
Lightning Arresters, approved	.90
Three-inch Dials, unbreakable, heat resisting composition, high finish; special	.30
Two-inch Dials, same design, for rheostats and potentiometer; special at	.25
Aluminum Loud Speaking Horn, nickel plated, highly polished; $8.00 list	3.75
Filament Rheostat, 6 ohm	.65
Filament Rheostat, 20 ohm	.90
Filament Rheostat, 50 ohm	.90

With 2" Dial, 15c extra.

A beautiful "SALRITE" pencil FREE with every order of $12.50 or more. Made of beautiful Mahoganite Rubber—five inches long. Equipped with vest-pocket clip, 10 leads and eraser.

Now is the time to build your own set to take with you on your vacation. We will be glad to offer you any information or advice that you may require. Just drop us a line.

A Recommendation

Hartford, Conn., June 4th, 1923.

Willard Radio Co.
New York City.
Dear Sirs:—

I received the Flewelling Circuit complete and wish to thank you. It is a beauty. I set it up in one hour and a half, but I have to get batteries so I wish to thank you again, also for the present that you sent me.

I have priced the machines here in Hartford and find that they cost anywhere from $35 to $190. I do not see how you can sell them so cheap.

I will close now but if I want anything in the future, you will have my order.

Again I wish to thank you.
I remain
Yours truly,
CHAS. W. HIGLEY.

147 Babcock St.,
Hartford, Conn.

AUDIO FREQUENCY TRANSFORMER. Designed for use with W. D. 11 tubes; list, $4.50; price $2.75

VARIOCOUPLER—Litz Wire Wound Secondary; value, $4.50; special 2.25

Ball Bearing Inductance Switch; value, 75c; special ..... .30

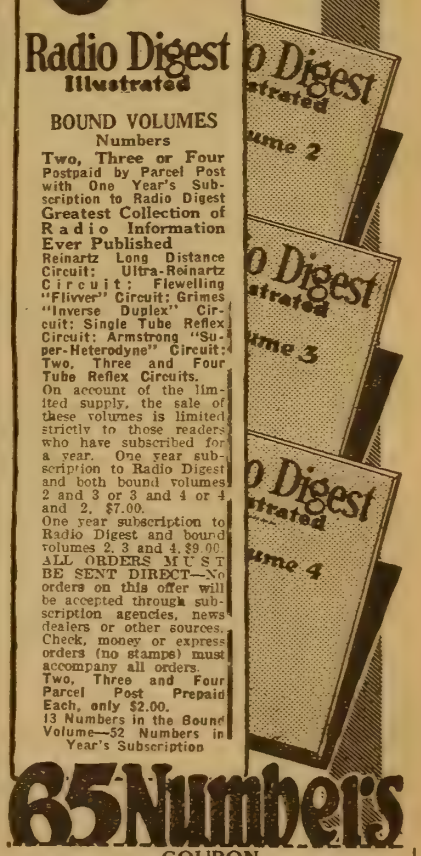
V. T. Sockets, nickeled, brass, sleeve, composition base; value, $1.00; special at ..... .40

Every article advertised above is guaranteed by the manufacturer and by us. Mail orders filled immediately. Transportation PREPAID on all orders of $5.00 or over, east of the Mississippi River. All others include postage.

Your Choice

Radio Digest Illustrated

BOUND VOLUMES
Numbers
Two, Three or Four
Postpaid by Parcel Post with One Year's Subscription to Radio Digest
Greatest Collection of Radio Information Ever Published
Reinartz Long Distance Circuit; Ultra-Reinartz Circuit; Flewelling "Flivver" Circuit; Grimes "Inverse Duplex" Circuit; Single Tube Reflex Circuit; Armstrong "Super-Heterodyne" Circuit; Two, Three and Four Tube Reflex Circuits.
On account of the limited supply, the sale of these volumes is limited strictly to those readers who have subscribed for a year. One year subscription to Radio Digest and both bound volumes 2 and 3 or 3 and 4 or 4 and 2, $7.00.
One year subscription to Radio Digest and bound volumes 2, 3 and 4, $9.00.
ALL ORDERS MUST BE SENT DIRECT—No orders on this offer will be accepted through subscription agencies, news dealers or other sources. Check, money or express orders (no stamps) must accompany all orders.
Two, Three and Four Parcel Post Prepaid Each, only $2.00.
13 Numbers in the Bound Volume—52 Numbers in Year's Subscription



65 Numbers

COUPON
PUBLISHER, RADIO DIGEST,
123 West Madison St., Chicago, Illinois.
Please reserve me Bound Volume Number Two and also Number Three, and one year's subscription to the Radio Digest, for which I am inclosing check—M. O. for Seven Dollars.
Please reserve me Bound Volume Number Two or Three or Four and one year's subscription to the Radio Digest, for which I am enclosing check—M. O. for Five Dollars.
Name.....
Address .....
City..... State.....

Radio Illustrated

Radio is being introduced into the "four hundred" as witnessed by this photo of Miss Margaret Hennessy, of New York City, as she tries out a portable set, using a small loop antenna. The outfit was to be raffled off for the benefit of the crippled kiddies at the Park Avenue Street Fair, one of the prominent outdoor affairs of New York society © K. & H.

Many vacationists have taken along their Radio sets. This Radiophan was snapped at Oakland, Maine, using a loop aerial and a submerged wire for a ground © Int.

Lord Curzon, foreign secretary of Great Britain, broadcasting a speech recently from his house in Carlton House Terrace on behalf of the great ball which is being held at Lansdowne House for the benefit of the Queen Victoria Jubilee Institution for Nurses © Int.

©CI6580728 JUL 10 1923

New Hopwood; Reinartz R.F.; Loop Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. V Copyright, 1923 R. D. P. Co. Inc. SATURDAY, JULY 7, 1923 No. 13

MOVIES SENT BY RADIO

Now we know why the devil enters our Radio sets these days. If you receive devilish music, just lay it to Miss June Farley, for she is the imp that sings at WJAX, Cleveland. Sorry we cannot show the bright red of the costume to make the picture more impressive

Photo by Radio Digest

AIR CHURCH ON WHEELS BUILT

WWJ ENGINEERS PUT SET ON TRUCK

Baseball Scores, Markets, Weather, Music, to Supplement Sermons

DETROIT.—Radio engineers from WWJ, the Detroit News broadcasting station, have converted a large motor truck into a Radio church for the Episcopal Diocese of Michigan. Vestrymen of St. Paul's Episcopal Cathedral, the services of which are broadcast every Sunday, turned over all its contributions from its Radio audience for this work. Some parts of the apparatus are loaned by manufacturers and retailers, but it is the aim of the church officials finally to pay for entire equipment with money sent to the church in appreciation of the services broadcast by WWJ.

Reverend Jerome, in charge of the Radio church van, says he is going to give baseball scores, markets, weather forecasts, solos and selections by the Detroit News orchestra. "This will get the folks interested in what I have to tell them," he says.

Besides the Radio outfit, the van is equipped for church services, communion and baptismal services. It also is the pastor's rolling home while he is travelling about the state.

Broadcasters of Britain Building Radiotheater

Take Step When Actors' Union Bars Members from Microphone

LONDON, ENG.—Because the Theatrical Managers' Association of London has decided to ban the broadcasting of plays, music, songs and other entertainments in which performers in employ of members of that body appear, the British Broadcasting Company is building a large new studio-theater from which to broadcast such entertainment. The company will organize playing troupes of its own, and will engage independent singers, musicians and other entertainers. The studio-theater will be at Savoy Hill, a London district, and will be the first of its kind in the world.

Prize Set for Best Radio Record at Citizens' Camp

DETROIT.—General J. G. Harbord has announced that he will present to the young man who makes the best record in Radio at the Citizens' Military Training Camp at Custer, Mich., this year, an up-to-date Radio receiving set. This offer is open to amateurs in Illinois, Wisconsin and Michigan. The camp opens at Custer, August 1, and continues until September 1. General Harbord was, until recently, the deputy chief of staff of the Army.

FILM ON AIR EXPERIMENT PROVES GOOD

Small Box and Curtain May Soon Make Radio Visible in the Home

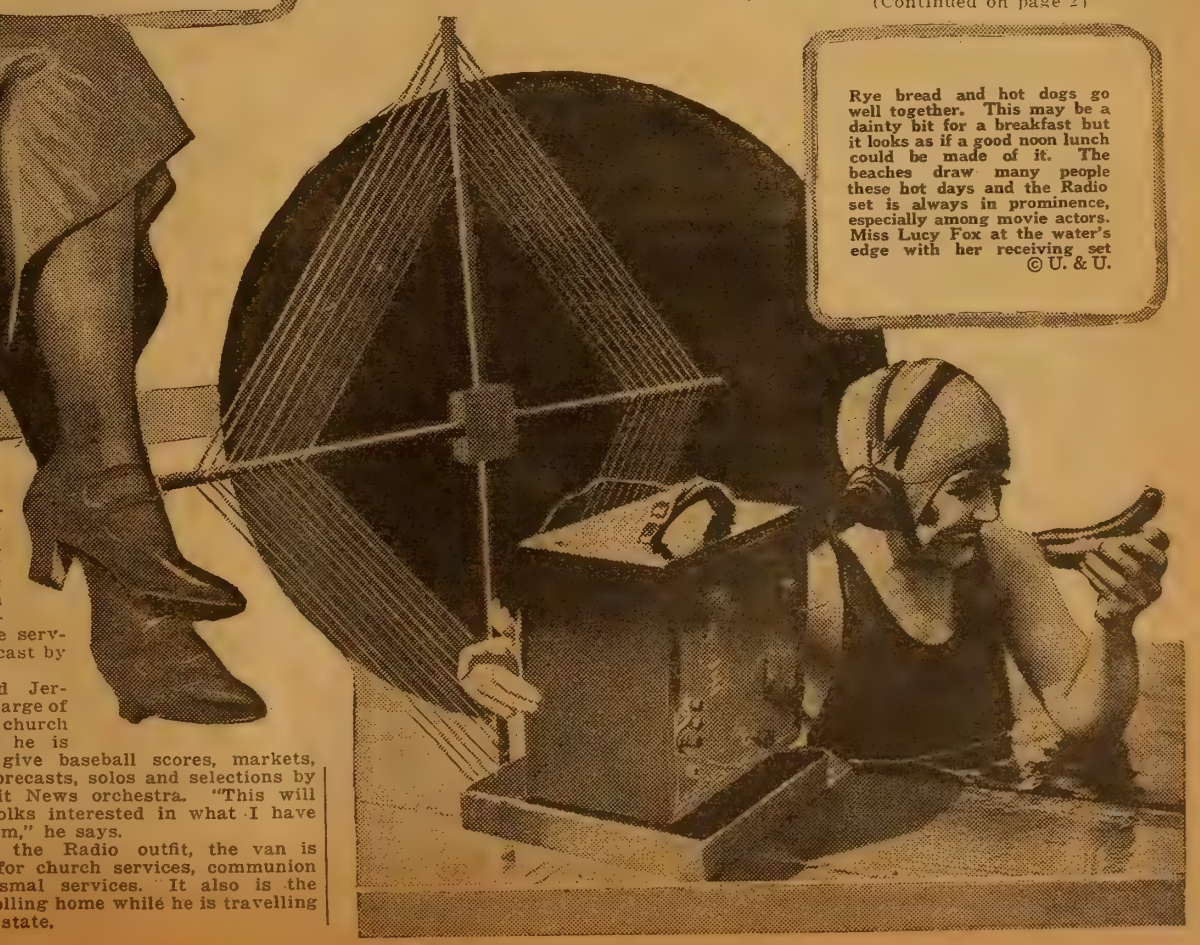
Plans City-to-City Test

Follows Up "Still" Photo Work Outlined Recently in Digest —Has War Uses

By Carl H. Buttman

WASHINGTON.—The near future will see the perfection of Radio movies; essentially, they are here today. Every "listener-in," with the aid of a special apparatus, contained in a box about a foot square and a small curtain, will be able to see as

(Continued on page 2)



Rye bread and hot dogs go well together. This may be a dainty bit for a breakfast but it looks as if a good noon lunch could be made of it. The beaches draw many people these hot days and the Radio set is always in prominence, especially among movie actors. Miss Lucy Fox at the water's edge with her receiving set

© U. & U.

"Radio Can't Save Sinners"

PARIS.—Sermons broadcast by Radio can never convert sinners, Cardinal Dubois, Archbishop of Paris, believes. The Cardinal is himself a Radio enthusiast.

SAYS RADIO MAKES "SCATTER-BRAINS"

CLEVELAND.—Radio, moving pictures, modern newspapers and automobiles have made the American people a scatter-brained race, James M. Beck, United States solicitor general, declared recently in an address here. The multiplication of mechanical facilities has substituted love of power for things of eternal moment, he said. He urged the preaching of love of work as the best possible cure.

MORE VALUABLE OF PARTS REQUESTED

RETURNS INDICATE THAT POPULARITY GROWS

Many Fans Saving Up Coupons to Get Several Prizes—Sixth Coupon of Series Appears

SPECIAL REWARD OFFER
Coupon Number 6

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Each week the number of Radiophans who are sending in the valuable Special Reward Coupons is increasing and it tends to show that a great number of our readers are anxious to secure the more valuable articles listed. As we stated before, the number of coupons that any one Radiophan may send in is unlimited, the only stipulation being that they must be consecutively numbered and accompanied with the necessary amount of cash, as required for the articles.

This method of obtaining such a varied number of valuable standard Radio parts and accessories is so simple that the plan is gaining new converts every day, as is indicated by the number of letters pouring into the office of the Radio Digest. Do not fail to secure your copy of the Digest each week and clip the coupon so that they may be consecutively numbered in order to obtain the more valuable of the many parts and accessories that are offered for your selection.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Electrad Grid Leak (with clip mountings); Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 inch black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-20 with .038 milhenry inductance, SW-15 with .066 MH., or SW-26 with .300 MH).

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.);

(Continued on page 9)

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440	10:00-11:00				11:30- 1:30		11:00- 1:00
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	10:00-12:00		10:00-12:00		10:00-12:00		9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00		10:00-11:00		9:00- 2:00		9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423		10:00-12:00		10:00-12:00		10:00-12:00	
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00		8:00-12:30	8:00-10:00	
KYW, Chicago, Ill.	345		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360		7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30		7:15- 9:30			
WJY, New York, N. Y.	405		5:30- 9:30		5:30- 9:30	5:30- 9:30		
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360		6:30- 8:00				6:30- 8:00	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas.	400		9:30-10:30		7:30- 8:30			9:30 1:0:30
WOAW, Omaha, Neb.	526	9.00-10:00	:900-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9;00:10:00
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00				6:00- 9:00		
WOR, Newark, N. J.	405	7:00-10:00	5:15- 6:30	7:00-10:00	5:15- 6:30	5.15- 6:30	7:00-10:00	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00		

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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Looking Ahead

"Cooperative Competition" in Radio Merchandising—an instructive series of articles telling who owns the patents to the various Radio systems and circuits and how you are pretty well cornered in a giant Radio patent monopoly by certain well-known concerns who have somewhat pooled their interests, written by John B. Brady, a patent attorney of note, will be started in the July 13 issue. Find out why the independent manufacturer has a hard road to travel. Begin reading this informative series next issue.

Radio Frequency Amplification Told Simply—July 13 by Thomas W. Benson in his series for newcomers, "First Steps for Beginners in Radio." Followers of Mr. Benson are unanimous in saying that he misses no detail, no matter how small, in his remarkably clear exposition of Radio principles.

Another Simplex Picture Hook-Up—the second of its kind, will appear next week in the Digest. Turn to Page Six and see the extraordinary method of illustrating circuits that has been started this issue. The uninitiated layman need have no trouble in arranging a hook-up with the assistance of this series.

"How to Make a Camper's Portable Reflex Set"—will be concluded next issue. Details of wiring and the assembly, as well as pictures of the assembled set will be given by H. J. Marx, who will also give operating instructions.

Part Four of the Broadcast Station "Telephone Book"—appears in the next issue. This part will be devoted entirely to the state, city-station index, and is necessary to make best use of the station schedule list.

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SENDS RADIO MOVIES

(Continued from page 1)

well as hear over the versatile Radio, according to C. Francis Jenkins, of this city.

Mr. Jenkins some time ago made successful tests of sending photographs by Radio, as already detailed in a story appearing in Radio Digest some weeks ago. Following the success of this, Mr. Jenkins started work on the sending of the motion pictures.

Last week he showed on a screen in his laboratory, the movements of his hand and other objects held in front of his Radio transmitting apparatus in another room. The apparatus used in transmitting still pictures was employed in the last experiment, but a new "lens-faced prismatic ring" was introduced to show a rapid succession of pictures depicting movement.

Needs Large Corona Glow Lamp

Perfection of the moving picture Radio transmiting set now awaits only the manufacture of a new and more powerful electric lamp of the "corona glow" type. In the recent demonstration a temporary lamp was made by the inventor, but it is not strong enough to transmit large pictures. The question of rapidity is solved, Mr. Jenkins says, as he has already sent pictures at twice the standard movie speed. What he needs is a better and stronger lamp which will stand up when the signal strength is increased about 3,000 times, as is necessary in sending pictures in motion.

Not only actual pictures of moving bodies can be transmitted by pointing the machine at them, but films can be broadcast, Mr. Jenkins claims, and shown on screens in theaters or homes where proper receiving and reproducing apparatus and a screen are available. When the power of the light is raised the size of the picture can be increased, it was explained.

Plans City to City Test

Radio experts of the Navy, who saw the first demonstration between two rooms of Mr. Jenkins' laboratory on Connecticut avenue, say that the invention is adaptable in military operations as well as in commercial fields. They point out that a transmitter used in an airplane over the enemy fleet or trenches would give officers far in the rear an actual view of the fall of shells and all front line activities. In the commercial field, with some adaptations, moving picture distributors might transmit their films to subscribers via Radio instead of by express, saving time and the making of many copies.

With the completion of his new lamp, probably not sooner than several weeks, Mr. Jenkins promises to give a long-distance demonstration, transmitting pictures of objects in motion and perhaps films between Washington and probably Philadelphia.

Doctor Uses Radio to Direct Birth on Isle

Gives His Instructions from Distant Life Guard Plant

HALIFAX, N. S.—One of the most impressive accounts of the service rendered by Radio, that of bringing a child into the world when other help was unobtainable, has just been related, for the first time, by Charles Wells, a member of the St. Kilda Life Guard Station on St. Kilda Island off the coast of Nova Scotia. On account of the unprecedented ice-conditions, efforts of the Government ice-breakers to reach the island with doctor and nurse to render aid to Mrs. J. Kartney, wife of one of the members of the life guard staff, failed, so the services of a doctor who had an amateur broadcasting station 150 miles distant was obtained. He had often sent out impromptu concerts which had been received by the members of St. Kilda lighthouse and other receiving centers throughout Nova Scotia.

When informed of Mrs. Kartney's plight he immediately began broadcasting so that the Kilda Isle residents, several of whom had receiving sets, could hear. He gave directions to three women, also living at the lighthouse, repeated the directions several times, and gave all the information necessary. The three women carried out his instructions and the birth was successful. A few days later the doctor who had sent orders by Radio made the trip via a Government ice-breaker and personally attended Mrs. Kartney and found her and an eight-pound baby boy very well.

NEW BROADCASTING STATIONS FOR MEXICO

Government Grants Permission for Erection of Plants

MEXICO CITY. — Two Radiophone broadcasting stations were recently opened here. Various efforts have been made in recent months to obtain concessions for the establishment of such stations, but it is only recently that the government granted this permission.

There is great enthusiasm over local broadcasting, and it is believed that the market for Radio sets in Mexico is favorable to considerable development by American manufacturers.

MAN-MADE STORMS "OLD STUFF"—TESLA

SAYS HE MANUFACTURED LIGHTNING FIRST

Inventor Discounts Value of Recent Sensational G. E. Experiment

By F. J. Andrews

BOSTON, MASS.—Much interest was incited in manufactured lightning recently, when engineers of the General Electric Company produced artificial lightning in the laboratories of the General Electric Works at Pittsfield, Mass., but Nikola Tesla, when told of the experiment, said that the manufacture of lightning is nothing new, he himself having succeeded in producing lightning discharges over a hundred feet long twenty-three years ago.

The G. E. engineers constructed a miniature village, including a steepled church, and in the course of the exhibit made the lightning strike the steeple of the church, demolishing it. They also produced rain from manufactured clouds.

"Old Stuff," Says Tesla

"When the average man hears of a manufactured thunderstorm he is naturally dumfounded," Tesla said. "What he doesn't realize is that the village struck by the artificial bolt was only a tiny model, that such experiments are not at all new, and that there is not any prospect of their being of any particular utility. I understand that electrical discharges obtained were fifteen feet long under a pressure of 2,000,000 volts.

"I might also point out that electrical effects such as are here considered grow in intensity with the square of the pressure. Thus the discharges I produced were eighty-one times stronger than those described. I communicated the results to the scientific world at the time and they were widely commented upon."

PHONE WIRES BREAK; AIR COMES TO RESCUE

Radio Proves Superiority Over Lines in Canadian Storm

TORONTO. — Radio communication is destined to play a vitally important part in maintenance of continuity of service on high tension power transmission lines in the future, in the opinion of operating officials of the Toronto Hydro Power Company. This newest form of communication has already been successfully used by the company in quickly locating "trouble" on its lines, and it has proved greatly superior to wire telephone methods used previously.

On a recent report following a severe snowstorm appeared this note: "Bronte—Tower 46, wires number 4 and 6 down—time 2.50 A. M." Beneath the message was the following notation: "Bronte—46—4 and 6 O. K.—time 3.10 A. M."

Behind this prosaic statement is hidden something which is of decided interest to the public and to power companies. When these two wires snapped beneath a weight of snow and accumulated ice, and under the pressure of wind the telephone wires also snapped and communication through that source was eliminated. The operator at the Bronte service station acted quickly and within twenty minutes the service was continued. Wire telephone communication was not re-established until a half hour later.

Beauty Exercises by Radio

COLUMBUS, OHIO.—Physical education by Radio is the latest addition in Columbus broadcasting circles. The flabby, skinny and over or under-developed specimens of humanity, or those who merely wish to take some wholesome exercise, now hear plenty of advice when WPAL of the Superior Radio & Telephone Equipment Company broadcast its lessons in instructive and constructive exercises.

ETHER TAKES HUMAN VOICE TO DEAF MUTE

HONOLULU, T. H.—The sensations of a man, born a deaf mute, who heard a human voice distinctly for the first time by means of Radio, were told by Fred W. Baars, who heard a Radio program recently. Baars is 55 years old. "Always before the night I heard the Radio I had heard only a vague roar," he wrote.

ADD SUMMER SIGNS: HAY FEVER CAUTIONS

WASHINGTON, D. C.—Signs of summer are seen in the recent broadcasts from Station NAA by the public health service on "Hay Fever and Weeds." NAA will not send out band music again until the fall and the bulletins and other broadcasts from the department of labor will not be resumed until December.

PEGGY'S DEBUT AS A RADIOPHAN

Movie fans in general are Radiophans and "Baby Peggy," the well-known little movie vamp, is not to be outdone by her elders, so it seems Digest Photo

Brazil Firm to Receivers

BUENOS AIRES.—The largest manufacturer of Radio equipment in Argentine has applied for receivership. Its financial difficulties are said to be directly due to intense competition that exists in the Argentine market, which has resulted in considerable price cutting.

Recruit Reserves by Air

CHICAGO.—Recruiting by Radio has recently accomplished marvelous results for the Illinois Naval Reserve. The Zenith-Edgewater Beach hotel station, WJAZ, has broadcast several talks by Capt. E. A. Evers, commandant of the reserve.

AIRPHONE NEW FEAR IN OUTLAW WORLD

LOS ANGELES COPS' AUTOS RADIO-EQUIPPED

Chief Flashes Orders to Motor Squads; "Apprehension of Crooks Now Matter of Minutes"

By Strachan McMillan

LOS ANGELES.—"Beware of the Radio," may soon be the "pass-word" among the outlaws in crookland who desire to escape the net of justice, if the experiments recently conducted by the Los Angeles police department prove to be successful. The Radio will shortly become the bitterest enemy of the criminal and his sure nemesis.

According to members of the police department, if the results of these experiments meet with the approval of the city authorities and the Radio is accepted as a permanent adjunct in the city's criminal-hunting business, crooks and other lawbreakers will be apprehended in minutes instead of hours and days after the commission of a crime.

Together with a committee of newspaper men invited by Chief of Police Louis D. Oaks to act as judges of the efficiency of Radio, and with several of the police automobiles equipped with Radio receiving sets, a "crook" in a high-powered car was to be sought by a fleet of department autos each one of the pursuing machines being directed by the voice of Chief Oaks—sitting in his own car, perhaps miles away from the scene of the chase.

How Plan Works

The police automobiles were notified of the crime, were given the number of the bandit car, its direction when last seen, the number of persons in the car, and other bits of information which the central office had at the time.

Chief Oaks stated that "the fine point in the chase" was that he knew where the crime was committed, and that he also knew where his scout cars were stationed at the time. "Suppose that the robbery took place on Tenth street and also suppose that I have Radio-equipped automobiles located at Fiftieth street, First street and at other streets east and west of the point where the crime was committed.

"Then it would be merely a matter of ordering the Fiftieth street auto to head toward Tenth street, the First street car to head out toward Tenth and the other outlying cars to come in, as the circumstances of the particular crime would seem to dictate. The crook in his high-powered car, with his number known and with several other marks of identification at once in the hands of each police automobile, will stand but little chance of getting away."

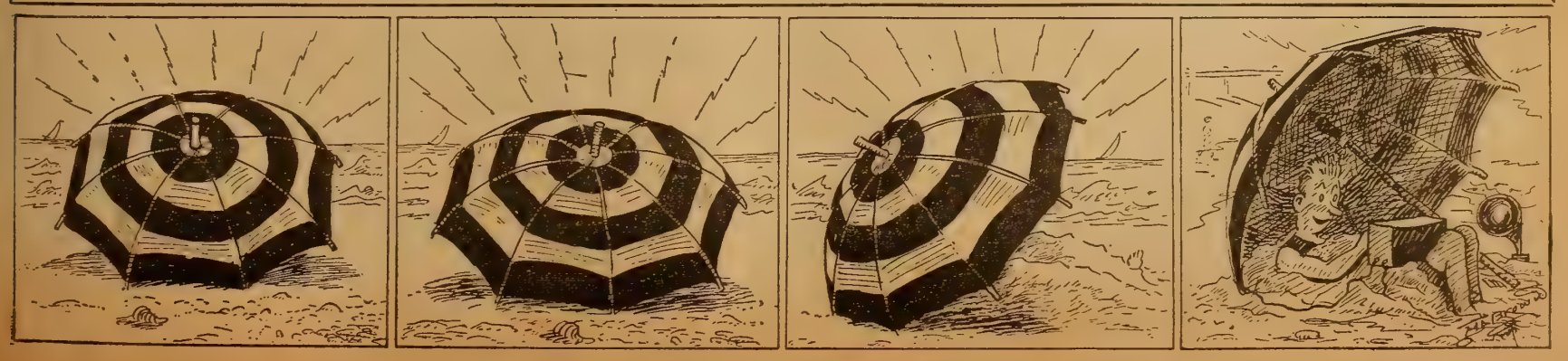
Kiddies' Story Teller Profits by Broadcasts

"Lamplight Tales" of Caroline Bouve, Proven Feature

BOSTON, MASS.—At least one author is strong for the Radiophone. This is Miss Caroline Bouve, author of "Lamplight Tales," who says that the bedtime story telling from WNAC by Mrs. Stewart, who was the first to introduce "Lamplight Tales" to the Radio public, have heavily increased the sales of Miss Bouve's book in and around Boston. Miss Bouve recently paid a personal call at WNAC to meet Mrs. Stewart and thank her for her splendid rendition of the stories. The Children's Half-hour, three times a week, proves a big attraction to thousands of children throughout New England, who are privileged to listen in.

The British war office reports the loss of seven secret Radio codes, and an entirely new set of codes is now in process of drafting.

THE ANTENNA BROTHERS Spir L. and Lew P. Shades of Hertzian Waves



COUNTRY TUNES IN HARDING'S MESSAGE

ALL STATIONS STAND BY AS PRESIDENT SPEAKS

Event Is of Historical Record—First Time U. S. President Addresses Entire Country

By F. J. Andrews

ST. LOUIS, MO.—On Thursday night, June 21, the chief executive of our country, President Harding, broadcast a speech from station KSD, St. Louis. His speech, the first one of a series which he is giving during his trip to Alaska, was delivered at the international convention of Rotary clubs and was relayed from the convention hall to the broadcast station. The wave length used was 546 meters.

As a special courtesy to the President, all Radio stations in the United States stood by while the President was speaking.

It is quite probable that no one person has ever addressed so vast an audience by word of mouth at one time as did the nation's chief executive on this occasion. Historical importance of the event was enhanced by the fact that it was the first time a President of the United States has made use of the Radiophone to speak to the citizens of the nation on a great political question.

Microphones, coupled to a special loud speaker, picked up the sound-waves and transferred them by wire to the broadcasting station, where they launched into the ether in the usual manner.

MAE MARSH TELLS OF HER MOVIE WORK

Received Munificent Pay of Three Dollars Per Day to Start

NEWARK, N. J.—Mae Marsh, pretty and demure, recently sat down in front of the microphone at WOR here, and in a hesitating sort of way, not frightened or nervous, told the multitude of "listeners in" some interesting things about her work. The main theme of her talk was about David Warwick Griffith, the "daddy" of super-productions, and, of course, she told of her start in pictures.

"In my first picture," Miss Marsh explained, "I received the fabulous salary of three dollars a day. In my second I was paid five dollars a day, and in my third, for some unknown reason, it dropped back to three." (This, of course, brought on a laugh.)

Holland-East Indies by Radio

WASHINGTON, D. C.—Radio Service between Holland and the Dutch East Indies is now in operation, according to a report just received from the American Commercial Attache at The Hague. For the present the service is restricted.

On account of the unusual growth of Radio traffic to Europe, the cable companies have postponed the construction of the proposed new cable between this country and Germany.

Minister Heads Big Bible Study Class from Dallas Journal's Plant

Rev. William M. Anderson Tells Story of Origin of Feature at WFAA—Members Listen in with Scriptures in Hand—Letters Proclaim Approval

By Rev. Wm. M. Anderson, D. D.

Much interest has been raised among the members and friends of the Bible Class which is conducted over the broadcasting station of the Dallas News and Dallas Journal by the stories of other classes and other stations, and a bit of pleasant rivalry has come up as to the claims of priority in organization. These things and the desire to pass on a successful part of the work of Radio Bible teaching have brought about the request that the writer of these lines tell the story of the WFAA Radio Bible Class.

The writer is pastor of the First Presbyterian Church of Dallas, one of the larger downtown churches, and, like pastors of similar churches in many places, was interested in the possibilities of broadcasting the church services for some who might not be able to attend.

Asked to Conduct WFAA Chapel

It was in making the investigation of the possibilities of this service that he was taken courteously into the plans of the management of the Dallas News and asked if he would undertake to conduct the chapel on the first Sunday afternoon of the operation of the then contemplated station of the News and Journal. Quickly, although with some fear and trembling, he agreed.

It was then made known that the next day, Friday, June 23, 1922, would be the first test day; that Saturday following would be also for testing and that Sunday would wind up the testing ready for official opening, June 26, 1922. The writer did not fully understand, but presently found out that part of the testing would be of his moral courage and nerve force as he faced the untried ordeal of speaking into a little microphone to an unseen audience of unknown number and sympathy.

Begins with "Microphone Fright"

The experience will be doubtless in agreement with many who tried for the first time to broadcast. Approaching the hour of that first chapel service was enduring agony. There was little sleep Saturday night. There was less comfort Sunday morning. As the hour of 2:30 approached the chapel speaker was barely in possession of the strength to talk.

With much floundering and great effort the talk was delivered to the air. The talker was as much in the air as the talk. But finally both came down. Fortunately the talk came down into receiving sets that were friendly and the speaker had an equally happy fate. That was the beginning of the writer's experience with broadcasting.

Consecutive Bible Study Started

In about six weeks a suggestion was made by L. B. Henson, supervisor of the station, that consecutive Bible Study would be more valuable to many listeners than unconnected addresses. Consecutive Bible studies were begun. That means that the class undertook the study of the Epistle to the Ephesians verse by verse and section following section. Members of the class were asked to have their Bibles at hand and follow in the scripture the reading and explanation of the passage.

A flood of letters proclaimed the approval of the listeners. For several months, until December 10 in fact, the number of listeners increased with the natural growth of interest in Radio generally, and many letters gave evidence of their presence in the Sunday afternoon audience.

Enrolls Radio Bible Class

Then came December 17 of last year, 1922. For the Bible Class it is an important date. It was this date that announcement was made to the listeners in that the station personnel and the teacher of the class had made a plan to enroll the names of all who would write in a request for the enrollment and have what was believed to be the first enrolled Radio Bible Class. Adams Calhoun, the clear voice of WFAA, gave out the word of announcement. Immediately, by telephone and telegraph, came in the names and the WFAA Radio Bible Class was in existence.

To the best of our knowledge, this marked the first organized Bible Class taught by Radio anywhere. It would be interesting to know from any readers if they have information of any earlier and similarly organized class. Many stations had taught Sunday School lessons, and had chapel, and broadcast services before that date, but we have no knowledge of any earlier organization.

Pass 3,000 Mark

It was predicted that the enrollment might eventually go to 3,000 or maybe five, and that we might have 2,000 in the first thirty days. The names poured in. An effort was made at first to read broadcast the names. One week 631 names came in. It was a hopeless task to read them all. We had no time left for announcements even—none for teaching. The reading had to be abandoned. Still the names for enrollment came in. Today, as these words are written, we are past the 3,000 mark, and still enrolling.

To each member of the class is sent out a certificate handsomely printed, declaring that the person named on its face is an enrolled member of the class. The certificate bears the teacher's signature.

Letters from invalids, shut-ins, and others who cannot get out to services show the interest of many of these in the growth and work of the class. The orphans' homes of several nearby towns have receiving sets and belong. Altogether the possibilities of its usefulness and reach pass the limits of imagination.

Aviation Talks to Be Broadcast

DAYTON, OHIO.—Plans for establishing a Radio broadcasting station are being made at McCook field. The proposed station will serve as a means of broadcasting lectures on aeronautics from the field in addition to military use. It is expected that equipment, which has arrived at the field, will be set up in time to begin broadcasting by early fall.

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PANELS—3/16" Thick
Hard Rubber — Bakelite — Hard Rubber — Bakelite
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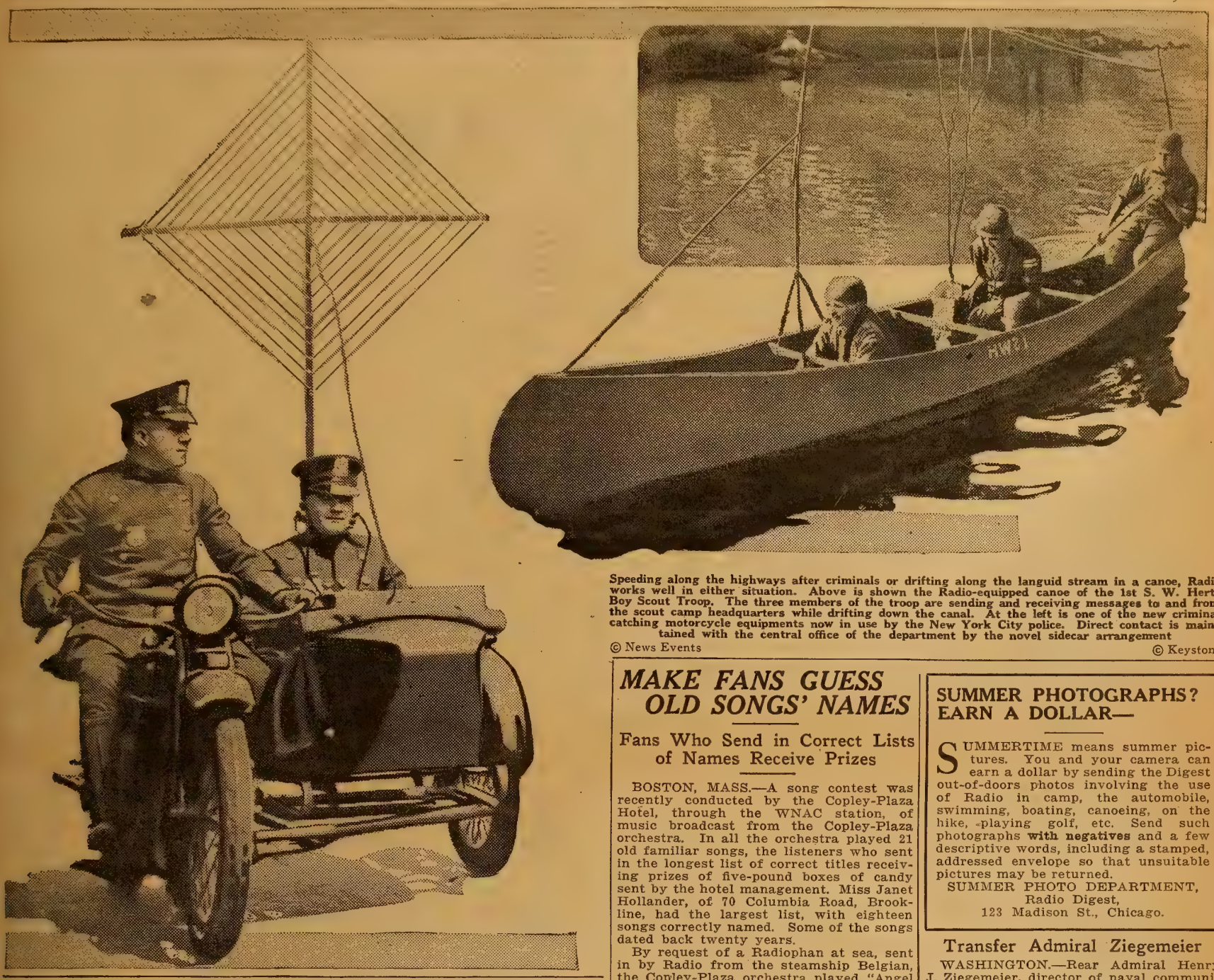

Speeding along the highways after criminals or drifting along the languid stream in a canoe, Radio works well in either situation. Above is shown the Radio-equipped canoe of the 1st S. W. Herts Boy Scout Troop. The three members of the troop are sending and receiving messages to and from the scout camp headquarters while drifting down the canal. At the left is one of the new criminal catching motorcycle equipments now in use by the New York City police. Direct contact is maintained with the central office of the department by the novel sidecar arrangement

© News Events © Keystone

MAKE FANS GUESS OLD SONGS' NAMES

Fans Who Send in Correct Lists of Names Receive Prizes

BOSTON, MASS.—A song contest was recently conducted by the Copley-Plaza Hotel, through the WNAC station, of music broadcast from the Copley-Plaza orchestra. In all the orchestra played 21 old familiar songs, the listeners who sent in the longest list of correct titles receiving prizes of five-pound boxes of candy sent by the hotel management. Miss Janet Hollander, of 70 Columbia Road, Brookline, had the largest list, with eighteen songs correctly named. Some of the songs dated back twenty years.

By request of a Radiophan at sea, sent in by Radio from the steamship Belgian, the Copley-Plaza orchestra played "Angel Face," which was sent out direct from the hotel by WNAC station. This establishes a new record for this enterprising station.

To humanize jail life, a Radio set has been installed in the Allegheny County jail in Pittsburgh, Pa.

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-doors photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 Madison St., Chicago.

Transfer Admiral Ziegemeier

WASHINGTON.—Rear Admiral Henry J. Ziegemeier, director of naval communications, and one of the foremost experts of the navy, has been detailed to command the Norfolk Navy Yard. His successor as director of naval communications has not been named, but it is stated that Commander D. C. Bingham, assistant director, will be acting chief.

CFCN MOVING 3,500 FEET UP ON MOUNT

PLAN NEW STATION TO BE BEST IN CANADA

Present Quarters Too Small for Equipment—Need More Studio Space for Artists

CALGARY, ALTA.—CFCN, station of W. W. Grant Radio, Ltd., here, will soon be installed permanently in its new headquarters on Mount Royal, one of the outlying suburbs to the southwest of the city, which is many hundred feet above the level of Calgary, as the city is situated in the deep valley of two rivers. The station will be approximately 3500 feet above sea level, and thus will have a higher altitude than almost any station in Canada or the United States.

W. W. Grant has announced his intention of abandoning the present quarters on Crescent Heights owing to the fact that two stations, CFCN and CHBC, The Morning Albertan station, are housed in the same building, with the result that space has become insufficient for the many purposes for which it is needed.

To Be Best in Canada

The new Mount Royal station will have all the conveniences of an ultra-modern broadcasting station. Its broadcasting room, when completed, will be one of the finest, most richly appointed and elaborate in the Dominion.

Considerable difficulty has been encountered in the past owing to the lack of available space in which to accommodate the artists who nightly entertain from CFCN. This obstacle will be completely overcome in the new station.

Moving of equipment will start soon, it is announced.

"RADIO WEST POINT" GRADUATES 65 MEN

Officers Complete 10 Months' Course for Signal Certificates

WASHINGTON.—Gen. George O. Squier, chief signal officer of the Army, presided at the graduation exercises at Camp Alfred Vail, in New Jersey, a few days ago, when sixty-five officers received certificates as signal officers. They all completed a ten months' course in communication work, including Radio in its many phases, and now have been ordered back to their regular duties with cavalry, artillery, infantry and other arms of the service, where they will act as communication specialists.

Quits Shipping Board for R.C.A.

WASHINGTON, D. C.—F. P. Guthrie, chief of the Radio communication activities of the United States Shipping Board, has resigned to accept a position as Washington manager of the R. C. A.

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TUBES REPAIRED

C-300 or UV-200	$2.75
C-301 or UV201	3.00
C-302 or UV-202	3.50
C-301A or UV201A	3.50
WD-11 or WD-12	3.50
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Moorehead Amplifiers	3.00
DV-6 or DV-6A	3.00
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NEW DX 1½ VOLT TUBES	4.00

All tubes guaranteed to work like new.
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HERE is your chance to cash in on your spare time. A special offer is being made to you for the summer.

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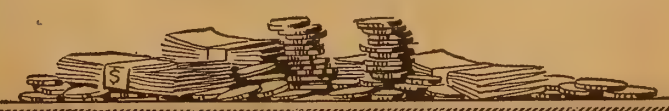
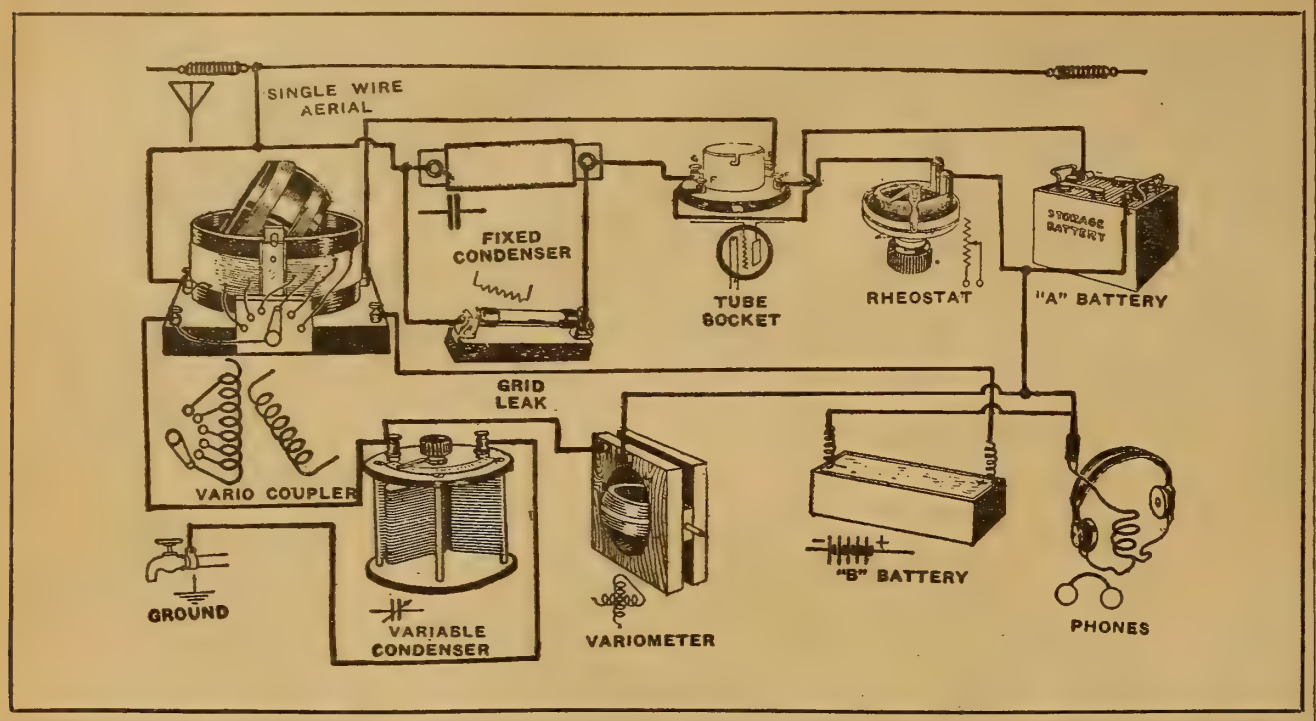


HOPWOOD NO-GROUND HOOK-UP FIRST SIMPLEX



HOPWOOD'S regenerative circuit has been taken as the first to be shown by Radio Digest in the new, simplex diagram series. As will be seen, the diagram symbol, picture and name of each piece of apparatus, is given. The newest comer to the Radio field should not find it hard to set up this hook-up according to the above layout.

The peculiar feature of the Hopwood hook-up is that it sometimes receives very well without using a ground at all. The ground is connected, however, above in the correct location so as to be used if necessary. If used without ground, put the variable condenser in series with the aerial at a point before reaching set.

The fixed condenser shown in the grid-aerial lead should have a capacity of .00025 mfd. while the grid leak resistance across this same condenser should be two megohms.

The B battery used has 22½ volts potential, and most any tube, soft preferred, will work well. The variable condenser shown in the ground lead should have .0005 mfd. capacity. While an ordinary rheostat will work satisfactorily to control the filament brilliancy, a vernier type rheostat will aid in tuning in.

Reviews of Books

Radio Experimenter's Hand Book. By M. B. Sleeper. This book will help in the selection and the construction of simple apparatus for transmission and reception of Radio telegraph and telephone signals. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75c.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is a complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payments for books not accepted. Send money order or check. Radio Book Department, Radio Digest Illustrated, 123 W. Madison St., Chicago, Ill.

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PATENTS. Booklet free. Highest references. Best results. WATSON E. COLEMAN, Patent Lawyer, 624 F Street, Washington, D. C.

Ritter Loop Aerial $1

Including wood parts—wire and binding posts. Can be assembled in a few minutes—Portable, requires little space, 36 inches across. Interference — Static — Lightning practically eliminated. Instructions with every SET. By Mail, 10c Extra.

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PARIS COMPOSER SCOUTS RADIO-OPERA RIVALRY

Broadcasts Won't Destroy Interest in Theater

PARIS.—"The Radiophone will no more destroy public interest in the theater or concerts than tinned corned beef will satisfy the gourmet," says Raynaldo Hahn, composer of "Ciboulette," discussing the rapid growth of broadcasting in France during the last few months. From a few hundred instruments last summer it is now estimated there are more than 30,000 receiving sets in the Paris district alone.

The Society of Musicians in Paris, however, does not agree with him and is planning a formal protest to the government. Such a renowned musician as Georges de Lausnay, director of the Orchestre de Paris, is planning to collaborate with eight other associations to this end on the grounds that already a diminution is noticeable in attendance at the better class concerts.

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QUICK SERVICE Include with your order remittance to cover repair plus parcel postage for one pound per tube. If preferred, tubes will be returned C.O.D. repair charges.

Abalene Radio 14 Vesey Street New York, N.Y.

"Air Detectives" May Aid Chicago Crime War

Chief Studies Detroit "Land-Water" Radio Patrol

CHICAGO.—This city may soon have Radiophone detectives to combat crookedness in the city's crime war, if suggestions made by Chief of Police Collins are carried out. Chief Collins recently returned from the International Convention of Police Chiefs at Buffalo, N. Y.

In a conference with Chief William Rutledge, of Detroit, he learned that the Radiophone is used successfully in that city to combat crime, both on land and water. Many of the police river patrol boats, constantly on the lookout for rum runners, are equipped with Radiophone receiving and transmitting apparatus.

One of the chief uses to which the "Radio detective" is put to in the Motor City is the broadcasting of the descriptions and license numbers of stolen cars. Also the news of holdups is flung out on the air so that the "strong arms" of the law in the outlying towns can be on the alert for any suspicious cars or persons.

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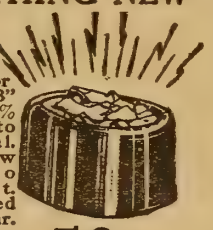
A real loud Talking Detector made of "B" Metal. 100% superior to any crystal. Puts new life into your set. Guaranteed for one year. It's the cheapest in the long run.



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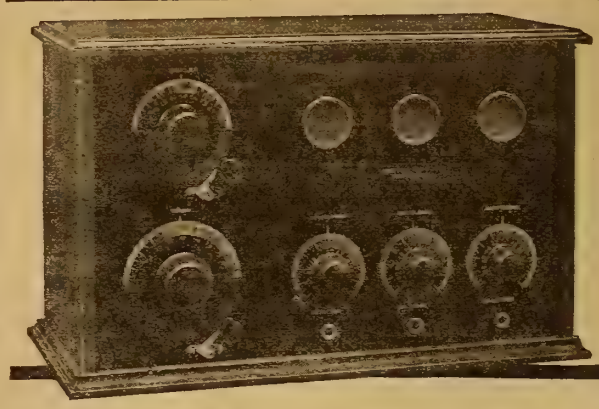

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Michigan "Senior" and "Junior" Regenerative Receiving Sets, with our patented Split-hair Vernier Dial Adjuster give the operator practically complete control of radio reception.

Our set owners report remarkable success in bringing in *any desired station* on which they had made previous dial-position records.

Troublesome nearby stations can be tuned *out* almost at will and signals come in clear, strong, pure-toned.

Loudspeaker reception on the "Senior," or on the "Junior" with our two-stage amplifier, is especially satisfactory.

Michigan Sets are Regenerative, licensed under Armstrong's U. S. Patent No. 1,113,149 and pending Letters Patent 807,388.

Michigan Accessories and Parts include vernier dial adjuster, two-stage amplifier, and a long line of highly perfected variometers, variocouplers, plate condensers, grid condensers, rheostats, etc.

Send for our catalog.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

The Week's Advance Broadcast Programs

Tuesday, July 3

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Peer Gynt," Star Orchestra; "Swiss Echo Song," Edna Charles, soprano; "Serenade," Mannie Roth, violinist; "Moment Musical," "Pulcinello," Orchestra, "Love Sends a Little Gift of Roses," Edna Charles; "H. M. S. Pinafore," Orchestra; "Alice, Where Art Thou?" Orchestra; "My Message," Edna Charles; "Prize Song" from "The Meistersinger," Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert, Baisden's Bon Ton Ballroom Orchestra; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour, "Uncle John," 8:00-10:00 P. M., Program arranged by Western Union Telegraph Co.

KSD (Central, 546), 8:00 P. M., Concert, Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Laura Grossman, soprano; Miriam Aaron, soprano; Bertha Kaplan, reader; Earl Wettelande, pianist; Cope Harvey's Orchestra; Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Calhoun's Texas Hotel Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Talk, "Care of the Hands," Vaughn De Leath; Banjo solo, John Martell; Popular songs, Will Von Tilzer; Banjo solos, John Martell.

WFAA (Central, 476), 12:30-1:00 P. M., Address, De-Witt McMurray, 8:30-9:30 P. M., Musical program, Elk's Quartet; 11:00-2:00 P. M., Musical program under auspices of Lester Gunst Co.

WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales," Uncle David; 8:30 P. M., Business report, Roger W. Babson; Instrumental concert.

WGY (Eastern, 380), 1:00 P. M., Address, "Old Glory," Mrs Margaret Tucker; 7:45 P. M., Musical program: "Les Sylvains," Earl Hermance, pianist; "La Nuit Monte," Helen B. Beeler, soprano; "Ave Maria," Bernardino Gazerra, cornetist; "Just You," Samuel E. Beeler, Jr.; "Reverie, Opus 32, No. 2," Eugene Scuitto, violinist; "Ave Maria," Harry Bannister, tenor; "At Dawning," "His Lullaby," Mary Roberts, contralto; "Spring Song," Bernardino Gazerra; "Slumber Song," "Revery," Helen B. Beeler; "Mother," Samuel E. Beeler, Jr.; "La Capricieuse," Bernardino Gazerra, violinist; "A Dream," Harry Bannister; "Where'er You Walk," from "Semelee," Helen B. Beeler; "Scotch Poem," Earl Hermance, pianist.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, The Junior Historical and Nature Study Society of New Albany, Indiana; Reading, "An Interesting Historical Episode."

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Concert, "Sonata in A Minor," Norma Rath, pianist, Rubin Phillips, violinist; Comedy, "That Blessed Baby," Mr. & Mrs. Harry J. Plogstedt; Papillons," Norma Rath; Rubin Phillips, violinist; "Chant d'Amour," "Waltz in C Sharp Minor," "The Magic Fire Scene," Norma Rath.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Babson report; Talk, "American Indians," Mrs. Flora Warren Seymour; The Benson children, violinist and soprano; 9:15 P. M., Instrumental concert, The Schubert Trio.

WMC (Central, 400), 8:30 P. M., Musical program, Marjorie Lamkin; Mr. Gulp; Hiram Fulsom; Louise Strickland.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOR (Eastern, 409), 2:30 P. M., Recital, Pupils of Alma I. Germain, pianist; Talk, A. R. Nelson, Educational Director of Y. M. C. A.; Songs, Arthur G. Balcolm; Selections by pupils of Alma I. Germain; Arthur G. Balcolm; Excerpts from "An American Bible," Elbert Hubbard; 6:16 P. M., Talk, "Psychology of Humor," Leon Mones; Children's stories; Recital, Mary Fitz Simmons, soprano; George E. Patten, tenor.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, Detroit News Orchestra; The Town Crier; Musical program, Pupils of Mrs. Earl F. Chase.

Wednesday, July 4

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Raymond," Star Orchestra; "If Thou Wert Blind," Muriel Lomax, soprano; "The Rosary," Jacques Sterin, cellist; "Berceuse," Orchestra; "Calm as the Night," Muriel Lomax; "Passpied," Orchestra; "Air," Jacques Sterin; Selection from "Tannhauser," Orchestra; "Scent of Lillies," Muriel Lomax; "Somewhere a Voice is Calling," Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30 P. M., Matinee musicale; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Concert, Band and Glee Club of the Junior Order American Mechanics' Orphans' Home of Tiffin, Ohio.

KYW (Central Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy of Rock Island Railroad; Cope Harvey's Orchestra.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Hilo Five Hawaiian Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Program under auspices of American Legion, courtesy of Col. Simmons.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Rights, Liberties and Duties," M. B. Bogarte, headmaster of Terrill School for Boys.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "Science Up to Date," Scientific American; Band concert.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, 10th U. S. Inf. Reg. Band; Address, General Dwight Altman; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Lecture; Concert; Babson's Radio Release.

WLW (Eastern, 309), 8 P. M., Patriotic songs, Roulman School of Expression; Excerpts from the Declaration of Independence; Bugle calls, Private Ward of Fort Thomas Military Post; Popular songs, Gussie Bishop; "Nocturne," "Rondino," Mitchell Humphrey, violinist; "Call Me Back, Pal O' Mine," "When the Gold Turns to Gray," "Old Fashioned Days," Donald W. Copelan; "Aria," Mitchell Humphrey; "Ah, So Pure!" G. Harris, tenor; "The Old Refram," Mitchell Humphrey, violinist; "God Touched the Rose," "Woman is Fickle," G. Harris; "Ave Marie," Mitchell Humphrey.

WOC (Central, 484), 8:00 P. M., Recital, Erwin Swindell, organist; 10:00 P. M., Musical program, Ladies' Glee Club of Palmer School of Chiropractic.

WOR (Eastern, 409), 2:30 P. M., Patriotic program; Songs, Helen Mohr; Richard E. Stout, violinist; Talk, "Independence Days on the Trail," King Stanley; 6:16 P. M., Irene Owens, soprano; Talk, William E. Hicks; Talk, "Radio for the Layman," Albert E. Soun; 8:00 P. M., Address, "The Meaning of Independence Day," Dr. Allen; Bianci Randall, soprano; Address, "Significance of Our National Banner," Alice D. Stueck; Address, "Citizen's Responsibility," Mayor Geo. K. Weston; Mrs. Ralph Bud, soprano; Accordion selections, Michael Carcacere; 10:00 P. M., Production of "Cavalleria Rusticana."

WJAX (Eastern, 390), 8:00 P. M., Recital, Vincent H. Percy, organist.

WLW (Eastern, 309), 10:00 P. M., Concert, The General Protestant Orphans' Home Band, Edward Schath, director; "The Star-Spangled Banner," "Military Escort," Band; Aria from "Fuerza del Distino," Ida Blackschlager; "Overture," Band; Address, Supt. H. A. Longman; "Medley Selection," Band; "To Be Near You," "The Slave Song," Ida Blackschleger; "The Last Rose of Summer," "Old Folks at Home," Ida Blackschleger.

Thursday, July 5

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "In the Tavern," Star Orchestra; Selection from "Manon," Nellye Gill, soprano; "Indian Lament," Harry Adaskin, violinist; "Graceful Dance," Orchestra; "The Spirit Flower," Nellye Gill; "Solvieg's Song," "Russian Serenade," Orchestra; "On Wings of Song," Harry Adaskin; "When Irish Eyes are Smiling," Nellye Gill; "Soldier's Chorus," from "Faust," Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., Musical program, Raymond Harmon, tenor; Mrs. Elwell, soprano.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Lyon & Healy Artist Dept.; Cope Harvey's Orchestra; 9:05-9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, under auspices of Will Foster, organist.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Talk, "Care of the Hair," Vaughn De Leath; Songs, Jimmie McHugh & Co., Songs, Vaughn De Leath; Songs, Jimmie McHugh & Co.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "What Is Law?" Judge Eugene B. Muse; 8:30-9:30 P. M., Program arranged by Masonic Service Committee of the Grand Lodge of Texas Masons; 11:30-12:00 P. M., Netto Male Quartet.

WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Uncle David; 8:30 P. M., Songs, Dean Winslow Hanscom, tenor; Thrift talk, conducted by American Bond and Mortgage Co; Concert.

WGY (Eastern, 380), 1:00 P. M., Address, "The Mentally Retarded Child in the Public Schools," Eleanor A. Gray; 7:35 P. M., Talk, "Fly Fishing for Black Bass," Jud Landon; 7:45 P. M., Musical program; "Les Pappillons," Wilfred Lebuis, pianist; "O, Canada," Chorus Franco-Canadien; "Poeme," Mme. Chantermerle, reader; "A la Claire Fontaine," "Bergeretta," "Le Jeune Fillette," Alphonse Girard, baritone; Address, "French Canadians and Their Music," Prof. Jos. Brodeur; "Ou va la jeune Hindoue," from "Lakme," Lucille L. Hebert; "Soirs au Quebec," Chorus; "The Music Box," Wilfred Lebuis, pianist; "Bereceuse," from "Jocelyn," Edward Froment, tenor; "Obstination," "Je vous donnai mon Coeur," Mlle. Beatrice Girard, soprano; "L'Illusion," Mme. Chantermerle, reader; "Tes Yeux," Edward Froment, tenor; "L'Allouette," "Bon Soir, mes Amis," Chorus.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Howard Hardaway, director; Angeline McCrocklin, contralto; Sue Bettinger, Grace Hardaway, ukuleles; William Fries, flutist; Howard Hardaway, guitarist; Reading, Joseph Hill, Mary Margaret Hill; Mildred Schirmer, pianist; Byron Holloway, baritone; Sunday School lesson; Talk, "Kentucky State Board of Charities and Correction," Mrs. Charles B. Semple.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Talk, "Auto Trails," Rockwell Stephens; Talk to Boy Scouts, Stanley Graham; Gene Granville, soprano; 9:15 P. M., Musical program, Anne Kelley, soprano.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Chisca Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOR (Eastern, 409), 2:30 P. M., Musical program; Estelle Furstenberg, violinist; Henry Cohen, pianist; Talk; 6:16 P. M., Concert, Willon Tenan Dance Orchestra; Playlet, "The Fast Set," The Mabel Brounwell Players.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Detroit News Orchestra; The Town Crier; Concert, Schmeman's Band.

Friday, July 6

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, Selection from "Carmen," Orchestra; Aria from "Louise," Mrs. Douglas Raymond, soprano; "Spanish Dance," Mannie Roth, violinist; "My Dreams," Orchestra; "Radiant Night," Mrs. Douglas Raymond; "The Blue Danube," Orchestra; "Londonderry Air," Mannie Roth; "Salut D'Amour," Orchestra; "The Bird of Love Divine," Mrs. Douglas Raymond; "Coronation March," Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30 P. M., Matinee musical; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Opera, "Sweethearts." Municipal Theater.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Lucille O'Brien, soprano; Dan Toomey, tenor; Agnes Mullen, soprano; Hilda B. Farr, pianist; Cope Harvey's Orchestra; 9:05-9:25 P. M., Book reviews.

WBAP (Central, 475), 9:30-10:45 P. M., Concert, Mrs. Pearl Calhoun Davis, soprano.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical acts, Rome & Dunn; Miller & Bradford; Stern & Waters; Keller Sisters & Lynch; Jason & Harrigan; Olive Bayes & Jack Smith; Al Bellan; 11:00-12:00 P. M., Musical program; A. Adams, cellist; B. Mudro, violinist; G. Black, pianist.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Dr. Robert Stuart Hyer, Southern Methodist University; 8:30-9:30 P. M., Recital, Edith Beilharz, violinist and assisting entertainers.

WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club; 5:00 P. M., "Twilight Tales;" Eunice L. Randall; 8:30 P. M., "Silversmith Series," David M. Cheney; Concert.

WGY (Eastern, 380), 1:00 P. M., Talk, "Patterns for Hats;" 7:35 P. M., Health talk, "Dog Fights and Dog Days," State Dept. of Health; 7:45 P. M., Musical program; "Twilight," Roland Davis, pianist; "Life," "Dance the Romaika," Mrs. Fred Ellison, soprano; "Concerto No. 4, Allegro Movement," Georgette Manny, violinist; "Dance of the Butterflies," Roland Davis; "More Grand Hts Humble Estate," Mrs. Fred Ellison; "Concerto No. 4, Andante Cantabile," Georgette Manny; "Hearts Wish," Roland Davis; "Allah," "A June Morning," Mrs. Fred Ellison; "Minuet," Georgette Manny; "Valse Impromptu," Roland Davis; 10:30 P. M., Musical program; "Waiu Lullluil," Schenectady Hawaiian Trio; "I Love a Little Cottage," Mae MacCarrol, soprano; "Lonesome, That's All," Quartet; "Aloha Oe," Hawaiian Trio; "At Parting," Mae MacCarrol; "The Story of a Tack," "Bill's Nanny Goat," Quartet; "Hawaiian March," Trio; "The Green Cathedral," Mae MacCarrol; "Sing Me a Song of the South," Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Resta Trio; Maurice Mennen, saxophonist; Gregor Balough, violinist; Reading, "An Interesting Historical Episode."

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Children's program, arranged by Mrs. Frances Ford; 9:15 P. M., Helen Howe, contralto.

WMC (Central, 400), 8:30 P. M., Concert, Union Avenue Methodist Church Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Willent; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOR (Eastern, 409), 2:30 P. M., Florence Robrecht, soprano; Talk, "The Simple Life," Karl E. Termohlen; Talk, "Broadway and Broad Street," Walt K. Suezey; Sophia Komcoss, pianist; 6:16 P. M., Arthur C. Comly, baritone; Children's stories; Arthur C. Comly, baritone.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; The Town Crier; Thomas B. Rhodes, tenor; Edward C. Dent, baritone; Aline Huck, pianist.

Saturday, July 7

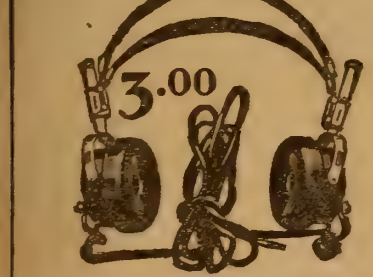
CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Scenes Poetiques," Orchestra; Fred Rogers, tenor; "Ship o' Dreams," W. Woods, cornetist; "The Merry Widow," Orchestra; Fred Rogers; "Serenade," Orchestra; "A Mother's Croon," W. Woods;

(Continued on page 9.)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.



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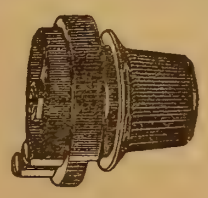

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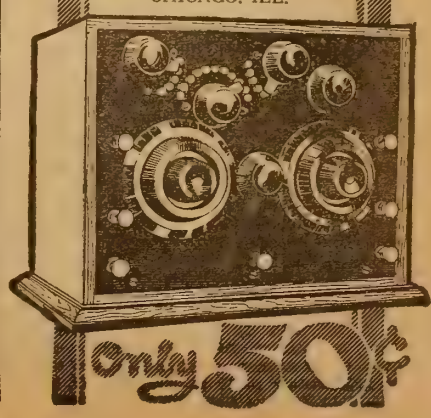

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Radiophone Broadcasting Stations

Corrected Every Week—Part III

(Note.—The third part of the schedule list appears and is completed below. The fourth part consists of the state, city-station index and will appear next week.)

WJAJ, Dayton, O. 360 meters. Y. M. C. A.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Slogan, "WJAK, of the Buckeye State." Mon, Thurs, 11 am, 4 pm, news, music. Thurs, 9-10:30 pm, dance music. Sat, 4 pm, bible lesson. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 50 mi. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 9 am, 10:30, 12:15, markets, reports. Tues, Wed. Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAP, Duluth, Minn. 360 meters. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 360 meters. 200 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 1,000 mi. Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment Eastern.

WJAZ, Chicago, Ill. 448 meters. 1,500 mi. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex. Sun, 10 pm-2 am, music, entertainment. Sun, 5-8 pm, concert. Central Daylight Saving.

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 273 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 1500 mi. R. C. A. and Westinghouse Co. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.

WJZ, New York City. 455 meters. 1500 mi. R. C. A. and Westinghouse Co. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11:30 pm, special program. Sun, 10:30 am-1 pm, church service; 8:30-10:30 pm. Eastern Daylight Saving.

WKAA, Cedar Rapids, Ia. 360 meters. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 275 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. 360 meters. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.

WKAH, West Palm Beach, Fla. 360 meters. 200 mi. Planet Radio Co. Slogan, "The Heart of Florida." Club, "Alligator Hop." No regular schedule.

WKAK, Okemah, Okla. 360 meters. Okfuskee County News.

WKAL, Orange, Tex. 360 meters. Gray & Gray.

WKAN, Montgomery, Ala. 360 meters. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Grandston, R. I. 360 meters. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 11 pm-12:30 am, entertainment. Eastern.

WKAR, East Lansing, Mich. 360 meters. Mich. Agri. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.

WKAW, Beloit, Wis. 226 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 231 meters. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern Daylight Saving.

WKN, Memphis, Tenn. 360 meters. Riechman-Crosby Co.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 9:45-10 am, 10:15, 11:15, 11:45, 12:15 pm, 1:15, markets, weather; 2:30 pm, concert; 7:30 pm, sports, specials; 9 pm, weather, news. Tues, Thurs, Fri, pm, concerts. Central.

WL2, Fairfield, O. 360 meters. U. S. Army.

WLAC, Raleigh, N. C. 360 meters. N. C. State College.

WLAG, Minneapolis, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Slogan, "The Call of the North." Club, "Tooth Brush." Daily ex Sun, 9:30 am, 10:10, 10:30, 11:30, 1:30 pm, 2:20, 4:30, reports; 6-6:30 pm, children's hour; 6:30-7:30, lecture. Daily ex Wed, Sun, 9:30 pm, concert. Sun, 10 am, church services; 4 pm, concert; 5, children's hour; 7:30 services. Central.

WLAH, Syracuse, N. Y. 234 meters. 900 mi. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. 360 meters. Tulsa, Okla.

WLAN, Houlton, Me. 360 meters. Putnam Hdwe. Co.

WLAP, Louisville, Ky. 360 meters. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 244 meters. 100 mi. A. E. Schilling. No regular program. Central.

WLAS, Hutchinson, Kan. 360 meters. 200 mi. E. V. Plush. Daily ex Sun, 9:30 am, 10:20, 11:30, 12:30 pm, 1:30, 5:15, markets, weather; 12:30-1:15 pm, 5-6, music. Wed, 8-9 pm, concert. Sun, 3 pm, music. Central.

WLAT, Burlington, Ia. 360 meters. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music, news. Sat, 2 pm, special. Sun, 11 am, church services. Central Daylight Saving.

WMAC, Cazenovia, N. Y. 261 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAD, Rock Port, Mo. 360 meters. Atchinson County Mail.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp.

WMAG, Liberal, Kan. 360 meters. 75 mi. Tucker Elec. Co. Daily ex Fri, Sun, 7:30-8:30 pm, music, news. Fri, 8-9 pm, concert. Central.

WMAH, Lincoln, Neb. 341 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 286 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News (Fair Department Store). Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Central Daylight Saving.

WMAR, Waterloo, Iowa. 360 meters. Waterloo Electrical Supply Co. Schedule not established.

WMAT, Duluth, Minn. 360 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. 250 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7-8 pm, music. Central.

WMAW, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 5:45 pm, sports, news. Fri, 10-11 pm. Central.

WMAX, Ann Arbor, Mich. 360 meters. K. & K. Radio Supply Co.

WMAY, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC, Memphis, 'Down in Dixie.'" Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAB, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.

WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Mon, Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.

WNAL, Omaha, Neb. 360 meters. R. J. Rockwell.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAO, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Daily ex Sun, 12:15-1 pm. Wed. Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern, Daylight Saving.

WNAV, Knoxville, Tenn. 360 meters. 1,000 mi. People's Tel & Telg Co. Tues, Thurs, Sat, 9-11:30 pm, concert. Sun, 10:30-12 am; 7:30-8:30 pm. Central.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yankton, S. D. 360 meters. Dakota Radio Apparatus Co. Wed, Sat, 9-10 pm, music. Central.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNI, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WNO, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.

WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 1,500 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 6, news, markets. Tues, Sun, 9:30-10:30 pm, concert. Thurs. 7:30-8:30 pm, concert. Central.

WOAJ, Parsons, Kans. 360 meters. 50 mi. C. E. Ervin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 240 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAS, Middletown, Conn. 360 meters. 100 mi. Bailey's Radio Shop. Daily ex Sun, 4:15-6 pm, music. Sat, 9-12 pm, dance music. Eastern.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAU, Evansville, Ind. 360 meters. Sowder Bowling Piano Co.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 10 pm, sports. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 526 meters. 1,000 mi. Woodmen of the World. Slogan, "Gateway to the East and West." Mon, Tues, Thurs, Fri, Sat, 9 pm, concert. Sun, 9:30 am, 9 pm, church services. Central.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12-1 pm, concert; 4:45 pm, organ recital; 9:55, time; 10:02, weather. Mon, Fri, 8-11 pm, music, concert. Eastern, Daylight Saving.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Fri, 1:15 pm, sacred service. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern.

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WOU, Omaha, Neb. 360 meters. Metropolitan Utilities Dist.

WOV, Omaha, Neb., 360 meters. R. B. Howell.

WPAA, Waco, Neb. 360 meters. Anderson & Webster Elec. Co.

WPAB, State College, Pa. 360 meters. Pa. State College.

WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.

WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-2 pm, 6:30-7 pm, music. Tues, Wed. 8-9 pm, concert. Thurs, Fri, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.

WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.

WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.

WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. 360 meters. Awerbach & Guet

WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.

WPAR, Beloit, Kans. 50 mi. 360 meters. R. A. Ward. Fri, 8 pm, entertainment. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.

WPAS, Amsterdam, N. Y. 360 meters. J. & M. Electric Co.

WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. 360 meters. Concordia College.

WPAY, Bangor, Me. 360 meters. Bangor Radio Lab.

WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.

WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WPI, Clearfield, Pa. 360 meters. Elec. Supply Co.

WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. 236 meters. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAF, Sandusky, O. 240 meters. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

WQAJ, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.

WQAK, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.

WQAL, Mattoon, Ill. 258 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.

WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern Daylight Saving.

WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.

WQAQ, Abilene, Tex. 360 meters. 300 mi. Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

WQAT, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5 pm. Eastern.

WQAV, Greenville, S. C. 258 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. Catholic University of America.

WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.

WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.

WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.

WRAC, Mayville, N. D. 360 meters. State Normal School.

WRAD, Marion, Kans. 360 meters. Taylor Radio Shop. Daily, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. Radio Club, Inc.

WRAH, Providence, R. I. 360 meters. Stanley N. Read.

WRAK, Escanaba, Mich. 360 meters. Economy Light Co.

WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.

WRAN, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.

WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.

WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.

WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.

WRAV, Yellow Spring, O. 360 meters. Antioch College.

WRAW, Reading, Pa. 238 meters. Horace D. Good.

WRAX, Gloucester City, N. J. 268 meters. Flexon's Garage.

WRAY, Scranton, Pa. 360 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15-11:30 pm, music. Sun, 4 pm, chapel. Eastern.

WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Wed, Sat, 9-11 pm, music, lecture. Sun, 2-4 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.

WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.

WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.

WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11:30 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAA, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.

WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.

WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.

WSAD, Providence, R. I. 261 meters. J. A. Foster Co.

WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.

WSAI, Cincinnati, O. 309 meters. United States Playing Card Co.

WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.

WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.

WSAP, New York, N. Y. 360 meters. Seventh Day Adventist Church. Fri, 7:30-9:30 pm. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAV, Houston, Tex. 360 meters. Clifford W. Vick. Temporarily discontinued.

WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.

WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.

WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Tues, Thurs, 5 pm, entertainment. Sun, 11 am, 7:30 pm, church services. Central.

WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.

WTAG, Providence, R. I. 258 meters. Kern Music Co.

WTAK, Steubenville, O. 266 meters. The Swan-Bower Co.

WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.

WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.

WTAW, College Station, Tex. 254 meters. 200 mi. Agricultural and Mechanical College of Tex. Sun, 11 am, 4 pm, 7, church services. Central.

WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.

WWAD, Philadelphia, Pa. 360 meters. Wright & Wright, Inc.

WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.

WWAY, Chicago, Ill. 360 meters. Marigold Gardens.

WWB, Canton, O. 360 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.

WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, 3-3:30, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.

WWL, New Orleans, La. 360 meters. Loyola Univ.

(Note.—This completes the station schedule list. The fourth part of the directory consists of the state, city-station index, and will appear next week.)

Farm Battery Makes B Battery

I wish to submit the following kink. There are many Radio owners that live in the country or in small towns who have direct current, 32 volt, lighting plants. Here is a way you can use this current in your detector tube circuit instead of a 22½ volt B battery.

Procure an attachment plug and enough drop light wire (two wires twisted together) to reach to your Radio set from the electric light socket. Attach the cord to the plug and screw plug in socket. If there happens to be but one socket in the room procure a two-way plug, so that the electric light can be used also, then attach the two ends of the cord to the B battery binding posts and you are ready to operate the set. If you do not get signals at first reverse the leads to the binding posts. After you have learned which lead is minus and which plus you should mark them so that they may be readily identified.

Here are the advantages of this method: Current is always strong and fresh. B battery noises are eliminated as the current comes from storage cells. The cost is almost nothing since tests show that the set uses but a small fraction of the current in comparison with one electric bulb. — Lawrence K. Twitty, Health Springs, S. C.

Variometers and Couplers

Many variometers and couplers are on the market that depend on wiping, or brush contacts, for positive circuits and therefore leave open the possibility of loose connections which will of course cause inefficient reception. Brass rods bearing in brass bushings do not offer the best electrical connection because of the characteristic of brass to become greasy when being used for such purposes. In addition to this, dust will collect between the bearing and cause more contact troubles.

An old telephone receiver cord will make sufficient leads (pig tails) for three or four variomters or couplers, and it will pay the worker to employ this method of connection when constructing Radio apparatus. In DX work the best contacts are none too good.—H. E. Jameson, Milwaukee, Wisconsin.

ADVANCE PROGRAMS

(Continued from page 7)

"Tales from the Vienna Woods." Orchestra; Fred Rogers, tenor; "Pomp and Circumstance." Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Musical program, Jenny Lind Wiles, soprano; 2:30-3:30 P. M., Concert, Bouquet's Southland Serenaders Orchestra; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 3:00 P. M., Children's program, pupils of Gibbs School of Music; 8:00 P. M., Musical program, Missouri Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program; Cope Harvey's Orchestra; Mrs. Virginia Baxter, soprano; Clyde W. Foster, baritone; Ben Lidorsky, Samuel Slavin, violinists; Rose Rosenman, pianist; 9:05-9:25 P. M., "Under the Evening Lamp." Youth's Companion.

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Concert, J. I. Wright's Male Quartet; 11:00-12:00 P. M., Recital, Mrs. Helen Fouts Cahoon, soprano.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk on New England Business Problems, Arthur R. Curnick, Concert.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Musical program; Isabelle Wetzelberger, soprano; King Waller, violinist; Jack Richards, tenor; Beach Williamson, saxophonist; Bill Barry, baritone; Hortense Mercer, pianist; Bonny Rosenbaum, banjoist; Ethel Walsh, clog dancer; Reading, "An Interesting Historical Episode."

WMAQ (Central, Daylight Saving, 447), 9:15 P. M., Musical program, Mixed Quartet.

WMC (Central, 400), 8:30 P. M., Program arranged by Hugh Sandidge.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.

WOR (Eastern, 409), 2:30 P. M., Talk, "First Aid Hints." Dr. Harriett Perkham; Recital, Lewis Granniss, tenor; Leslie Fairchild, pianist; Lena Kaufman, violinist; "Ballad of Business," Mannie Switzer; 5:15 P. M., Sport news, Fred J. Bendel; Book review, Earl Dana; Madeleine Ores, pianist; Leah Seeley, soprano; 8:00 P. M., Georgia MacMullen, soprano; Lillian May Challen, baritone-contralto; Talk, "The Right Word," J. Curtis Nicholson; Recital, Mr. and Mme. Gracomio Bonig; 10:00 P. M., Concert, Elite Novelty Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30 P. M., Concert, Schmeman's Band.

Sunday, July 8

WFAA (Central, 476), 2:30-3:30 P. M., Bible Class, Dr. William M. Anderson, Jr.; 9:30-10:00 P. M., Sacred music, Central Christian Church; 10:00-11:00 P. M., Concert, Henry Ashley's Kidd Springs Orchestra.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., "Adventure Hour," Youth's Companion; Concert; 8:30 P. M., Talk on World Unity, conducted by Mass. Federation of Churches; 9:00 P. M., Music.

WGY (Eastern, 380), 9:30 A. M., Church services, First Methodist Church, Schenectady; Sermon, "The Goal of Personality in the Light of Modern Psychology," Rev. Philip L. Frick, D. D.; 7:30 P. M., Church services; Sermon, "My Life," Rev. W. E. Compton, Mt. Pleasant Reformed Church, Schenectady.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church services, Broadway Baptist Church; Rev. Dr. Russell Johnson Pirkey, pastor; Mrs. John Rasmussen, soprano; Angeline McCrocklin, contralto; Williams L. Vick, tenor; William C. Burger, baritone; 4:00-5:00 P. M., Concert, under auspices of Mrs. Jane Webster Murrell.

WHK (Eastern, 360), 8:00 P. M., Musical program, WHK Trio; Little Symphony Orchestra.

WMC (Central, 400), 11:00 A. M., Church services, St. Mary's Episcopal Cathedral; 4:00 P. M., Memphis vs. Nashville baseball game.

WWJ (Eastern, 517), 11:00 A. M., Church services, St. Paul's Episcopal Cathedral; 4:00 P. M., Concert, Schmeman's Band; 5.00 P. M., News Orchestra.

Monday, July 9

WGY (Eastern, 380), 1:00 P. M., Talk, "The New Bias Fold Applique," Modern Priscilla; 7:45 P. M., Musical program; "Rhapsody, No. 9," Kathryn P. Hinkey, pianist; Travelogue address, "A Trip Through India," Part I, Dr. Sigel Roush; "Indian Lament," "Song of India," William Helm, violinist; "A Trip Through India," Part II, Dr. Sigel Roush; "Sparks," "The Winter Wind Etude," Kathryn P. Hinkey; "A Trip Through India," Part III, Dr. Sigel Roush; "Serenata," "Viennese Melody," William Helm, violinist.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra.

WLW (Eastern, 309), 8:00 P. M., Concert, The Roger Hill Dance Orchestra; 8:30 P. M., Grand Opera from the Cincinnati summer opera season at the Zoo.

WMC (Central, 400), 8:30 P. M., Concert, Hotel Gayoso Orchestra.

SPECIAL OFFER LIST

(Continued from page 2)

Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A).

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Decima Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 2 Ratio.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Decima 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B.

POSITIVE RESULTS

are being obtained by thousands of satisfied users of the

EASTERN COIL SETS for Cockaday Circuit

The remarkable features which are making this circuit more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

COMPLETE SET OF B, C AND D COILS—PRICE **$2.75**

Hook-up, directions and material list furnished free with each set of coils.

Mail Orders Filled. Dealers Communicate

EASTERN RADIO MFG. CO.

22 WARREN STREET NEW YORK, N. Y.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Series Condenser and Tube

(Submitted by F. W. S., Fostoria, Ohio.)

Question.—Have built a Flewelling Super set exactly as per the instructions in Radio Digest except that I am using a 23-plate .0005 mfd. variable condenser instead of the 11-plate .00025 mfd. condenser that you recommended, and am also using a UV-200 tube. Would this make any difference? I tune in nearly all of the stations, but do not hear anything of the whistle that you speak of. Can you tell me what my trouble is?

Answer.—So long as you get all of the various stations you can be sure that you are able to tune your set with the 23-plate condenser, so unless you care for maximum results, you can continue using this one. The reason that an 11-plate condenser is recommended for the Flewelling Super is explained by the following: A vacuum tube when used as a detector gives returns dependent upon the voltage impressed upon the grid of the tube, the rule being that the output is proportional to the square of the input. If we multiply the input voltage by five times, we increase the output of the tube 25 times. Now, the voltage that we impress upon the grid of our detector tube is dependent upon, among other things, the amount of inductance we use in our tuning device. The more inductance and the less capacity, the greater will be the voltage on the grid of our tube. If we can still tune our set to resonance, then the smaller the condenser we use, the better will be the results. That is one reason for the 11-plate condenser recommended for the Flewelling Super. When you bring in a station two or three hundred miles away and your set is only connected to the ground, you must realize that you are dealing in mighty small quantities and that you must take advantage of every little factor that might be of help.

Now as to the tube that you are using. The Flewelling Super is undoubtedly the simplest known method of producing super regeneration. It does this in the following manner:

We allow our set to regenerate to the point of "spill over" and block the tube. This stops the action of the set, but our .006 mfd. condenser has now accumulated a charge, our grid leak is so set that it allows the blocking charge to leak off of the grid. As this charge leaks off, the tube and set go into action again, but (and here is the important feature) the .006 mfd. condenser now discharges. This charge and discharge are exactly timed by the grid leak adjustment, therefore giving up the opportunity of letting our tube regenerate to its full capacity and yet restricting from oscillating at its own free will. Ordinarily we are restricted as to the amount of regeneration that we can use, because of this tendency toward free and sustained oscillation.

Were we to use a soft tube such as the UV-200 we could do the same thing, but at a great loss in efficiency and at the expense of a great deal of trouble. We could not block the tube so readily nor could we use high enough plate voltage to give maximum results.

A real good regenerative set plus one .006 mfd. condenser used in conjunction with a hard tube and a good variable grid leak, will enable one to operate what is perhaps the most sensitive Radio receiver known today, the super regenerator.

Reflex Amplifier

A "reflex amplifier" using three tubes, a crystal detector and associated apparatus, may be so connected as to provide three stages of Radio frequency amplification, detection and two stages of audio frequency amplification. The tubes thus operate both as Radio and audio frequency amplifiers, but it is not advisable to attempt the use of more than two stages of audio frequency amplifications, due to the fact that the highly magnified audio frequency signal prevents the tubes from operating efficiently as Radio frequency amplifiers.

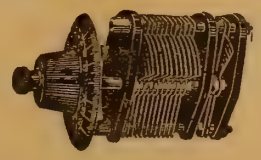
A. C. Used for Amplifier Tubes

Alternating current may be used to heat the filaments of amplifier tubes, but cannot be used for the filament of the detector as the alternating current hum is so loud that it is impossible to receive the Radio signal. A crystal detector is usually employed to rectify the signal in multi-stage amplifiers which have the filaments of the amplifier tubes heated by alternating current. By using a "hard" tube with the grid and plate elements connected together as a rectifier, and employing a proper filter circuit, the alternating current supply may also be used to provide the necessary plate voltage.

A single coil crystal set will not tune as good as a two circuit one.

For Perfect Reception

You Must Use



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The Reader's View

Single Circuit Selectivity

What's all this twaddle about single circuit receivers not being selective? I say "twaddle" because that's just what it is.

There are several amateurs in this town who use the phone a lot and they never interfere with my reception of broadcasting. Canadian 3AEO, using four tubes, is only three blocks away, never bothers me at all. I have heard him talking to 3KO, ten blocks away and then tuned in WWJ or WGJ and haven't heard a peep out of 3AEO or 3KO. They were still going for I turned back to see if they were still there and they were very much so. I could hear them all over the room on two tubes when I had either one tuned in.

I have had 3AEO speaking to me and giving me a message and 3KO, a 10-watter, come on calling 3IR. I could hear 3KO faintly but being tuned to 3AEO, I heard every word of his message with no difficulty. 3KO works on 190 meters and 3AEO works on 200 meters.

My set isn't a freak for I have built four just like it and they all work equally as well. I have made them all get KHJ or KFI as a final long range test before I pronounced them O. K. Los Angeles is about 2,200 miles away from here.

I have heard several two circuit sets around here and have gone away disgusted and feeling glad that I owned a single circuit receiver.

I think it's about time somebody started out with an axe after the guys who spout the piffle about a single circuit set not being as selective as a two circuit set.

Your issue of May 5, 1923, contains an article on editorial page of this nature. In view of my own observations and tests I cannot help but think that such an article is everlasting piffle. I maintain that selectivity is more easily obtainable in a single circuit than in a two circuit set for the reason that very few owners of two circuit sets know how to handle them, even after months of monkeying with them.—Cliff H. Dafoe, Chatham, Canada.

Single Wire Antenna

A receiving antenna adapted to wave length of 360 to 400 meters should be a single wire installed in the shape of an inverted L, the total from the distant end to the receiving set being between 160 and 180 feet. Both ends of the horizontal portion should be supported as high as possible, at right angles to power or telephone lines and above tin roofs or grounded metallic structures.

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Argus, Outdoor or Indoor	.95 .12
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Radio Digest Illustrated

REG. U. S. PAT. OFF.

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. V Chicago, Saturday, July 7, 1923 No. 13

Summer Teaches Us Lessons

Many Things to Be Learned for General Improvement

THE little setbacks that Radio may receive this season will be a boon to the entire industry. The dealers and manufacturers will have time to learn the needed lesson. The time has come when a dealer cannot afford to carry a conglomerate stock of odds and ends, expecting to unload it at a great profit on the public. The time has passed when a newly born fan will step into a store and buy anything with a piece of wire wrapped around it. The spasmodic demand of the faddists will not prove profitable in the long run. The dealer is beginning to realize that dependable apparatus, bought to meet the varying Radio conditions, is more to be relied upon than unknown apparatus that looks good in the catalogue and is merely an ornament on the shelves.

Radio Intelligence Work

Invaluable Assistance in Army Maneuvers

ALTHOUGH little was known of the work of the Radio intelligence section of the army during or since the war, it was one of the most spectacular. Radio direction finders were placed all along the lines at a distance of about five miles from the actual front and spaced about twelve miles apart. These receiving sets located the enemy stations in operation, recorded their bearings by means of directional coils, not unlike modern Radio compasses, and forwarded the bearings to headquarters, where they were plotted on maps.

Other Radio receiving stations at army headquarters intercepted and copied all enemy code messages and telegraphed them back to general headquarters, where code experts worked them out, giving the staff valuable information as to the movements or intentions of the enemy.

Humidity Makes Trouble

Dampness Will Make Set Inoperative

YOU will find that a great many ills with the Radio set are laid at the door of static, but a large portion of them can be found in dampness. The summer season is attended with damp spells which fills the air with humidity. The outside weather conditions are let into the house, for windows are allowed to be left open most of the time. Sets are taken to the seaside and on boating trips where dampness prevails.

Under such conditions the broadcast listener is apt to wonder why that set which has acted so faithfully at home in a warm room has suddenly become languid. Dampness in most cases is the secret of the jinx that is resting on the wonder box.

Water is one of the highest conducting substances of electrical energy, and dampness indicates the presence of water. Sets in which the base and panel mountings are not damp-proof are not going to be efficient in damp weather. Leakage that to the lay mind may mean nothing will appall the Radio engineer who is able to comprehend what this means.

Real Pleasure in Making Sets

Homemade Sets Outnumber Manufactured Ones

A NUMBER of years ago, before Radio had the universal appeal that it has at the present time, it was necessary for the experimenter, or man who was interested in the science, to make practically all of the parts that went into his set, but the present tendency seems to be to go to some store and buy these parts already built. This means that the cost of the sets are higher, and a great deal of the real pleasure is left out of the operation of building your own set. Incidentally, a great deal of this apparatus is not as good as the real homemade parts. However, there are some parts, such as head phones, vacuum tubes and transformers, that are much better manufactured where duplication of the finer details may be procured.

The average fan takes much pride in making parts, and there is a great deal of satisfaction taken when those parts function correctly and bring in messages. Careful construction always brings results, and many times a homemade set will surpass those of special manufacture.

RADIO INDI-GEST

In Quest of the Kanoofis

Part IV—The Arrival at Walla Walla

After thirteen years of sailing upon the ocean blue. *(Bloo-ee.)*
A little island in the sea came popping into view. *(Pop-pop.)*
We landed on the shore at night, because we thought it best. *('Fraid cats.)*
And there were all the contribs to Radio Indi-gest. *(Playing hop scotch.)*
They greeted us with open arms and asked us where and how. *(Wherfor.)*
They did not recognize us, for we are old men now. *(We looked like Santa Claus.)*
The Spaniards that we took from Spain, all spoke good English too. *(We taught them how.)*
They were all Radiophans, you see, and stuck to us like glue. *(Major's cement.)*
It seems Indi-gest bought this place for reasons of his own. *(Real estate.)*
And put a station on it that throughout the world is known. *(This is Station B-U-N-K broadcasting.)*
A laboratory he has, too. Now there's some common sense. *(Horse sense.)*
From here he broadcasts funny things, and does experiments. *(Gives big prizes, too.)*
We told him of our searching for years to get one part. *(We looked, too.)*

So he said, "WALLA WALLA'S where you should have made your start. *(What did we know?)*
We have a real Kanoofis here. It's buried in the ground." *(So, you've been hiding it?)*
He scraped the earth a little bit, and that was what he found. *(May have some licker buried, too.)*
Now, we suppose you're right on edge to know what it can be. *(You are, too, aren't you?)*
A Kanoofis is the funniest thing that ever you did see. *(Never was in a circus, either.)*
"It's a SILK THREAD off the corner of a dark red TURKISH TOWEL. *(Aw, I knew it all the time.)*
You hang it on your switch points, so your Radio set don't howl. *(Certainly glad that's over with.)*
—ENDED BY JENNIE JEROME.

(Readers desiring Kanoofises may secure same from Mr. Indi-Gest by tendering suitable contributions, or what have you?)

(1) Sure; (2) The Natives Stole 'Em for Beads

Dear Indi: By the looks of the flashlight photo of your new station you have already joined the A. R. R. L. (Sure, I'll bite. Why?) Because, note the moonshine and how still it looks. Am I right? I also note the insulators are conspicuous by their absence. Whyfor?
—MIKE ROFARADS.

A-B-C Lessons for Indigest Beginners

Chapter III—Have You a Little Crystal?

BY GOSH

C IS for crystal,
A chuck of stuff quite neat,
That brings in all the locals
Quite clear and very sweet.

Revenue Officers Say You Can't Work Your Circuit

Gents: Well, the great problem is solved at last. The illicit liquor which is being broadcast by the A. R. R. L. can now be received. The answer is in the Undiluted Still Condenser Circuit. A copy of this circuit is enclosed. The 20 gallon tube is mounted with the water-cooled plate at the lower end. The faucet is mounted at the lower end of the plate so that the ether which gathers in the tube through the process of Volsteadization may be drawn out. The phones should be worn during the reception and one will hear the sweet strains of "How dry I am."
—HOOTCH SHOT DICK OF BLAND CANYON, COLO.

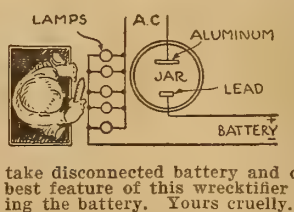
Rest in peace
Charles Daniel McCluer.
He tried to murder
A "spark" amateur.

Referred to the P. and Q. Dept.

Deer cir? I have saw your unvaluable paper and wood like to get sum inflamation how to bild a set. Wear dos the varyomeet her go? How meny bees do you use in a bee battery? Do you keep the bees in a honie combe coil? I have not got a aunt enna, I have a aunt Mary & she is only five feat long. Do you roast a peanut toobe? Wil I kneed a potatoe meter? Yours in variable.
FEEDBACK FOG.

We Passed It on a Blind Man

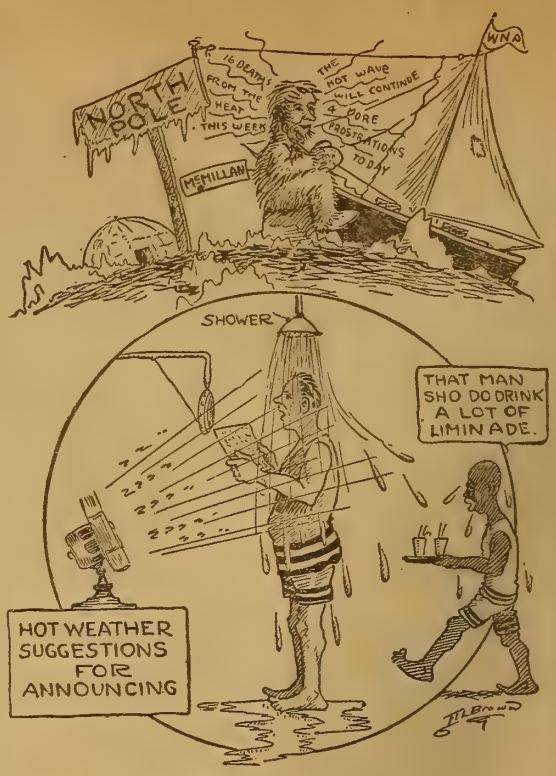
Dear Indi: I notice your kinks department and since I have a dollar no one will accept I am sending it with the kink. An amateur told me that a wrecktifier is necessary to charge my storage battery from A.C. current. Having a small baby sister who wrecktifies the tubes in 1 4-5 seconds flat (world's record) I decided to use her to advantage. Following is the circuit:



Put baby in the box and in few moments she will wrecktify the lamps. Then take disconnected battery and carry to battery station. The best feature of this wrecktifier is the exercise you get carrying the battery. Yours cruelly.
—I. T. SMEE.

Looking Ahead

You Can Never Tell What's Wrong with a broadcasting station program till you hear from its listeners. If you were one of the lucky Radiophans to hear Indigest's opening night program, don't let us hear from you, unless you have a kick. We always like a good kick in anything. Send along the kicks as Walla Walla has a complete repertoire of non-trust songs and, oh, boy! What a CHARMING flock of sopranos. Now, these sopranos are very versatile and strive to please. Bambdin Bray is training them that way. If you don't hear what you want, ask for it and Bambdin will train 'em. What is your ideal Indigest Program? Read Indigest two weeks from now and maybe somebody will send some in. Buy Indigest from your most horrible newsdealer, 10c. In fact, continue buying Indi until we tell you to stop.



Condensed

By DIELECTRIC

News of the Marine Band concerts from Station NAA being off for the summer months was not received with joy by the thousands who tune in for them, but later advice is very acceptable. With the new station in the national capital on the air these concerts may still be heard. The music will be picked up in the local parks and sent out as usual. WEAF will relay some of the concerts and speeches, which will ensure many weaker sets the pleasure of listening in too—though far away.

And now photosculpture! There is only one fault with this new marvel in Radio, and that is that two cameras are required for the job. So many folks get to oscillating when they face only one camera, and with two before them they may distort the image entirely. Borah or LaFollette would enjoy the experience probably; although it requires an hour to transmit the impressions from subject to sculptor they would lose nothing in the interim—and we would gain bronze tablets. Would that constitute base-relief?

"Al" Smith is not regarded as exactly bone dry, nor does he believe in treating a dry subject without some admixture of moisture, and I submit the proof of that was given only recently. This genial governor of New York state addressed the people of his state by using Station WGY to report directly on the financial status of the commonwealth. Usually such reports are very dry. This was not, and while the choice of phrases may have had something to do with that, I believe the main factor was receiving sets in comfortable home surroundings.

The General Electric Company plans to have duplicates of its well known Station WGY in sections of the country serving the largest audiences. One of these, as already indicated, is to be completed by fall at Oakland, Cal., and another is likely to be built at Fort Worth, Texas. Each of these stations has a normal radius of well over a thousand miles and Radiophans will look forward to having so good service as they are accustomed to from WGY, in other parts of the country.

Every Radio journal, and section of daily papers covering the subject, is calling attention to the manner of using Radio sets on vacations. We need to be educated to the idea that the pleasure of listening in is there for us this summer as never before. Static, of course, is still on the job as in seasons past, but the powerful stations can cut through it for a considerable distance, also interference has been reduced nearly to the limit. If you fail to include your set on that trip, you will certainly regret it and spoil your outing to a large extent.

There are many who prefer to listen to well-balanced programs of lasting music rather than the evanescent outpouring of a wailing ukelele. To such the "pop" concerts given from Station WNAC in Boston offer real treats. Not only do you hear an orchestra, comprised of members of the Boston Symphony, but it has been possible to listen to the Harvard glee club, a thoroughly trained body of singers.

Radiophans of the country owe much to station WEAF for their enterprise in boosting along the speeches of President Harding, the one from St. Louis and another from Kansas City. We have been looking forward to the time when it would be possible for the mass of American citizens to hear (if not see) the head of the nation. I do not doubt the ultimate effect of this presidential broadcasting will be to focus larger attention on Radiophony to our general benefit. The next step—already visioned—is to accompany speech carried by ether waves with a moving picture of the speaker right in the home. This would almost entirely eliminate the sense of distance, which has already been materially reduced through the use of Radio.

First Steps for Beginners in Radio

Chapter VIII—The Regenerative Detector

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

- Chapter IX—Radio Frequency Amplification.
- Chapter X—Audio Frequency Amplification.
- Chapter XI—How Super Regeneration Is Accomplished.
- Chapter XII—Reflex Circuit Operation.
- Chapter XIII—About Headsets and Loud Speakers.
- Chapter XIV—Batteries Used in Radiophony.

REGENERATION is possible only by reason of the fact that the energy or current flowing in the plate circuit of a tube is many times greater than the controlling current in the grid circuit. Obviously it should be possible to take a small part of this energy and feed it back into the grid circuit and thus cause a still greater change in the plate current. It

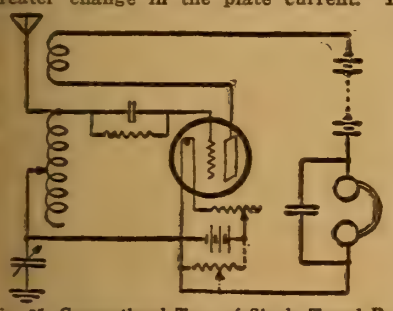


Fig. 35—Conventional Type of Single Tuned Regenerative Circuit Using Tickler Feed Back

should be remembered that it is the extent of the change in the plate current that determines the strength of the signals in the head phones or loud speaker.

Regeneration

It simply remains then to arrange some means of transferring energy from the plate to the grid circuit to convert the regular tube detector into a regenerative detector. There are a number of methods of accomplishing this, but these can all be divided into three classes, inductive, capacitive or resistive. The first two methods are in more general use and we shall first consider their application to single circuit tuners.

Considering the simpler form of single circuit tuner as shown in Figure 35, we find a second coil connected between the plate and the positive B battery. This coil is placed in inductive relation to the inductance in the aerial circuit, the two coils usually taking the form of a variocoupler, the stator in the aerial circuit, the rotor in the plate circuit. The function of the coil in the plate circuit is to transfer energy by means of its inductive properties back into the grid circuit.

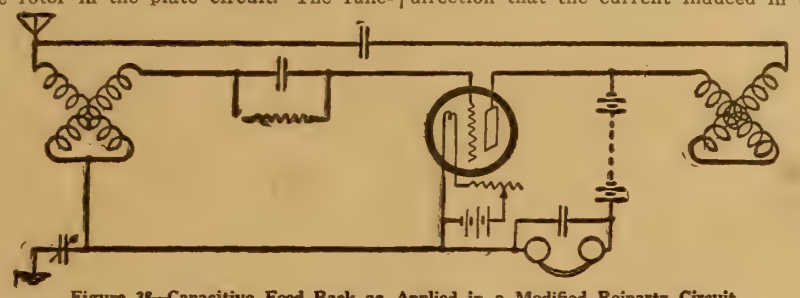


Figure 38—Capacitive Feed Back as Applied in a Modified Reinartz Circuit

The action of the arrangement is as follows: Consider the tube lighted and a signal striking the aerial circuit. The tube functioning as described under tube detectors acts to vary the plate current. The plate current flowing through the "tickler," as it is termed, induces a current in the aerial circuit to cause greater electrostatic charges to reach the grid and hence greater changes in the plate current with an increase of signal strength.

The adjustment of the tickler is rather critical; when the coupling is too close, too much energy reaches the grid and the whole circuit oscillates, acting as a Radio transmitter. In fact, the device will transmit speech for a half mile or so if a telephone transmitter is connected in the ground lead to modulate the waves emitted from the aerial.

Loose Coupling Between Coils.

On the other hand, with too loose a coupling between the coils the maximum effect upon the plate current will not be obtained and the loudness of the signals decreased. The proper point of operation is just before the oscillating point. The reduced till the speech clears up and the signals are the loudest.

Direction of Windings

To obtain maximum results with this circuit, two things are essential. The winding on the tickler must be in such a direction that the current induced in the aerial circuit will be in the same direction as the current from the received waves. Should the set not function when first connected, the leads to the tickler can be reversed. The other factor is the grid leak value. This should be variable and carefully adjusted.

Too low a value will cause the tube to block, that is, give clicks in the receiver which may have quite a time interval between them. The leak should then be increased, when the clicks come closer together, till finally they are just inaudible. At this point the grid leak is of proper value.

Having laid down the theory of the regenerative circuit, possible variations come rapidly to mind. Thus the two windings may be honeycomb coils, or spider web coils. A variometer with the stator in the aerial circuit and the rotor in the plate circuit will serve the same purpose.

It will be found that the filament brilliancy and plate voltage have a decided effect upon the operation of the circuit and should both be varied till best results are obtained. A vernier rheostat is well worth the extra cost, and a potentiometer shunted across the A battery as shown by the dotted lines will enable one to control the plate voltage to a nicety. It will be noted that a fixed condenser is connected across the phones and B battery. This functions to bypass the Radio frequency currents that flow in the plate circuit to obtain regeneration and will make the set more stable.

The Ultraudion circuit devised by Deforest was possibly the first form of the capacity feed back type of regenerative circuit and is shown in Figure 36 in its original form. Its action is based on the presence of the capacity across the phones being in both the grid and plate circuits.

(Continued on page 14)

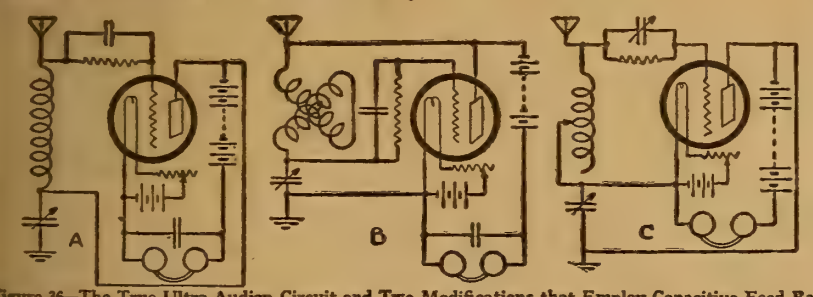


Figure 36—The True Ultra Audion Circuit and Two Modifications that Employ Capacitive Feed Back

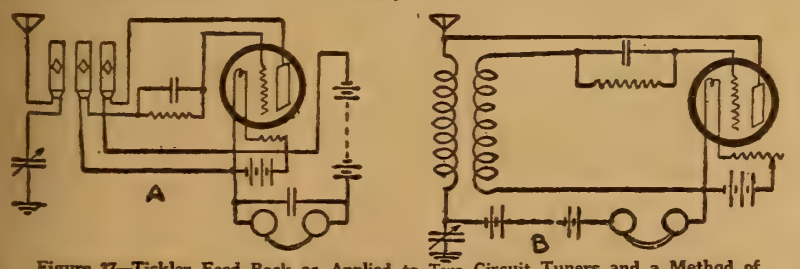


Figure 37—Tickler Feed Back as Applied to Two Circuit Tuners and a Method of Obtaining Regeneration. (Not Advised.)

However, when receiving Radiophone broadcasts, it will usually be found that the sound is distorted when the regeneration is pushed this far, so the coupling is

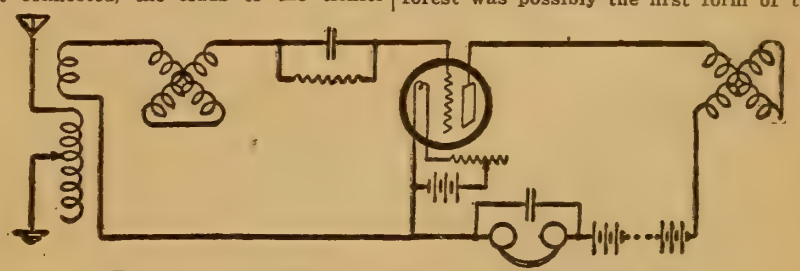


Figure 39—Three Circuit Tuner Using Tuned Plate Feed Back

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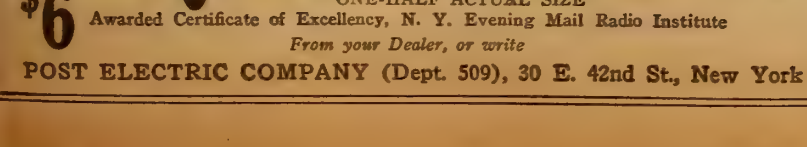

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23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Remler Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.80	.40
2 Remler Coil Mounts with Straps	1.20	.80
1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
1 Bakelite 3" Dial	1.00	.25
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Howard Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cuni Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
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Special Ultra Audion Coil, plain or bank wound with tape	3.00	1.95
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2 Switch Levers	.70	.50
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Genuine Solid Mahogany Cabinet, size 9x 10½, with hinged top	5.00	2.95
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With this super hook-up I have logged 46 stations in one month, none less than 600 miles and the most distant was WSB at Atlanta, Georgia. The airline distance being approximately 1,437 miles from Sydney, N. S. I claim my super hook-up to be original with me, although it does incorporate an idea from Flewelling and uses tuned plate regeneration. I also claim that it is the simplest form of a super set with a loop or regular antenna. I used the Canadian dry cell tube (Northern Electric 215A) with 90 volts on the plate.—Allison D. Trumbull, Sydney, N. S.

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THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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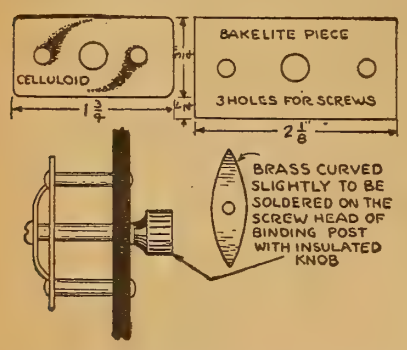
Variable Grid Leak

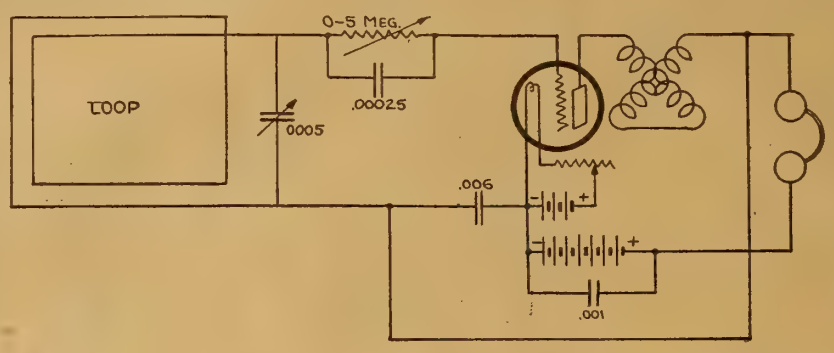
A variable grid leak can be made from the parts shown in the illustration. Three holes large enough for binding posts are made in a piece of celluloid 1¾ by ¾ inches. Other parts required are two brass bolts with nuts, one binding post with insulated knob, one piece of brass or copper, like the one shown in the sketch, long enough to reach from the center hole and to follow in the ink line on the celluloid.



The piece of brass or copper is soldered to the head of the screw and the insulated binding post and the metal index pointer is screwed on the end.

The assembled parts can be either mounted on the panel or on a piece of bakelite a little larger in size than the celluloid. If a condenser is desired the screw heads can be raised above the celluloid with brass pieces or nuts and the condenser mounted above. The line or mark should be made with India ink, and the two points when straight across should almost touch the binding posts at the ends.—Ira N. Faurot, Smith Center, Kansas.

CIRCUIT GOOD FOR CAMP OUTFIT



R. R. Spike Good for Portable

Scorn not the lowly railroad spike. It has the makings of a crackerjack antenna or ground and may be a valuable adjunct to the summer Radio kit of any "bug" who would rather swing a few healthy heaves of the hammer than climb a tree to string an aerial.

Take a railroad spike and file it off clean. Then drive it deep into the trunk of a good-sized tree. Use a common ground clamp for making a connection, and you'll find you have a ground of unusual quality. Drive a spike like the first one in another tree and hook it up to your antenna binding post. The tree will do the rest. What could be sweeter?

Old and New B Batteries

It is not advisable to connect old and new plate batteries of the dry cell types in the same circuit. The reason for this is that the internal resistance of the battery increases with the age and a large amount of the energy of the new dry battery is consumed in forcing the current through the high resistance of the old battery. A block of B battery having a potential of 22.5 volts when first put in service may be used until the potential has fallen to 15 volts. Then it should be discarded and replaced by a new battery.

Finding Battery Noises

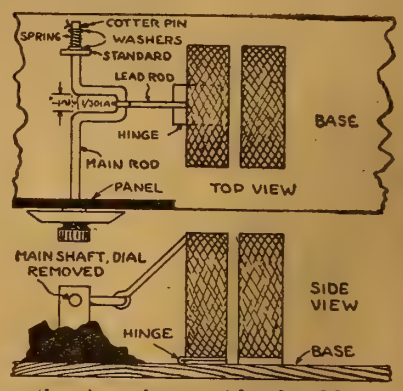
Interfering noises in a Radio receiver employing a vacuum tube may be due to current irregularities in the filament battery or in the plate battery. To locate the source of the noises, these batteries may be tested in turn by touching the cord tips of the telephone receivers across the terminals of the batteries. If a click and no further noises are heard when the filament battery is tested in this manner the trouble is elsewhere, but if a hissing sound is heard in the receivers the battery needs charging. If a crackling or snapping sound is heard when the plate battery is tested it should be discarded and a new battery placed in service.

Regenerative Interference

A regenerative receiver, when operated beyond the oscillating point, causes considerable interference with nearby receiving stations. This is due to the fact that oscillations of small power are produced by the set and radiated from the antenna. These oscillations when combined with oscillations transmitted from a Radiophone station, produce a beat of audible frequency which seriously interferes with the reception of broadcast music or speech. This interference, due to re-radiation, may be prevented by combining Radio frequency amplification with the regenerative set, thus effectually preventing the radiation of oscillations from the antenna system.

Back of Panel Mounting for Two Honeycombs

The accompanying illustration shows a method of mounting two honeycomb coils back of a panel. The main rod or shaft may be of No. 6 wire or ⅛-inch brass rod, 8 to 10 inches long. The lead may be a piece of No. 8 or 10 wire of suitable length. A washer must be placed between the dial and panel to keep the dial from rubbing. The spring at the end of the rod is to keep a strain on the rod and coil to prevent its moving of its own accord. The loop in the main rod equals one-third of the diameter of the movable coil (outside diameter). —E. A. Boepple, Rocky River, Ohio.



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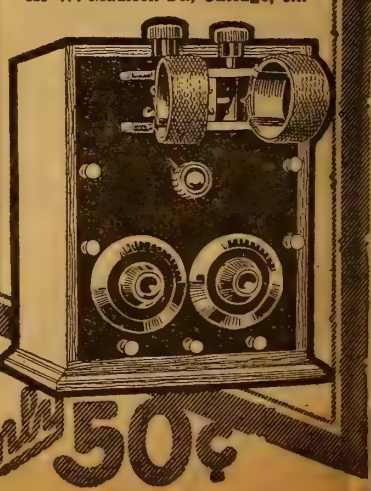

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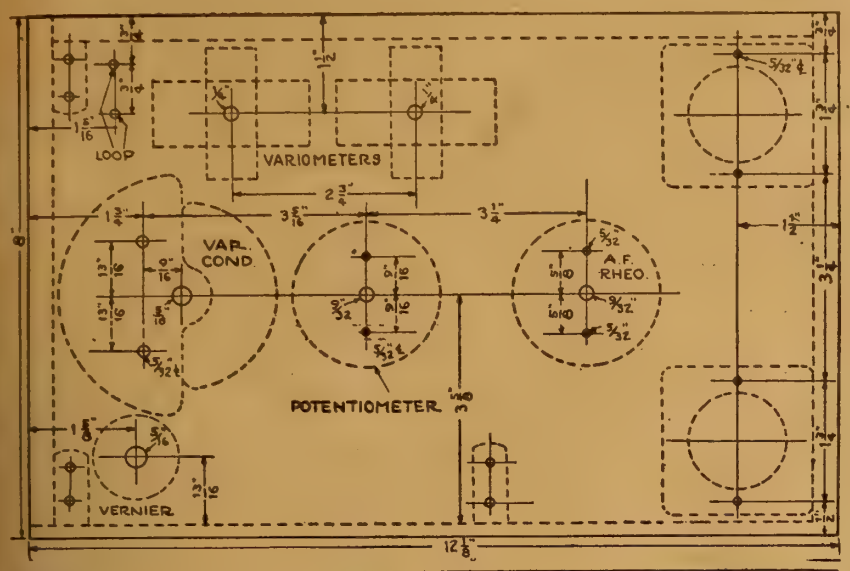
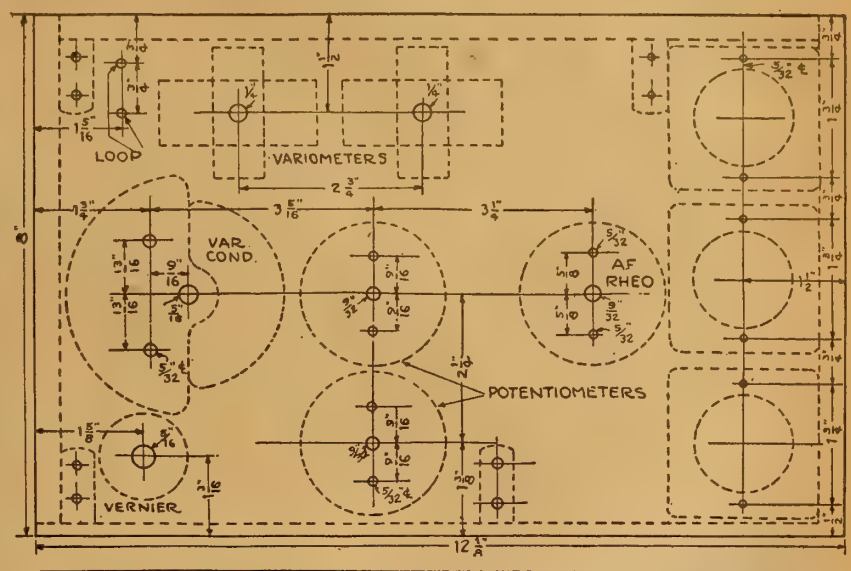
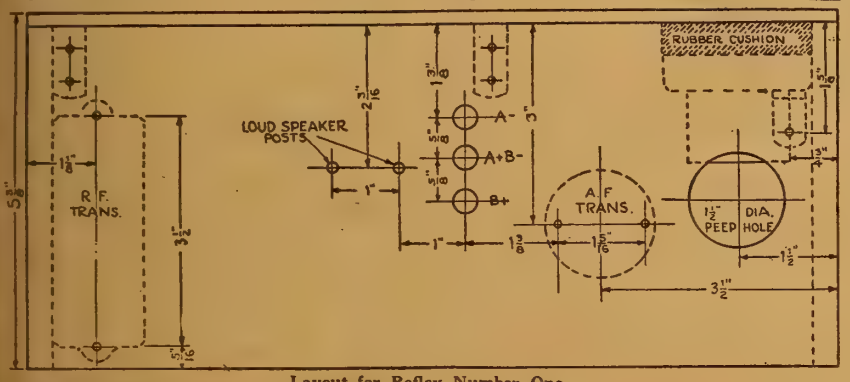
How to Make a Camper's Portable Reflex Set

Part III—Panel Layouts

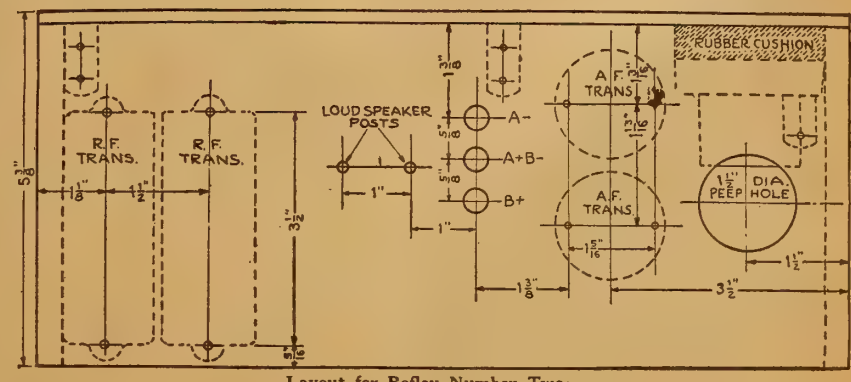
By H. J. Marx







Layout for Reflex Number One



Layout for Reflex Number Two

REGARDLESS of which of the three circuits the constructor contemplates using, the sizes of the two pieces of panel stock for the top and side remain the same. The variations are simply a question of changes in the number and location of the drilled holes for mounting the apparatus.

Compactness is a valuable asset in reflex circuits, but the arrangement of the apparatus, to avoid interference, is very important. The position of the audio frequency transformers with respect to the Radio frequency transformers must be given a little consideration. Watch to see that any magnetic field that may emanate from the audio frequency transformer will not be in a position to affect the windings of the Radio frequency transformer. The variometer also should be kept away from any position where it would be affected by the magnetic field of the transformers.

Resilient Socket Mounting

Because dry cell tubes are to be used, and on account of their microphonic nature, some form of resilient mounting for the tube sockets is advisable. The black sponge rubbers used by draftsmen make very good cushions. They should be cut to match the base of the tube socket. In order to get a real cushion effect, it is not sufficient to merely insert the rubber under the sockets and then to pull up tight on the screws holding it. The socket should be attached to the rubber cushion with one set of screws and the rubber to the panel with another set of screws. Any shocks or jars cannot be transmitted through the screws, but are absorbed by the rubber cushions. A flexible lead should be used between the terminals on the sockets and the bus bar wiring. If the heavy bus bar wiring is connected directly to the socket binding posts, it again helps to add rigidity and permits the transmission of shocks and bumps.

Corner Angles

The small brass corner angles that can be purchased in the five and ten-cent stores will come in handy for panel assembly and also for mounting any subpanels, as was used in the four-tube hookups for supporting the three audio frequency transformers. In using these angles and brass screws, a little care and attention is necessary in order to avoid additional connections and short circuits where they come in contact with other apparatus, such as condensers and transformers.

Another convenience is the use of the small brass drilled strips bought in the same manner. They often come in very handy for set assembly. One was used for mounting the crystal detector direct to the grid terminal of the secondary of the Radio frequency transformer.

Reflex Number Three

The panel layouts not only give the locations for the mounting of apparatus, but also show in dotted lines the position of the sub-panel and the three small audio frequency transformers.

A small variable condenser with a cross section about the size of a quarter was used as a vernier and connected in parallel with the large variable condenser.

The cushion mounting of the sockets is illustrated in the view of the side panel.

The mounting of the sub-panel is left to the ingenuity of the constructor since it is simply a matter of using brass angles. Slight variations in location are immaterial.

Two 1½-inch peep holes are drilled in the side panel for observing the filament lighting of the tubes. These diameters can be increased if desired. The two Radio frequency transformers are mounted on the inside of the panel.

For battery connections the small telephone cord tip jacks were used. Regular binding posts are mounted for the loud speaker terminals.

Care should be taken in mounting the

(Continued on page 14)

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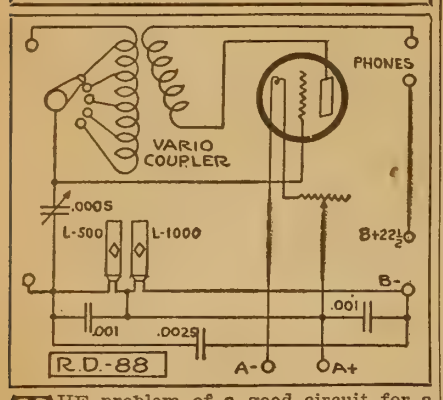


THE problem of a good circuit for a portable set using a loop aerial can be very satisfactorily solved through the simplified type of a single tube super regenerator. A typical circuit of this type is presented as RD-88.

The loop should be about 2 feet square with about 12 turns spaced ½ inch apart. The wire can be about No. 20 gauge single or double silk covered.

Any of the standard type of variocouplers can be used. The variable condenser gives best service if it has the vernier adjustment feature. The two honeycomb coils are connected in series with a coupling adjustment. A standard two-coil mounting should be used. The fixed condensers should be of the mica type, as the paper condensers are too unreliable in capacity values.

This circuit will give satisfactory service with practically any type of tube. With hard tubes the plate voltage can be increased.

FIRST STEPS IN RADIO

(Continued from page 11)

Thus when a difference of potential across this condenser was varied by variations in the plate voltage, the changing values were impressed upon the grid circuit, giving a feed-back effect and regeneration. This circuit is used in a somewhat different form at present, shown at B in Figure 36.

The variable condenser in the aerial circuit will be found to have a positive potential applied to one set of plates and the other plates being connected to the negative of the B battery through the phones. Thus when the plate current is varied by the original signal wave current, the potential across this condenser will vary and current impulses will be impressed upon the grid circuit to assist those from the wave, thus giving regeneration.

The action is assisted by the inductive effect of the variometer in the aerial lead, the self induced current in it increasing the variation in the potential differences across the variable condenser.

With this circuit the grid leak is very critical, for the positive of the B battery reaches one side of the grid condenser and if too much escapes across through the leak, the grid will be unable to assume an appreciable negative charge from the incoming wave and the set will not be sensitive.

Modification of the Circuit

A modification of this circuit that is somewhat superior to that just described is shown at C in Figure 36. The action is identical but the regeneration is easier to control and the signals are somewhat louder by reason of the tuning inductance being connected to the grid and plate.

The application of regeneration to double circuit tuners is identical in principle, the only difference being that the energy is transferred to the secondary tuning circuit instead of to the aerial circuit, although the latter method is occasionally used, the aerial circuit in turn transferring it to the secondary. The simplest form of inductive feed-back in the two circuit tuners is the three-coil honeycomb or spider web circuit. In this arrangement, three coils are arranged close together, the center one or secondary being fixed in position, the other two being so mounted that they may be swung to the side. The coil on the left is usually made the primary or aerial inductance, while that on the right the tickler.

In operation, the left hand coil is used to vary the coupling between the aerial and secondary circuit for best selectivity. Then by moving the coil on the right the proper amount of current can be transferred from the plate circuit to the secondary circuit to get good regeneration without distortion.

Sometimes a variable condenser is shunted across the tickler coil to help control the regeneration, which is highly critical. A better method is to connect the variable across the phones, in which position it acts as a throttle to control the amount of Radio frequency currents flowing in the plate circuits and thus assist in controlling the regeneration.

As a rule, a variable condenser across the phones instead of the fixed condenser used there in most regenerative circuits, will permit better control of the operation and may overcome the squealing and howling that cannot be completely cleared up in many sets.

There are numerous methods of inductively coupling the plate circuit to the secondary, but as a general rule no circuit should be used where a change in tuning will vary the feed-back effect.

For instance, at B in Figure 37 is shown a circuit used by many where one inductance is made to act as the tickler and aerial tuner. It will be very apparent that any attempt to vary the coupling to obtain selectivity will alter the feed-back, or in attempting to control the feed-back the selectivity of the set must be sacrificed.

Various other arrangements of inductively coupled methods are described by the technical press, but a study of the above will show the principle used and will assist in the selection of a suitable set.

Feed-Back in the Reinartz Set

The well known Reinartz tuner is a form of capacity feed-back with a special untuned or aperiodic aerial circuit. In Figure 38 is shown a modification of the Reinartz tuner that is somewhat easier to build and will be found very simple in operation. As shown, a tap is taken off one variometer between the stator halves and grounded through a variable condenser. Another variometer is connected to the plate and the other terminal to a .0005 mfd. condenser, which is connected to the aerial lead.

This set functions as a closely coupled two circuit tuner. Half of one variometer stator and the aerial circuit condenser form the primary while the balance of the variometer forms the secondary circuit. Regeneration is obtained in the following manner: The variometer being connected to the plate, the small fixed condenser and the aerial tuning inductance form a tuned circuit between the positive and negative terminals of the B battery. Should a change of potential on the grid cause a variation of the plate current, the voltage applied to the tuned circuit will vary and the currents will flow therein at Radio frequencies.

When this circuit is tuned to the same wave length as the secondary circuit, the currents therein build up rapidly and flowing through the aerial inductance part will be transferred to the grid circuit, and being in phase with the currents therein, will assist them and increase the changes in grid potentials, giving greater signal strength. This circuit is recommended for trial by those not familiar with it, for it has given excellent results wherever used. The action in the regular Reinartz circuit is similar, except that the inductances are varied by taps and the condenser in the plate aerial circuit is made variable.

The Three Circuit Tuner

We come now to the three circuit tuner which is exclusively regenerative and the earliest type of feed-back circuit discovered by Armstrong. The circuit is shown in Figure 38 and is usually known as the variocoupler-two variometer circuit. The action here is rather difficult to explain.

When the set is operating the plate current is varied by the changing potentials on the grid. Each change of the plate current is opposed by the inductive action of the plate variometer. Thus when the plate current is decreased by a negative charge on the grid, the plate variometer tends to keep the current flowing through the tube and builds up the plate voltage.

The increase of positive potential on the plate induces a greater negative charge on the grid by electrostatic attraction, which in turn reduces the plate current still lower, giving a greater change in plate current than would result from the original negative charge on the grid. The plate circuit is tuned to the incoming wave and thus the inductive action of the plate variometer is properly timed to act in synchronism with the Radio frequency currents in the grid circuit.

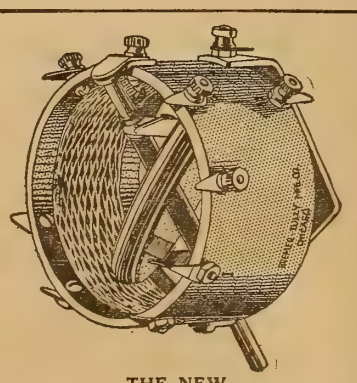
The proper operation of this circuit demands the adjustment of three different circuits to obtain maximum signal strength and therefore is more difficult to adjust. As a rule, it is unsatisfactory to the beginner for its great selectivity and difficulty in tuning a station, but once the knack of handling the tuner is mastered, it is second to none for long distance reception with amplifiers.

Body Capacity

In most regenerative tuners the approach of the hands to adjust the dials untunes the set. This is termed body capacity and is due to the fact that any conductor brought near the set forms one plate of a condenser and thus changes the tuning of the circuits. This is prevented by shielding the set by fastening sheets of conducting material to the back of the panel and grounding to the ground terminal or to the negative filament.

The wiring of a regenerative set should be such as to prevent any feed-back to the grid circuit other than that provided for in the instruments themselves. It is apparent that any lead in the plate circuit which lies parallel to the grid circuit lead would induce currents in the latter either by inductive or electrostatic action. Therefore separate all wires carefully and let them cross only at right angles.

(TO BE CONTINUED.)



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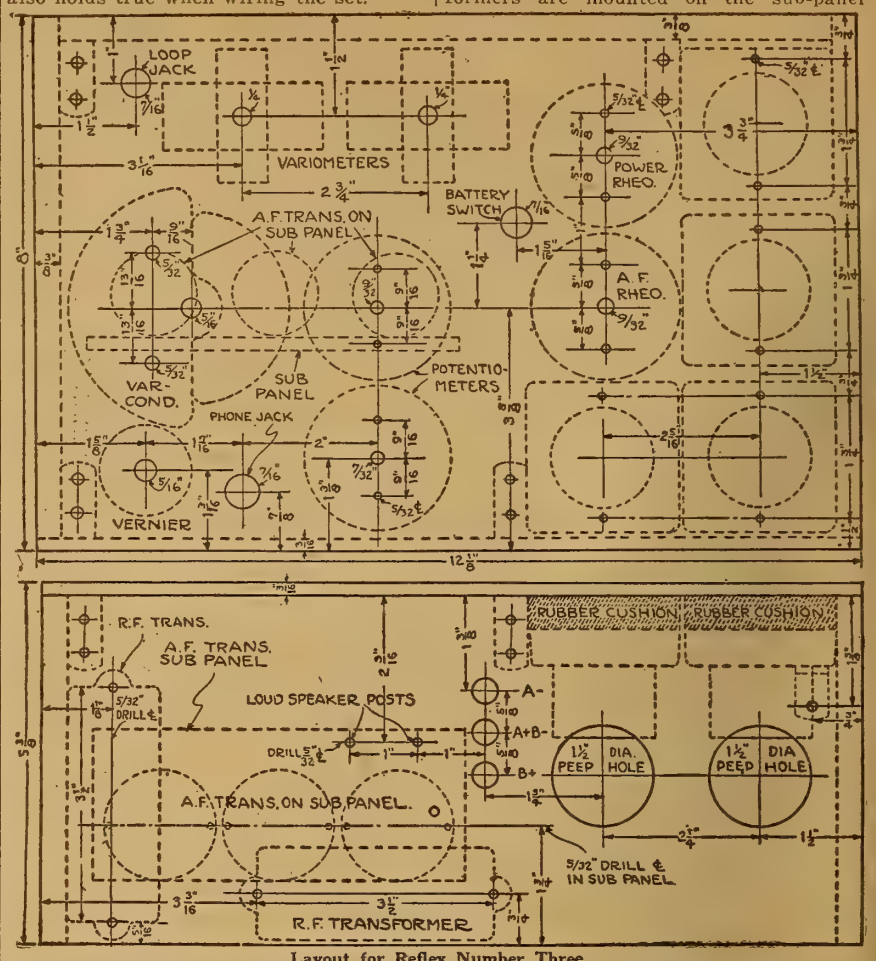
PORTABLE RECEIVER

(Continued from page 13)

apparatus so as not to interfere with the wooden strips in the carrying case. This also holds true when wiring the set.



Layout for Reflex Number Three

Reflex Number Two

The panel layout for the three-tube circuit is slightly changed from that of the four-tube set. The control apparatus is the same, except that the rheostat for the separate audio frequency tube has been eliminated.

The loop and phone jacks and the battery switch have also been eliminated. The audio frequency transformers are also mounted on the side panel in this layout, and the sub-panel eliminated. The one peep hole is dispensed with also.

Two binding posts take the place of the loop jack. The Radio frequency transformers are mounted on the sub-panel alongside of each other.

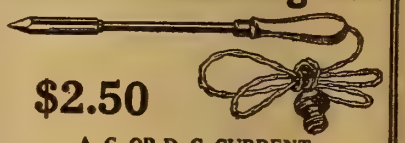
Reflex Number One

The panel layout of the two-tube circuit becomes very simple with plenty of room for mounting of apparatus and accessibility. One of the sockets and one of the potentiometers are eliminated, otherwise the top panel presents no variations from the three-tube layout.

In the side panel layout, just one transformer of each of the two sets is eliminated.

(TO BE CONCLUDED.)

Electric Soldering Iron



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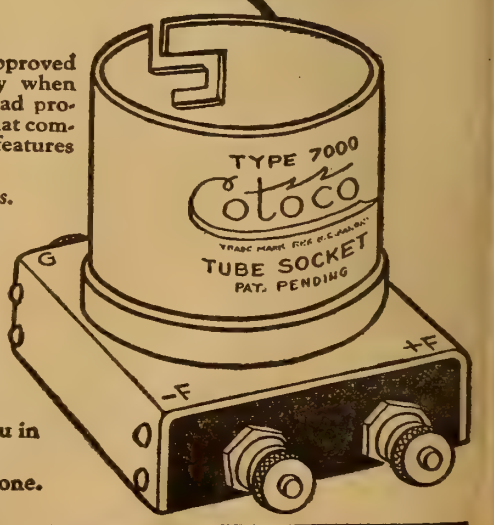


COTO-COIL CO. PROVIDENCE

Questions and Answers

R.D.-68-69.

(3056) ECF, Nanuet, N. Y.

In your Jan. 6th issue you printed a R. F. and an A. F. three-coil regenerator (R. D. 68-69).

I constructed one of these sets and would like to have some information about it.

Your diagram calls for primary 35, secondary 50, tickler 75. I find that better results are obtained with a primary 75, turns on a secondary or tickler of 50 turns, and then I must place my secondary at right angles to the primary. Is there any way I can overcome this? Will coils of more turns help me?

I do not seem to be able to tune in distant stations while the local stations are broadcasting. Is there anything you can suggest that will make this possible?

What are the VT-2 and E tubes you recommend for the 2-step and where can I get them? Will these tubes give me better results than the two Cunningham tubes I am now using?

What transformers are the best for audio frequency amplification and is it necessary to have a high and low ratio transformer, and which is placed first?

Can you furnish me with a panel diagram and size for the two cabinets?

A.—Noting your specifications and experience in operation of R. D. diagrams 68-69 will advise that a discrepancy is indicated in the variance of coils best functioning contrary to those shown in diagram. Values as specified are correct and should afford the best results. The circuit is selective and capable of discrimination in reception. Would advise a careful review of connections to determine what factor is acting as a deterrent to operation of set.

VT-2 and E tubes are manufactured by the Western Electric Company, but would not prove of sufficient advantage to warrant a change from those now employed.

Transformers of standard type having ten to one ratio on first and three or four to one ratio on second stage of amplification are used for audio frequency.

Panel construction is largely a matter of personal discrimination. Regret that we have no constructional data to offer for set in question.

Condenser Values.

(2908) JAG, Frederick, Okla.

How many square inches of soft copper tinned on one side would it take to make a variable condenser of .001 mfd. capacity? Give the thickness of the metal.

Would some other material be better than the copper? If so, what kind, and why?

What is the best dielectric and how thick should it be?

Where can I obtain all necessary materials.

Would you advise the use of amperite current adjusters on amplifier tubes?

Is there any way to measure resistance and capacity without a lot of expensive instruments?

A.—We are pleased to answer your inquiries as follows: For a book type condenser a sheet of soft copper tinned on one side 3 by 4 inches and separated either by a very thin piece of mica or heavy wax paper will approximate a .001 mfd. Tinfoil pasted on wood forms could be used but would be no better.

Mica is the best dielectric, .003-inch thickness ,if possible. Materials in question should be obtainable at any Radio supply store. Amperite current adjuster is very good, probably more effective than a rheostat.

Resistance may be calculated or measured with an ammeter. Capacity is rather difficult for a novice to arrive at without special apparatus designed for the purpose.

Reinartz and R. F.

(4124) WGG, Tucson, Arizona.

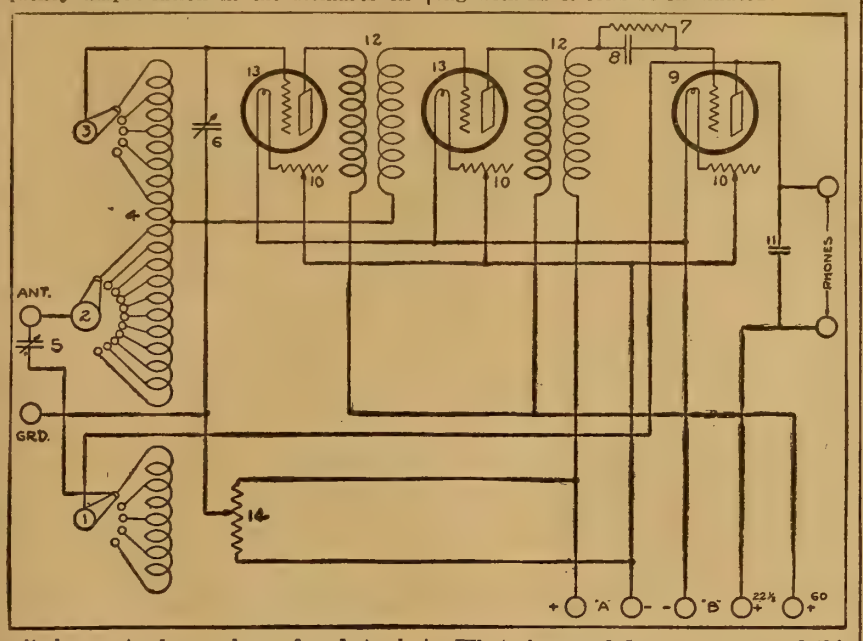
How may I add two stages of untuned transformer Radio frequency to my Reinartz circuit?

Will I need a variable grid leak in the above requested circuit?

How may I wind a Reinartz coil for use up to 750 meters?

In the above requested circuit will a 23-plate condenser work as well as the 13-plate condenser shown in the antenna circuit?

A.—Answering your inquiry we are advising that the employment of Radio frequency amplification in the Reinartz circuit has not always been found to be practical. However, we are referring you to the diagram on this page. No grid leak is indicated.



A Reinartz coil wound to accomplish 750 meters wave length would be cumbersome and impractical. It is advised that circuit be loaded by placing a 35 turn honeycomb coil in the antenna circuit and secondary circuit, grid lead, respectively. A twenty-three plate variable condenser can be used.

Flewelling Queries.

(2856) ABS, Fort Smith, Ark.

Your name was handed me by the St. Louis Post Dispatch Radio Department, as being in position to answer the following questions concerning the Flewelling Circuit:

What vacuum tube would you suggest as the best detector and amplifier?

Do the book type variable condensers function best, if so, what kind?

Will the Jefferson transformers No. 45 give appreciably greater and clearer amplification than Myers AF choke coils?

What should I use as grid-leak?

Please furnish detailed Flewelling hook-up and one stage of transformer or choke coil (whichever functions better) amplification.

Will .005 condensers function as well as .006 condensers?

Using two G-R coils will a double or triple coil mounting function better?

How can hand capacity effect while tuning with H. C. coils be eliminated?

What size panel do you recommend this set to be placed on?

A.—Answering your inquiries with relation to the Flewelling circuit will advise: That selection of suitable tube may be made from Western Electric VT-2, UV-202 and 201. WD-11 using one and one-half volt dry cell is also effective considering the amount of current consumed.

Would not advise use of book type variable condenser as it is not efficient.

Jefferson transformers No. 43 will afford better and clearer amplification than audio frequency choke coils.

Pencil line or any standard variable grid leak will serve.

Page thirteen of December 9 issue of Radio Digest contains complete details and panel layout for method of audio frequency amplifiacitons. Blueprints can be secured for fifty cents through our book department.

Would advise a strict adherence to capacities designated by author of circuit, condensers, etc.

A double coil mounting is all that is required, although a three-coil mounting may be used in order that if it seems desirable to use a different hook-up at any time a new mount is not necessitated should new hook-up require a three-coil mount.

Body capacity effect experienced in tuning honeycomb coils can be reduced by placing them in the back of cabinet and shielding cabinet, grounding shield.

In making this circuit, as before stated, a strict adherence to specifications is advised, to assure the results possible with this popular circuit.

Mr. Flewelling has been writing for Radio Digest on the subject of the circuit which bears his name, and you will without doubt find interest and helpfulness by reading his articles.

About WD-11 and WD-11A

The dry cell tube known as the WD-11 may be used either as a detector or an amplifier. Due to the fact that this tube is more highly evacuated than the usual type of gas-content detector tube, it is less critical in adjustment. A slight change in mechanical design is the only difference between the WD-11A and the WD-11, as these tubes have the same characteristics. A plate potential of about 20 volts should be used when operating this tube as a detector and 40 volts as an amplifier.

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The Kellogg variocoupler is of the same standard design as our variometer, being made of molded Bakelite, with reinforced construction.

For increasing the wave length from 500 to 2,500 meters, the Kellogg standard wound induction is added to the variocoupler.

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Radio Illustrated

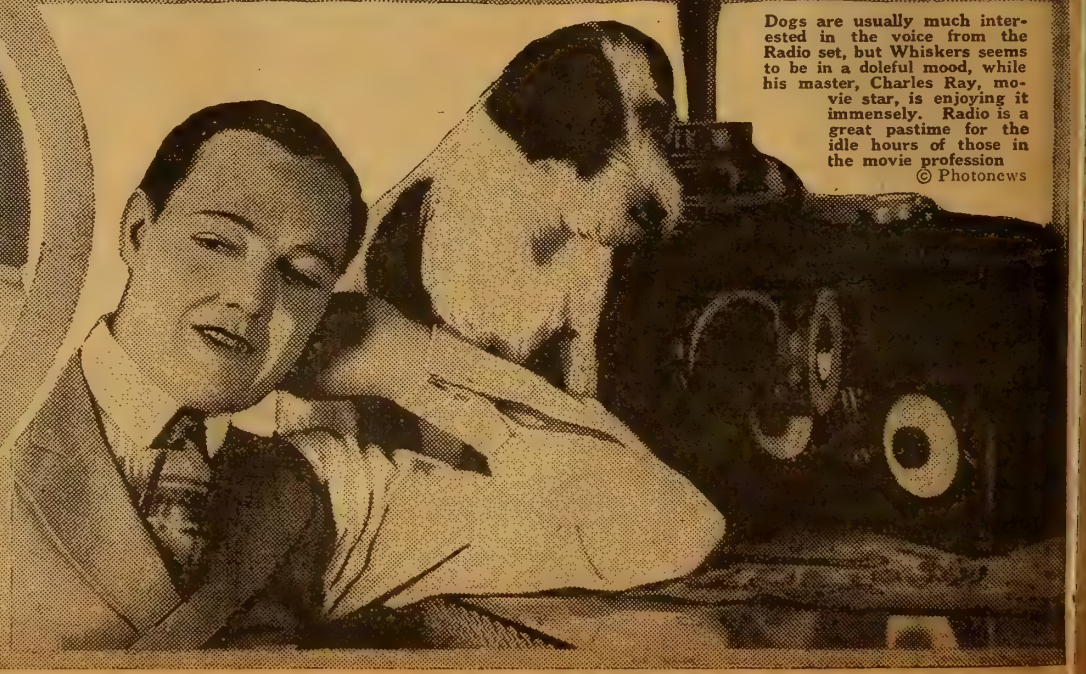
May Murray, the famous moving picture actress, in the garb of a role she recently starred. A few weeks ago she gave Radiophans a treat with a talk from Station WOR on dancing. A great many actors and actresses in the motion picture profession have used the microphone to further their popularity with the great open audiences in the country and places wherein they cannot reach in person

Photo by Edwin Bower Hessler

Just a little listening-in party, the party being Miss Peggy Stohel, at the camp. Seventy-five per cent of the persons who travel to vacation lands in cars have their Radio sets with them. If they do not have cars, the sets are sent as baggage

© K. & H.

You may just as well start the baby on "Radio food," for it is bound to need it sooner or later. This shows Jim Little listening in on a concert just before he is put to bed for his afternoon nap. Jim is a modern fellow, and now that he has been started on the Radio trail he will not go to sleep until his Radio requirements have been filled. © Fotograms



Dogs are usually much interested in the voice from the Radio set, but Whiskers seems to be in a doleful mood, while his master, Charles Ray, movie star, is enjoying it immensely. Radio is a great pastime for the idle hours of those in the movie profession

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Neutrodyne; Phantom; Portable Vacation Set

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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LEARN WHILE SLEEPING

STATION MANNED BY PUBLIC IS PROPOSED

PHILADELPHIANS SUGGEST NATIONAL "CHAIN"

Plan Is Outgrowth of Chamber of Commerce Study to Effect Better Broadcasting

PHILADELPHIA.—Development of a central Radio broadcasting station, to be owned and operated publicly as one of a chain which will extend throughout the country, is asked by representatives of the national Radio Chamber of Commerce in a proposal laid before the Philadelphia Chamber of Commerce.

Dr. Wilmer Krusen, chairman of the Municipal Affairs Committee of the Philadelphia Chamber, which has the proposal under consideration, has called a meeting of representatives of all local broadcasting stations to meet with his committee at the Chamber of Commerce.

Proposal for the establishment of a public broadcasting station is the outgrowth of much study by the National Radio Chamber in seeking to solve the problem of developing better broadcasting.

Sees Great Public Service in Plan

"There are probably 50,000 broadcast receiving sets serving from 200,000 to 300,000 persons, in Philadelphia," according to a statement issued by the chamber. "This number is increasing rapidly because fair equipment is now within the reach of all. The mere presence in Philadelphia of such a station as we contemplate would undoubtedly serve to increase greatly public interest in Radio and hence, correspondingly, the influence of the Philadelphia station.

"Such a station should be heard easily in half of the sets of the country, or not less than 1,000,000 sets, serving perhaps 4,000,000 persons. So rapid is the increase in the number of Radiophones that it is safe to say that within five years the voice of Philadelphia could and would be heard by half of the people of the United States.

"The public broadcasting station must and will be supported by the people whom it serves. We are presenting to Philadelphia the opportunity to lead the way in the great new development of this epoch-making art by establishing the first public broadcasting station in the United States, owned and operated by the public."

Giant Horn for City Park

ATLANTA, GA.—A giant loud speaker, fifteen feet long and big enough for a tall man to enter upright, amplifies the received municipal concerts broadcast nightly by the Atlanta Journal, Station WSB, for summer crowds at one of the city parks.

WONDER IF HONOLULU HEARD WOR WEDDING

NEWARK, N. J.—Word is being awaited as to whether or not Radiophans in the Hawaiian Islands and France picked up the wedding ceremony recently broadcast from Station WOR. The wedding in question was the ceremony which united Col. King Stanley, seventy, former Indian Scout and Miss Grace A. Raymond, forty-five.

It will go down in history that President Harding was the first president to use Radio in speaking to the invisible public. His Alaskan trip is well dotted with speeches, many of which will be broadcast. Radio will keep him in close touch with things at home while in Alaska. He said, "It's a great stunt," after making a speech in a western state. The Presidential car is equipped with amplifying units and loud speaking horns, which broadcast the speaker's voice many blocks and it is easy for the crowds to hear the President from the observation platform on the train. Where speeches are made in halls the usual broadcasting takes place, and we all can hear it if we have long distance receiving sets. When the President and his party reach Alaska, their destination, only a thin piece of copper cable leading back to the States will let him know what is doing here. However, Radio will be used almost entirely on this trip.

SUBCONSCIOUS MIND TAUGHT BY HEAD SET

Teach Naval Aviators Radio Code in Short Time—Speed Acquired

Sleeping Mind Memorizes

Principle Applicable to Other Fields—May Find Use in Schools of Country

By L. M. Lamm

WASHINGTON, D. C.—Are you having a hard time trying to learn the Radio code? Are you looking for an easy way to learn it? Is there something else difficult for you to grasp? Then go to sleep and let your subconscious mind learn it for you. That is the advice of Radio experts of the Navy Department. Experiments have been made and claimed to have been a success.

A novel plan for teaching the Radio code to student naval aviators at the Naval Air Station, Pensacola, Fla., has been under trial recently, according to officials of the Bureau of Aeronautics of the Navy Department, and reports received indicate the plan to be both practical and valuable.

Learn While They Sleep

The plan is to teach student aviators to receive code at high speed while they are asleep. The advantage claimed for the idea is that it enables the student to acquire facility in receiving the code in a fraction of the time that is ordinarily required. In recent tests made, say officials of the department, students who have been particularly slow in making progress with Radio practice have been saved from being dropped from the class at Pensacola.

The idea originated in the experience of Chief Radio Mate Phinney who is in charge of Radio instruction in the ground school at the Pensacola Air Station. In asking for a trial of his plan, Phinney cited his own case, and told of how in practicing receiving at the rate of thirty-five words per minute he fell asleep while the mechanical sender which he was using continued to send messages to him. When he awoke Phinney claimed that he was able to receive at the rate of thirty-five words,

(Continued on page 2)

"RADARIO" COINED BY CROSLEY PLANT WLW

CINCINNATI, O.—The word "Radario" is claimed to have been used first by station WLW, Crosley Manufacturing Company. this city. The term means Radio drama and was coined by WLW officials to describe the particular type of technique necessary for microphoning the invisibile play. The station also claims the first Radio dramatist, Fred Smith.

FANS SAVE COUPONS FOR LARGER PARTS

LETTERS SHOW READERS TO BE SAVING SERIES

More Valuable of Standard Apparatus Goal of Special Award Enthusiasts—Many Cash in

SPECIAL REWARD OFFER
Coupon Number 7

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

With the publication of the seventh Special Reward Coupon for Digest readers many letters have been received which tell of the desire of fans to save the coupons for the more valuable pieces of apparatus in the offer list, such as those items catalogued under Classes E, F, G, and even H.

Many of these letters also indicate that the writers are saving more than one series of coupons. One fan told that he was saving four distinct series of coupons in order to secure audio and Radio frequency transformers in the Class H list. He is planning a set requiring two audio and two Radio frequency transformers and appreciates the saving made possible by the coupons.

It might be added here that there is no limit to the number of series turned in by any fan. Go as far as you like! And again, a series does not have to begin with coupon number one. Any series may begin with any coupon number, so long as it follows a consecutive series of numbers. All that is necessary in addition is the remittance called for in the particular class from which the item may be selected.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips).

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-20 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH).

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .0000€

(Continued on page 9)

LEARN WHILE SLEEPING

(Continued from page 1)

while previously he had been unable to catch more than twenty or twenty-five words. He advanced the theory that in a few hours of his slumber his subconscious mind had been trained to the higher speed.

Plan is Practical

When the proposition was first made to apply the test to student naval aviators in the ground school in Pensacola, officials of the Navy Department say that it was met with amused skepticism, but a practical test has convinced the skeptics that the plan is workable.

The matter of acquiring a speed of twenty words per minute has ever been a bugbear to students at the training station, it is said, and in a number of cases has seriously hampered their progress. This speed must be reached by the end of the six months' course in order for the student to receive a designation as pilot. In the last class to enter the ground school several students proved to be difficult subjects, and as a last resort the attempt was made to boost them to the required speed by sending radio code messages to them while they slept.

Applicable to Other Memory Work

Before turning in at night the student adjusts the receivers on his head which are used in the regular class. A regular watch is stood throughout the night by expert operators on the sending key and throughout the night they send at high speed—about ten words in excess of the student's capacity to receive. It has been found, according to the reports reaching the navy headquarters, that in his conscious hours the following day the student is able to receive messages at the speed they were sent to him while he was asleep.

In discussing his method Chief Mate Phinney claims that it has educational value in that memory tests which he has made have given astonishing results. Long passages of literature have been committed to memory in this manner that would otherwise have taken laborious effort extending over a long period of time. The belief was expressed that the scheme might be applied to other lines of education and perhaps eventually would find use in the schools all over the country.

Cuban Station Owner Gives Long Distance Certificates

TUINUCU, CUBA.—Frank H. Jones, owner and operator of station 6KW, Tuinucu, Cuba, has a novel way of confirming the long distance reports of ambitious amateurs who write in to him, reporting reception of his broadcasts and requesting a check on the received broadcast.

On receipt of such reports, Mr. Jones checks up the report with the station log and issues a "Certificate of Long Distance Radiophone Reception," stating the date the record was accomplished, wave length used, type of apparatus employed at the broadcasting station, and a schedule of programs.

Majority of Radio Exports Go to Canada, Figures Show

WASHINGTON, D. C.—There were 128,026 pounds of Radio apparatus exported in April, valued at $244,195, according to information just made public by the Department of Commerce. Of this apparatus, by far the largest quantity went to Quebec and Ontario, Canada, the exports to these provinces amounting to 33,319 pounds, valued at $56,325. The second largest quantity went to Argentina, with Cuba and England being the countries to which the next largest quantities went.

Series of "Outdoor" Talks by Jud Landon, Broadcast

SCHENECTADY, N. Y.—For lovers of the field and stream WGY, the broadcasting station of the General Electric Company here recently inaugurated a series of "outdoor" talks. Jud Landon, nationally known devotee of the rod and gun, gives red-blooded talks for red-blooded men. He tells about the ways and the haunts of game fish; discusses in the language of the sportsman, such important things as bait, flies, tackle, rod and reel.

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Looking Ahead

A Trip Through WGY—next week with Vera Brady Shipman. Fans of the great Schenectady broadcaster will enjoy this story.

How Audio Frequency Amplification Is Accomplished—and many other things about it will be told by Thomas W. Benson next issue in his instructive series for Radio beginners. Read Chapter IX, page 11, this week.

"Co-operative Competition" in the Radio Industry—will be continued next week by John B. Brady, a patent attorney well informed on the Radio situation.

A Photo Diagram of Another Standard Receiving Set—this time the Jones Symphony Receiver—will be in the July 21 issue. The understandable layout will no doubt be appreciated by Digest readers, as have the other photo diagrams of this series.

Tube Characteristics of the Northern Electric 215A—will be discussed by H. J. Marx in the July 21 issue. This little "pickle" tube has acquired popularity over night, scarce as it is.

And of Course the Other Regular Features—Flewelling Answers to Queries, Part I of the Radiophone Broadcasting Station Directory, Advance Programs, etc., will be in your copy of the Digest next week.

Have a Copy with You on Your Vacation

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

GIVE WORLD RULES ON RADIO IN WAR

NO BAN ON NEUTRAL SETS IN OWN TERRITORY

Belligerent Powers May Not Erect Station in Jurisdiction of Country at Peace

WASHINGTON.—International rules for the control and operation of Radio in time of war, as propounded by the Commission of Jurists at the Hague, were announced by the Department of State today.

These regulations, in the preparation of which Capt. Samuel W. Bryant, U. S. N., and Col. Geo. S. Gibbs, U. S. A., assisted American Commissioners Moore and Washburn, provide substantially that:

In time of war the working of non-belligerent Radio stations shall continue to be organized, as far as possible, in such manner as not to disturb the services of other Radio stations. Belligerent and neutral powers may regulate or prohibit the operation of Radio stations within their jurisdiction.

The erection or operation by a belligerent power of Radio stations within neutral jurisdiction constitutes a violation of neutrality on his part as well as on the part of the neutral power.

Neutral Power Need Not Restrict

A neutral power need not restrict or prohibit the use of Radio stations located within its jurisdiction, except to prevent the transmission of information destined for a belligerent concerning military operations and except as further prescribed. All restrictive or prohibitive measures taken by a neutral power shall be applied impartially by it to the belligerents.

Belligerent mobile Radio stations within a neutral State must abstain from all use of their Radio apparatus. Neutral Governments are bound to prevent such use.

The transmission by Radio by a vessel or an aircraft, whether enemy or neutral, when on or over the high seas, of military intelligence for the immediate use of a belligerent is deemed a hostile act and will render the vessel or aircraft liable to be fired upon. A neutral vessel or neutral aircraft which transmits, when on or over the high seas, information destined for a belligerent concerning military operations shall be liable to capture. The Prize Court may condemn the vessel or aircraft, if it considers that the circumstances justify condemnation. Liability to capture of a neutral vessel or aircraft on account of the acts referred to is not extinquished by the conclusion of the voyage or flight on which the vessel or aircraft was engaged at the time, but shall subsist for a period of one year after the act complained of.

Belligerent Control Over Neutrals

In case a belligerent commanding officer considers that the success of the operation in which he is engaged may be prejudiced by the presence of vessels or aircraft equipped with Radio installations in the immediate vicinity of his armed forces or by the use of such installations therein, he may order neutral vessels or neutral aircraft on or over the high seas, to alter their course to prevent their approaching the armed forces under his command; or not to make use of their Radio transmitting apparatus while in the immediate vicinity of such forces.

A neutral vessel or aircraft, which does not conform to such direction, exposes itself to the risk of being fired upon. It will also be liable to capture.

Neutral mobile Radio stations shall refrain from keeping any record of Radio messages received from belligerent military Radio stations, unless such messages are addressed to themselves. Violations of this rule will justify the removal by the belligerent of the records of such intercepted messages.

Belligerents are under obligations to comply with the provisions of international conventions in regard to distress signals and distress messages so far as their military operations permit. Nothing in these rules shall be understood to relieve a belligerent from such obligation or to prohibit the transmission of distress signals, distress messages and messages which are indispensable to the safety of navigation. The perversion of Radio distress signals and distress messages prescribed by international conventions to other than their legitimate purposes constitutes a violation of the laws of war and renders the perpetrator personally responsible under international law.

Northern Electric
Peanut Tubes, Type 215A
DEALERS—ATTRACTIVE DISCOUNTS
NOTE: We are the Largest Exclusive Radio Jobbers in the Middle West
HUDSON-ROSS
123 W. Madison St. Chicago

SIX BIG HUSKIES DO "FLORADORA" STUNT

MACY EMPLOYES STAGE UNIQUE OPERETTA

Bessie Barriscale's Brother Is Author-Hero of Musical Comedy Broadcast from WJY

NEW YORK—Radiophans had an opportunity of hearing a unique musical comedy recently when "Once Upon a Time," written and produced by employes of R. H. Macy & Co., Inc., was broadcast from Station WJY, New York.

Richard Barriscale, brother of Bessie Barriscale, film star, is author of the play and its hero. A number of tuneful songs written by Jack Straus, son of the president of Macy's, Harry Herman, Ralph Goldstein and Mr. Barriscale were rendered, among them: "When Dreams Come true," Hearts Are Trumps," Hitch Your Wagon to a Red Star," "He's Getting Better Day by Day," "You'll Think of Me Sometimes," "May-Ga-Lanka Blues" and "Macy Mine."

The operetta was originally produced last month at the Central Opera House under the auspices of the Community Club, an organization of Macy employes.

Beauty Chorus Attraction

A great deal of attention was attracted to it at the time by the Beauty Chorus, whose pictures were later featured in newspapers throughout the country.

Another hit was a burlesque on the Floradora Sextette by six husky delegates from the store's delivery department, who donned ballet costumes to lend an air of realism to their performance.

The play was condensed for broadcasting purposes by Miss M. C. Sidney, head of Macy's Department of Training, who was formerly on the stage.

Miss Kathleen Grealish, who played the double part of Sally and Irene, had been heard over WJZ before. So had William Francis. Both collaborated in the Christmas stories which were sent out by WJZ at that time.

Radio Gospel Does Missionary Work

Clergymen Say Church Services Reach Many Thousands—Two Elderly Women Dress to "Attend"

SCHENECTADY, N. Y.—Local clergymen whose services have been broadcast now look upon the Radio station as a powerful gospel missionary. Words spoken in a church in the presence of a small group of people are given wings and travel to thousands of homes reaching the aged and the infirm and many who, but for the Radio, would not hear a church service. Village churches locked because of a shortage of ministers or inability to provide for a pastor regularly, now open their doors and the congregations worship with the Schenectady church membership via Radio.

Dress to "Attend" Radio Church

After every service letters reach the pastor from all parts of the country. One clergyman was recently told of two elderly women, too feeble to go to church, who dress each Sunday in their best finery and sit at their Radio set, hats and gloves on, and devoutly listen to the service. During the scripture reading they follow the pastor in their bibles and at the offertory they solemnly place a modest offering in a plate at their side. At the end of the service the money is sent to the pastor who has been speaking to them.

A lumberjack recently wrote one of the Schenectady ministers that he had heard a church service for the first time in eleven years, and that it had taken him back to his "Sunday School Days". He was so impressed that he is getting a loud speaker so that the gospel message may be appreciated by others in the camp.

PLAN TO PLACE RADIO IN CHARITY HOSPITALS

LOS ANGELES.—The Times of this city is promoting a very laudable plan to secure Radio sets for the inmates of charitable institutions and shut-ins or incapacitated individuals. The plan has been named the "Uncle John Radio Fund." All wishing to contribute to the fund should make checks payable to the "Uncle John Radio Fund," The Times, Los Angeles.

FIRST SPECIAL PERMIT TO BOY TRANSMITTER

SAN FRANCISCO.—The first special amateur Radio license under the new Department of Commerce regulations is held by Lester Picker, 18 years old, of San Ysidro, who is known to Radio amateurs of three continents through his Station 6ZH. Colonel J. F. Dillon, United States Radio inspector for the sixth district, granted him the license recently.

DROP COIN IN SLOT—GET MUSIC

Put a nickel in the slot and receive Radio broadcasts, is the latest Parisian Radio innovation. Automatic Radiophones are now being installed in French cafes, movies, hotel lobbies, ship cabins and other public places. Each apparatus is connected with a receiving set. Should music be unavailable, time signals are given out. When a coin is dropped in the slot (at the time concerts are on the air), connection is made and the listener in immediately enjoys music © K. & H.

ETHER CONCERTS AID OPERA RECORD SALES

Radio Keeps Public Informed on Latest Disc Music

COLUMBUS, O.—Definite results have come from the broadcasting of operas recorded on records from WPAL, Superior Radio and Telephone Equipment Company. The operatic selections are given every other week. From eight to ten records produced by one artist are broadcast and many people either call in person or write for the records they have heard broadcast. Aside from the fact that this means of announcing the better things in music has proved a good stimulant for selling records, it has also been the means of informing the public on the availability of great works in the form of records.

RADIO TO REPLACE SIGN TALK FOR DEAF

State School Plans Special Class to Train Students

JACKSONVILLE, ILL.—A deaf man who had not heard a sound in sixty years was able to hear music and the human voice by means of a Radiophone as the climax to a series of experiments conducted at the state school for the deaf here.

As a result of these experiments Col. O. C. Smith, managing officer of the school, announced that he was making preparations to conduct a class at the school next year, all pupils of which will be taught not with the old method of sign language and lip reading, but by use of Radio apparatus.

STATIC BUG-A-BOO ON AIR VANISHING

IMPROVEMENT BROUGHT BY NEW WAVE LENGTHS

Federal Inspection Officials Report Fans Getting Better Summer Results Than Ever

WASHINGTON.—Officials of the Commerce Department report that the schedule of new wave lengths for broadcasting stations has met with a cordial reception throughout the country, and that improvement in reception is noted almost everywhere.

All nine Radio Supervisors report satisfactory results in the allocation of the Class B and A wave lengths, stating that almost all listeners in are experiencing better reception than ever before in summer time, even with static interference at its height. Last summer, they point out, some five hundred stations were operating on 400 and 360 meters, whereas today the B stations have some nearly forty exclusive national waves, and the A stations have thirty-one waves assigned individually in the nine Radio districts.

The real success or improvement brought about by the wave allocation will not be fully appreciated until later in the fall, it is said.

Many Stations Keep Old Wave Lengths

Over three hundred of the old stations continue in Class C, satisfied apparently to operate on 360 meters. Experts of the commerce department express some surprise at this condition; they hoped for early applications for transfers to Class A and B with independent wave lengths. Although no new stations are being licensed under Class C the fact that over three hundred stations, scattered all over the country, continue to transmit on the 360 meter wave tends to maintain interference which it was expected would be eliminated.

Speaking of static, a member of the Radio Section pointed out that if the "Radio receivers" would use shorter, single wire antennae and listen in on the shorter wave Class A stations, very little static interference would be noticed. Reception should be better, they say, as the equipment is not as susceptible to static. The use of loops and indoor aerials is also recommended.

Writes Scenarios to Airphone Jazz

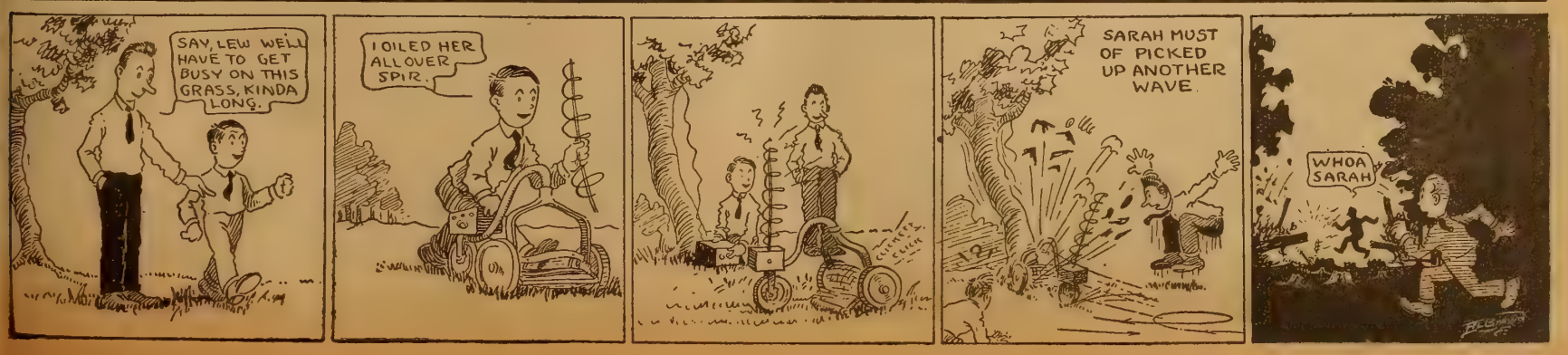
Rex Taylor Types Off Wesley Barry Picture with Country-wide Loud Speaker Accompaniment

HOLLYWOOD, CAL.—The motion picture director who employs a five-piece orchestra on the stage to get him and his actors into the proper moods or their various scenes, has nothing at all on the scenario writer these days.

Rex Taylor who is writing the screen version of "George Washington, Jr.", which is to be Wesley Barry's next feature picture for Warner Brothers, is now clicking his trusty "Underwood" to the accompaniment of some of our best known jazz orchestras. He has arranged to have Lyman's Orchestra from the Ambassador Hotel, "The Packard Six," Major's Orchestra from Ocean Park and other noted jazz organizations play nightly in the study of his Hollywood bungalow to provide proper inspiration for the rollicking comedy scenes he is developing in the George Cohan play.

A Radio receiver which Taylor has built himself is the means of bringing these various orchestras to him and he claims that with the cheerful strains from the loud speaker filling his comfortable study, he can accomplish a full day's work during the evening broadcasting hours without tiring him in the least.

THE ANTENNA BROTHERS — Spir L. and Lew P. — On the Forestry Service Wave



SURVEYS INDUSTRY'S TANGLE OF PATENTS

"Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

By John B. Brady

(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation will occupy four parts, of which this in the first.)

PART I

THE RADIO industry can learn a great deal from its giant predecessor, the automobile industry, and perhaps amicably adjust the present chaotic situation arising out of the patents by a cross-license agreement to eliminate extended litigation. The automobile industry many years ago formed a National Automobile Chamber of Commerce which the manufacturers of different makes of cars joined and interchanged their patent rights on such a basis that production might go on unhampered with patent litigation.

Pressing Small Manufacturer Out

The Radio patent situation for the smaller manufacturer on the outside of the big four looking in at the Radio Corporation is growing more acute each day. The Radio Corporation is bringing suits under its numerous patents and gradually pressing out the small manufacturer from his right of livelihood.

Glancing over the court records of only the past twelve months shows the Radio Corporation in litigation with the Radio Audion Company under the Fleming valve patent 803,684 in which they were successful in preventing the manufacture and sale of the Myer tubes when sold as detectors, although not when sold as amplifiers and oscillators.

Get Myer Injunction

Upon the unsuccessful outcome of this suit the American Telephone & Telegraph Company sued the Radio Audion Company and DeForest Radio Telephone & Telegraph Company on the DeForest amplifier patent 841,387 and grid patent 879,532 in which an injunction was obtained against the defendants. The Radio Audion Company appealed their case to a higher court. The Audion Company found the Radio Corporation circularizing the trade with unfair notices to the public having a tendency of damaging the business of the defendant, and as a result were successful in having this practise declared in contempt of court and collected damages from the corporation.

R. C. A. After Small Manufacturers

An apparently aggressive policy has been adopted by the Radio Corporation against the small manufacturer in bringing a number of suits, among which is that against A. H. Grebe and J. H. Bunnell & Company under the DeForest patents 841,387 and 879,532 in the Federal Court for the Southern District of New York to prevent Grebe as manufacturer and Bunnell as distributor

(Continued on page 8)

Calls on Radio to Add to Benefit of Churches

COLUMBUS, OHIO.—Believing that the Columbus Federation of Churches can be of greater general benefit than has been before possible, Rev. Walter A. King, executive secretary, has arranged with the Erner & Hopkins Company to broadcast weekly services over Station WBAV.

The services will be interdenominational and will be provided with the view of reaching many shut-ins who are often unable to attend the regular church services. Various religious leaders of Columbus will provide the programs.

WLW Seeks Lost Dogs, Relatives and Flyers

Even Fraternity Uses Airphone to Locate Missing Members

CINCINNATI, O.—Broadcasting stations are called upon to aid in all kinds of searches. Requests upon station WLW, have been most varied in their demands. For example, Colonel Graham Seton Hutchison, delegate from England to the Associated Advertising Clubs of the World convention at Atlantic City, was wanted by the Cincinnati Chamber of Commerce and, as he was flying around in an airplane from city to city on a speaking tour, it was difficult to locate him. The committee then sent a message to him via WLW and contact with him was finally made.

Search for members of the Chi Sigma Chi fraternity was made by Radio and everyone belonging to this fraternity was asked from WLW to send their names to the station. The great number of responses received from widely separated points in the U. S. showed that many of the members of this fraternity were owners of Radio receiving sets.

An alarm clock has been invented by a Frenchman which responds to a certain Radio wave length sent out by the Eiffel tower station.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	5:45- 6:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	.....	11:00- 1:00
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	360	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	500	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....	9:00- 9:30
KFI, Los Angeles, Calif.	469	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	10:00- 1:00
KGW, Portland, Ore.	492	10:00- 2:00	.....	10:00-11:00	.....	9:00- 2:00	.....	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	.....	10:00-12:00	.....	10:00-12:00	.....	10:00-12:00	.....
KSD, St. Louis, Mo.	546	8:00-12:30	8:00-10:00	8:00-10:00	.....	8:00-12:30	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	6:30- 8:00	.....	.....	.....	6:30- 8:00	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	400	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30]0:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00:10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00	.....	.....	.....	6:00- 9:00	.....	.....
WOR, Newark, N. J.	405	7.00-10:00	5:15- 6:30	7:00-10:00	5:15- 6:30	5.15- 6:30	7:00-10:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	.....

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

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42.25	Erla Reflex Circuit. Complete parts to build this set, including diagram.	27.95
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2.50	Gold Grain Detector (Base Mtg.)	1.39
1.00	Variable Grid Leak (0-5)	.39
2.50	11 Plate Variable Condenser	1.16
3.50	23 Plate Variable Condenser	1.29
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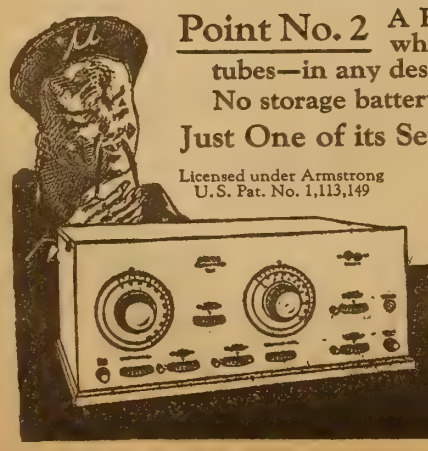

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"BACK STAGE" AT THE STATIONS

The pnoto at the left is that of Raymond Guy, well known to Radiophans as the "Jazz Announcer" of WJY, New York. In the center is the first feminine broadcast announcer of Washington, D. C.; Ruth Lukens, Station WIAY. Miss Lukens announces all the daytime numbers for the big department store station of Woodward and Lothrop. All kinds of things are sent out by WIAY, including music, baseball reports, bedtime stories and weather reports. Charles O. Fisher, in charge of the plant, says that it is very difficult to get a good ladies' voice for announcing, but Miss Lukens, he explains, is doing remarkably well. Walter C. Evans, right, chief engineer of KYW, Chicago, is the young man who keeps this equipment 100 per cent efficient. Evans grew up with head phones on his ears. Perhaps this is responsible for his creditable record in the Radio industry

Left Photo © K. & H.

MUSSOLINI ACTS TO PRY OFF RADIO LID

ITALY MAY SOON BEGIN BROADCASTING

Italian Fans Will Have to Pay Tax, Fixed by Wave Length of Sets

ROME.—The question of inaugurating a broadcasting service in Italy has been seriously discussed for the last year, but there was little hope of obtaining permission from the government for such a service until the matter recently was brought to the attention of the Premier himself, who promised to do his utmost to simplify the bureaucratic difficulties which had always surrounded any proposition regarding Radio.

The matter was placed in the hands of governmental experts, and they have devoted much time to outlining a program which, frankly, is not exactly what Italian Radio experts had hoped, but one must be satisfied that at least broadcasting has become a possibility and the wall of opposition which thwarted every Radio plan has been demolished by the Fascisti government. One company has agreed to pay a certain tax to the government in return for the permission of starting a broadcasting service throughout Italy.

Fans Must Pay Rent

This company is allowed to charge a certain amount to all subscribers, but unfortunately Radiophans and amateur inventors are not numerous throughout Italy at present. Heretofore they have not been encouraged, in fact, heavy fines have been imposed if private installations were placed on roofs or terraces of private dwellings.

It is hoped that with the broadcasting service Radiophans will increase in number, otherwise the project will be doomed to failure. The concession will be given to the Italian Marconi Wireless Company. They must undertake, according to the conditions laid down by the government, to supply a broadcasting service of news, concerts, etc., on a wave length which will vary from 200 to 400 meters.

1,100 Miles Covered with Only Ten Watts of Power

MARION, KANS.—Some unusual results have been accomplished by Station WRAD, a ten-watt broadcasting plant owned and operated by the Taylor Radio Shop, this city. Reports recently received from this station indicate that it has been heard in thirteen states and different points in Canada as far as Rokeby, Sask.

This record is unusual for a ten-watt Radiophone station, inasmuch as the service is regular and the distances covered constant.

As an example of the enormous amplification in Radio transmission from the minute variations in current in the microphone into which the speaker talks, to the amount radiated by a large broadcasting station. If a man's power could be amplified in the same proportion, he could move at one time 400 times the amount of freight handled on all the railroads of this country in a year.

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-doors photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 Madison St., Chicago.

Plane at Buffalo "Picks Up" Omaha

Flyer Hears Music 1,000 Miles Despite Storm—Use Aerial Length of Plane

BUFFALO, N. Y.—Radio receiving in an airplane was successfully demonstrated in the air over Buffalo recently by H. H. Howell, of the Howell Electric Company, of Buffalo and L. L. Irvine, former American ace and inventor of the Irvine plane shute.

The day of the demonstration was an extremely windy and stormy one. In spite of this fact, a concert was successfully received from Station WOAW, the broadcasting station of the Woodmen of the World, in Omaha, Nebraska, a distance of 1,000 miles. The program of the orchestra of the Rialto Theater, in Omaha, was received. Mr. Howell said the strong wind shifted the machine, cutting them out occasionally, but had it been a better day, there is not a doubt but what the entire program would have been received without the least break in the smoothness, as received on the ground.

The airplane was equipped with an antenna following the length of the plane and the frame of the machine for the ground.

Mexico Spends $200,000 to Lengthen Plant Ranges

MEXICO CITY.—The Mexican Government intends to change the apparatus used in its Radio stations from spark to continuous wave. With the present spark sets, it is reported that the Mexican stations can communicate only with two European stations; one, POZ, at Nauen, Germany and the other, Lafayette at Bordeaux, France. Equipment for four modern transmission stations of continuous-wave type have been ordered from Germany at a cost of $200,000. They will be installed at Mexico City, Merida, Vera Cruz and Tampico. The old spark stations will be transferred to the Islas Marias; LaPaz, Lower California, Guadalajara, Jalisco and Acapulco, Guerro.

Leviathan Sets Three Sea Airwave Records

Operators Received and Sent 75,000 Words on Trial Trip

NEW YORK.—In addition to making world speed records during the trial trip, the Leviathan established three marine Radio records for volume of traffic, range of transmission and reception and for operation of duplex telegraph and telephone system. The Radio operators received and transmitted an estimated total of 75,000 words, or 15,000 a day, the greater volume press dispatches.

From the first night out of Boston the Radio office was swamped with personal, official and press messages. E. N. Pickerill, chief Radio officer, and John R. Irwin, Anthony Tamburino and R. J. Green, operators, worked in four-hour shifts at the keys. In the tropical waters, where the static interfered the most and messages were heard indistinctly on land, three stations were directed to listen in. With more than a hundred correspondents on board, the passengers, among them some of the leading business and financial men of the country, yielded to the press on the question of order of dispatch.

Because of the pressure of business no effort was made on the trial trip to test the Radiophone equipment of the Leviathan. Mr. Pickerill had agreed to call up his wife in New York during the trip but had to give up the plan until the maiden voyage to Europe.

WHO'S WHO IN RADIO INSPECTION SERVICE

Officers Listed to Guard Amateurs Against Fake Representatives

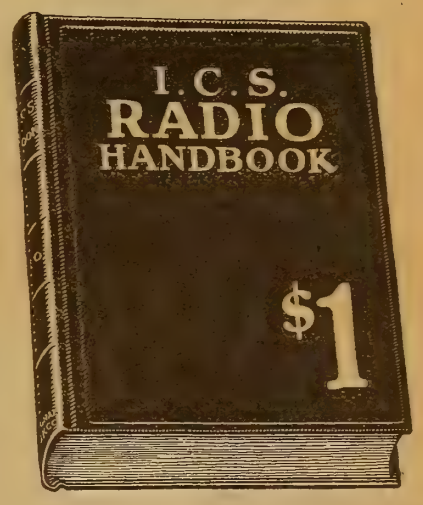
WASHINGTON.—Every amateur and broadcaster should know the officials of the Radio Section of the Department of Commerce in his district, so that he can get advice, keep in touch with new regulations and not be imposed upon by bogus representatives.

At headquarters in Washington, Chief Supervisor of Radio, W. D. Terrell is in charge under Secretary Hoover and Commissioner Carson. Mr. Terrell is assisted by W. E. Downey, Supervisor of Radio. In the nine districts with headquarters as shown, the following men are in charge:

District	Headquarters	Supervisor of Radio
1st	Boston	C. C. Kolster
2nd	New York	Arthur Batcheller
3d	Baltimore	R. Y. Cadmus
4th	Atlanta	R. Y. Cadmus
5th	New Orleans	Theodore G. Deiler
6th	San Francisco	J. F. Dillon
7th	Seattle	O. R. Redfern
8th	Detroit	S. W. Edwards
9th	Chicago	E. A. Beane

When there is more than one tuned circuit, each circuit must be equally tuned to secure resonance.

The ship doctor is having his troubles because of Radio. Not only has he the sick on his own vessel to care for, but he now receives many calls from ships which carry no doctor and send Radios for information.



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THE most complete book of its kind ever published. Written, compiled and edited by practical radio experts of national reputation. Packed with concise, sound information useful to every radio fan—from beginner to veteran hard-boiled owl. Hundreds of illustrations and diagrams to make every point clear. Note this *partial* list of contents:

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STORM PUTS WIRES OUT—RADIO TO AID

CYCLONE DISABLES TELEGRAPH IN ONTARIO

All Land Lines Broken Down in Storm —Election Returns Made Despite Fact

By Albert H. Munday

TORONTO, ONT.—A striking instance of how Radio served a multitude of people when all other methods failed was evidenced recently when Station CFCA received and broadcasted election results of the Ontario provincial elections and in so doing recorded a scientific achievement. Not only did the presentation of results turn out as planned days in advance, but an unforseen event which it seemed would prove a tragedy became a triumph for Radio.

For when a cyclone struck the province just as results were being received, killing two men, injuring five and causing a loss to property of well over a million dollars as well as isolating many of the leading towns, Station CFCA which had been broadcasting, brought its equipment into action to receive, in order to get via Radio the election returns from those sections of the country to which communication by wire had been destroyed. The wires were down throughout the Niagara peninsula and the western parts of Ontario. And in Toronto, in the East, and even in the isolated West, thousands of electors waited for the news. In telegraph rooms the instruments suddenly ceased and in telephone cabinets operators patiently waited at dead sets. Yet the storm's work had been ruthless and it seemed that it would be hours before the necessary communications would be established.

Announcer Asks for Complete Results

But in the silence of the CFCA's Radio studio the problem was being solved. The announcer stood by the microphone. He held a list of the ridings from which no returns had been received. He stood unspeaking for a moment until the operator threw the current on, and then in slow and deliberate phrases he began:

"CFCA, the Radio station of the Toronto Star of Toronto, Canada, is making a request to all those listening in, particularly those in the vicinity of Hamilton and in the southwest part of the province, for results from constituencies that are either missing in whole or in large parts. The telephone wires have been blown to the ground and the only way to get the results is by the Radio."

In less than ten minutes a telephone message was received and the first returns were given by a young fan who had heard of results in one of the stricken districts. After a few minutes other reports were received. The broadcast of the election results proved to be one of the most efficient and quickest methods ever used in Canada.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

So-Called Flewelling Variations

(Submitted by F. S. W., Melrose, Mass.)

Question. I have built a Flewelling receiver and after working with it for some time I believe that I have improved upon the original circuit through the particular arrangement of the parts and the wiring. So far as I can see, the wiring diagram is the same as that published, yet if I change a single part I am afraid that I will lose the effects that I am securing such as Philadelphia, Troy and New York City without any antenna or ground. Can you explain why I am securing such wonderful results?

Answer. For approximately eight months the writer has been endeavoring to tell the public that the Flewelling circuit is not only capable of such results as you are securing but even better. A little comparison might help you to understand why this would be so. Take the case of a plain regenerative receiver. Although there are probably not more than a thousand makes of this type manufactured today that are working at the highest point of effciency, yet any of them which are worthy of the name that they carry will bring in a powerful broadcast station, say 30 miles away without any antenna, and only a ground connection. Again, you will be able to pick them up on a small loop without any outside connection whatever. This distance of course varies with conditions. It is sometimes more or less, but if a plain receiver will do this (and I have seen them do it up to 50 miles away) what may we expect from a super-regenerative receiver? It makes no difference how super-regeneration (so-called) is accomplished, if we can improve on the plain regenerator, we most certainly have a mighty sensitive receiver. The Flewelling receiver stands as an entirely unique method of securing regeneration plus and you need have no fear that you will move about any part of your receiver.

Not only should you secure the reception that you speak about but under favorable conditions you should do much better.

That you may know what to expect when your receiver is properly handled, etc., let me say that the powerful stations in Chicago may be received in your location any night in the week on the ground alone. This has been done over the period extending from November until March, during which time the writer was a resident of your neighboring town. Quite often you will get the Chicago stations, or others, without any ground or antenna and you may carry the set along the street while you are doing it as others have done before you.

A very interesting thing for those who care to experiment is to rewind the coils on their receiver (or preferably, use another set of coils) and try to bring in the 100 meter broadcasting that is being done. Roughly, theory tells us that the super-regenerative circuit, amplifying the shorter waves better than the longer, does so inversely as the square of the wave length, which means that the 100 meter stations would come in just so much easier. Practically, however, we find that the amplification is even greater than this, so you can see that there would be a decided advantage in bringing in these stations.

Let me, however, congratulate you upon the results that you have already received.

Free Competition Now Inaugurated in Sweden

Government to Erect Broadcasting Stations for Radio Company

WASHINGTON, D. C.—The proposed Swedish law for regulating Radiophony in that country recognizes the principle of free competition, with regard to the manufacture of Radio apparatus. It will permit amateurs to build their own sets, requiring only that these shall be constructed in accordance with certain regulations. The Telegraph Department does not contemplate limiting within narrow margins the wave lengths on which amateurs may receive.

In accordance with the proposed law the government is to erect the broadcasting stations and rent them to the Radio Telephony Company, which in turn will receive a rental from receiving stations.

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QUEEN'S VARIOCOUPLERS OR VARIOMETERS	$2.50

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The Week's Advance Broadcast Programs

Tuesday, July 10

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program. "Melodique." Star Orchestra. "The Dwarf." Arthur Fisher, baritone; "In the Garden of My Heart," W. Woods, cornetist; "Espana," Orchestra; "Jogging Along the Highway," Arthur Fisher; "Maytime," Orchestra, "Until the Dawn," W. Woods; Arthur Fisher, baritone; "Berceuse." "Prelude," Orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:30 P. M., Address; 6:45 P. M., Visit to the Little Folks, Dreamtime Lady; 7:20 P. M., Concert, King Haw Entertainers, Musical program, Mixed quartet, numbers, "Moonlight." "Fang." "The Miller's Wooing," "Faning," "One Fleeting Hour," "Lee," "Good Evening"; Baritone solo, "On the Road to Mandalay"; Tenor solo, "Dear Heart"; Contralto solo, "Until"; Violin solos.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert, Mrs. R. E. Oliver, soprano; Ingwald Wicks, violinist; Ruby Wicks, pianist; Ruth Dougherty, whistler; 2:30-3:30 P. M., Musicale, featuring Mrs. R. E. Olive, Ingwald Wicks, Ruby Wicks and Ruth Dougherty; 8:00-10:00 P. M., Christian Timmer and artist pupils.

KSD (Central, 546), 8:00 P. M., Concert. Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, furnished by Lyon & Healy Company; 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, Cope Harvey's Orchestra; June Wilson Thrall, soprano; Martin Nelson, tenor; Lucille O'Brien, soprano; Hilda B. Farr, pianist.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Cahoon and his Texas Hotel Orchestra.

WBZ (Eastern, 337), 7:30 P. M., Concert, W. H. Warner, bass; Grace Bosworth Clarke, contralto; Priscilla Paradis, violinist; **8:45 P. M.,** Bedtime story for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Song recital; 4:30-5:55 P. M., Short talks; Talk on "Affairs of the Heart," Betsy Logan; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Daily message, Vaughn De Leath; "Page Paderewski," Pete Wendling, pianist; "Bonnie," Hugo Frey, singer; "Dirty Hands!" Dirty Face!" Frank Marvin, singer; "Tarantella," Joe Meyer, violinist; Songs, Robert H. Bowers; "Now That I Need You, You're Gone," "Maggie! Yes, Ma'am!" Frank Marvin, singer.

WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Recital, Belcanto Quartet; 11:00-12:00 P. M., Recital, W. A. Green Company.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis, Bellevue Stratford Orchestra; 3:00 P. M., Concert; 3:45 P. M., Recital; 6:30 P. M., Meyer Davis Bellevue Stratford Orchestra; 7:00 P. M., Children's Own Half Hour, Cousin Sue; 8:00 P. M., Boy Scouts Radio Corps; 8:30 P. M., Musical program; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGY (Eastern, 380), 1:00 P. M., Music and address, "The Women of One Hundred Years Ago." Mrs. C. A. Dingman; 7:45 P. M., Musical program, "Polonaise in A Flat," Ellen Waite, pianist; "Before You Came," "Starlight," Edward E. St. Louis, baritone; "Dawn," "The Bird with the Broken Wing," "O Heart, My Heart," "Pearl Adams, soprano; One-Act Playlet, "A Wall Street Romance"; "All for You," "Love Among the Roses," Edward E. St. Louis; "Rhapsody in G Minor," Ellen Waite.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Musical program, Mary Anderson Theater Orchestra; Claudine Yates, violinist; Hazel McClellan, soprano; Zither duets, Louis Wegert, Herman F. Wegert; Mary Belle Bennett, reader.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonewitz, Germantown Theater; 3:00-4:00 P. M., Artists' recital; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talks; Musical program; 10:10-12:00 P. M., dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Musical program, Peerless Dance Orchestra of Northern Kentucky; A. W. Wieve, baritone; "That Lullaby Croon," "I Want the Moon," Helen Hofer, soprano; Address, Powel Crosley, Jr.

WMC (Central, 500), 8:30 P. M., Program furnished by Lions' Club; 11:00 P. M., Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk; A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmenan's Band; 7:00 P. M., Concert, News Orchestra; The Town Crier; C. L. Hoot, bass; Mrs. Roy Smith, soprano; Hazel Taylor, pianist.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee musicale; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe Program.

KSD (Central, 546), 8:00 P. M., Concert, First Infantry Band.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, courtesy Lyon & Healy; Cope Harvey's Orchestra, Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Andrew Chapel, negro Methodist Church jubilee singers.

WLW (Eastern, 309), 8:00 P. M., Musical program, Zither duet, Ruth and Charles Hohe; Sam Ward, comedian, Guitar and mandolin selections, Al Zels and sons; Lesson on swimming, Stanley Braunnger; Zither duet, Ruth and Charles Hohe; "I Love Life," "Tit for Tat," Mary Elizabeth Green, soprano; Guitar and mandolin selections, Al Zels and sons; "Liszt Rhapsody, No. 9," Margaret Conway, pianist; "Concerto No. 9," Patricia and Margaret Conway, violinist and pianist; Mary Elizabeth Green, singer; "Heure Katl," Patricia and Margaret Conway.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

WBZ (Eastern, 337), 7:30 P. M., Concert, Alice Powers, soprano; Willard Clark, baritone; Benjamin Buxton, pianist; "Reminiscences of Other Days," Mrs. Harry G. Kitson; **8:50 P. M.,** Bedtime story for grownups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; **2:00-3:00 P. M.,** Dinner music, Arcadia Cafe Concert Orchestra; 4:30-5:30 P. M., Musical program; **7:30 P. M.,** Bedtime stories, Dream Daddy; **8:00 P. M.,** Musical program, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M. Musical program, Larence Dahmn, pianist; Lena Lanza, soprano; Mary Moody, mezzo-soprano; Dorothy Donaldson, violinist; Dorothy Corbin, reader; **7:00 P. M.,** Recital, Arthur Kraft, tenor; Frank La Forge, pianist.

WFAA (Central, 476), 12:30-1:00 P. M., Musical program, Melba Theater talent.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Meyer Davis Bellevue Stratford Orchestra; **6:30 P. M.,** Meyer Davis Bellevue Stratford Orchestra; **7:00-7:30 P. M.,** Children's Own Half Hour, Cousin Sue

WGY (Eastern, 380), 7:45 P. M., Farmer's Night; "The Husking Bee," Cornhuskers Orchestra; "New Hampshire Home," James Montgomery, baritone; "Farmer Green," John T. Hill, reader; "The Boston Melody," Orchestra; Address, "The American Farmer and His Problem," W. W. Norton; "Old Oaken Bucket," "The Church in the Wildwood," Cowbell Four; Rube skit, "Just Before Train Time at Yaps Crossing"; "In the Shade of the Old Apple Tree," "Juanita," "Ford Song," Cowbell Four; "Barn Dance," Orchestra; "Down on the Farm," Seymour MacWilliams, tenor; "Barnyard Melody," Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, under auspices of Carolyn Pell; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Song recital; 6:00-6:45 P. M., Dinner dance music, baseball scores; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde G. Kerns; 6:30 P. M., Sandman; 8:00 P. M., Recital, Mrs. Frank W. Elliott, organist; 10:00 P. M., Musical program, Lorimer Foley, Ted Sloat, Mae Chambers, Dorothy Smith.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmenan's Band; 7:00 P. M., Concert, News Orchestra; The Town Crier; Vocal program furnished by pupils of John Watt.

Thursday, July 12

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "The Barber of Seville," Star Orchestra; "Homing," Mary Bothwell, contralto; "Viennese Melody," Mannie Roth, violinist; "Sheperd's Hey," Orchestra; "The Song of the Open," Mary Bothwell; "Scenes Poetiques," Orchestra; Mannie Roth, violinist; "Blue Bells Drowsily Ringing," Mary Bothwell; "In the Shadows," Pirouette, Orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45 P. M., Visit to the Little Folks, Dreamtime Lady; 7:00 P. M., "Macbeth," Rev. W. E. Kealy; 7:20 P. M., Concert, Esther Rose James, soprano, Adeline Ricketts Maund, reader, Joseph B. Farman, violinist; Norman L. Rose, accompanist. Musical program, Soprano solos, "I Gathered a Rose," "Sing! Sing! Birds on the Wing," Nutting, "Angels Guard Thee," "Lullaby from "Jocelyn," "Thou'rt Like a Lovely Flower," "Elegie," "Look Down, Dear Eyes," Reading selections.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee musicale; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Concert, Gladys G. Hill, dramatic soprano.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, furnished by Lyon & Healy; 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, courtesy of Salvation Army Staff Band; Cope Harvey's Orchestra; 8:00-8:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, S. D., Head of Dept. of English, Loyola University.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fort Worth artists.

WBZ (Eastern, 337), 7:30 P. M., Concert, Mme. Margarthe Von Mitzlaff, contralto; Mrs. Alice P. Huck, pianist; Ruth Dumond, soprano; N. J. Feriole, tenor; Pauline Cebrelli, pianist; **8:50 P. M.,** Bedtime story for grown-ups, Orison S. Marden.

WDAP (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Arcadia Cafe Concert Orchestra; 4:30-5:55 P. M., Talk, Betsy Logan; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Why Be an American?" B. E. L. Saner; 8:30-9:30 P. M., Hawaiian music, Grace and Edith MacDowell; 11:00-12:00 P. M., Musical program, under auspices of Bush & Gerts Piano Company of Texas.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; **3:00 P. M.,** Concert, Strawbridge and Clothier Male Quartet; **7:00 P. M.,** Children's Own Half Hour, Cousin Sue; **8:00 P. M.,** Musical program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Alvin Marcus and orchestra; Sunday School Lesson; Welfare talk, Mrs. Chas. B. Semple.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theatre; 3:00-4:30 P. M., Musical program; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00-9:00 P. M., Musical program; 9:00-9:30 P. M., Organ recital, Karl Bonawitz.

WJAX (Eastern, 390), 8:00 P. M., Concert, Hotel Cleveland Orchestra.

WLW (Eastern, 309), 10:00 P. M., Musical program, Woody Dance Orchestra; Ed Decker, tenor; "When Song is Sweet," "Little Gray Home in the West," Elizabeth Jones, soprano; "At Dawning," "Calm as the Night," Cincinnati Instrumental Trio; Comedy, "He Said and She Said"; "The Swan," "March Militaire," Trio; Woody Meyer's Dance Orchestra.

WMC (Central, 500), 8:30 P. M., Concert, Chisca Philharmonic Orchestra, Clara Ahern, director.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; **5:45 P. M.,** Chimes concert; **6:30 P. M.,** Sandman.

WOO (Eastern, Daylight Saving, 509), 1:00 P. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45 P. M., Organ recital; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden; **8:30 P. M.,** Vocal selections; **8:45 P. M.-12:00,** Dance music, Hotel Adelphia Roof Garden Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmenan's Band; **7:00 P. M.,** Concert, News Orchestra; The Town Crier; Katherine Daniel, soprano; Edward Kelly, tenor.

(Continued on page 9.)

Wednesday, July 11

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Poet and Peasant," Star Orchestra; "Chant Triste," Jaques Sterin, cellist; "Loves a Merchant," Muriel Lomax, soprano; "Valse Bluette," "Entrance of the Boyers," Orchestra; "Berceuse," Jaques Sterin; "Amina," Orchestra; Muriel Lomax; "In Love," Orchestra; "O Lovely Night," Muriel Lomax; "Vivenne," Orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Little Symphony Orchestra, Victor Saudek director; 6:30 P. M., Review (continued) of J. M. Barrie's "What Every Woman Knows," Marjery Stewart; 6:45 P. M., Visit to the Little Folks, Dreamtime Lady; 7:20 P. M., Concert, Little Symphony Orchestra.

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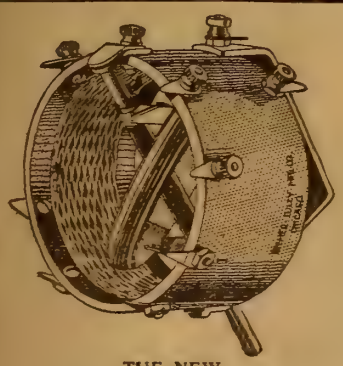

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Tuscola, WDZ
Urbana, WRM
Zion, WCBD

Indiana:
Anderson, WABC
Brookville, WSAL
Evansville, WAOU
Greencastle, WLAX
Huntington, WHAY
La Porte, WRAF
Marion, WLAQ
Mishawaka, WOAO
Muncie, WJAF
South Bend, WABJ, WGAZ
West Lafayette, WBAA

Iowa:
Ames, WOI
Boone, KFGQ
Burlington, WIAS, WLAT
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Dubuque, WQAK
Fort Dodge, KFER, WEAB
Gladbrook, KFIK
Iowa City, WHAA
Lamoni, KFFV
Le Mars, KFCY, WIAU
Marshalltown, KFJB
Newton, WIAH
Oskaloosa, KFHL
Sigourney, WOAD
Sioux City, WEAU, WHAE
Vinton, WIAE
Waterloo, WHAC, WMAR, WRAN

Kansas:
Anthony, WBL
Atwood, WEAD
Beloit, WPAR
Cheney, KFGP
Emporia, WAAZ
Hutchinson, WLAS
Iola, KFID
Liberal, WMAG
Lindsborg, WDAD
Louisburg, KFIL
Manhattan, WTG
Marion, WRAD
Parsons, WOAJ
Topeka, WJAQ, WPAM
Wichita, KFHI, WAAP, WEAH, WEY

Kentucky:
Bowling Green, WNAB
Frankfort, WOAK
Lexington, WQAH
Louisville, WHAS WLAP
Paducah, WIAR

Louisiana:
Alexandria, KFFY
Baton Rouge, KFGC
New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WWL
Shreveport, KFDX, KFHF, WGAQ

Maine:
Bangor, WABI, WPAY
Houlton, WLAN

Maryland:
Baltimore, WCAO, WEAR, WKC, WNAV
Frostburg, WPAQ

Massachusetts:
Boston, WNAC
Dartmouth, WMAF
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WABK, WCN, WDAS

Michigan:
Ann Arbor, WMAX, WQAJ
Berrien Springs, KFGZ
Dearborn, WWJ
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Escanaba, WRAK
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Rodgers, WCAF
Saginaw, WABM, WIAW

Minnesota:
Baudette, KFGY
Duluth, WJAP, WMAT
Hutchinson, WFAN
Minneapolis, KFDZ, KFEX, WBAD, WBAH, WCAS, WLAG, WRAH
Moorhead, WPAU
Northfield, WCAL
St. Cloud, WFAM
St. Paul, AV7, WAAH

Missouri:
Butler, WNAR
Cameron, WFAQ
Cape Girardeau, WSAB
Columbia, WAAN
Independence, WPAG
Jefferson City, WOS
Joplin, WHAH
Kansas City, WDAF, WHB, WMAJ, WOQ
Marshall, WJAT
Moberly, KFFP
Rockport, WMAD
St. Joseph, KFHD, WEAK
St. Louis, KFEZ, KFGJ, KFIB, KSD, WCK, WEB, WEW, WMAY, WRAO
Springfield, WIAI, WKAS, WQAB
Tarkio, WIAT
Webster Grove, WOAL

Montana:
Billings, KFCH
Bozeman, KFDO
Butte, KFAP
Great Falls, KDYS
Havre, KFBB

Nebraska:
David City, WRAR
Fremont, WOAE
Grand Island, KFJA
Hastings, WQAY
Kearney, KFHP
Lincoln, KFDU, WFAV, WJAB, WKAC, WMAH, WQAP
Norfolk, WJAG
Oak, KFEQ
Omaha, KFCZ, KFFX, WAAW, WIAK, WNAL, WOAW, WOU, WOV
Rushville, WEAV
Tecumseh, WTAU
University Place, WCAJ
Utica, KFGV
York, KFDR

Nevada:
Reno, KDZK
Sparks, KFFB

New Hampshire:
Laconia, WKAV

New Jersey:
Camden, WRP
Gloucester City, WRAX
Jersey City, WNO
Moorestown, WBAF
Newark, WAAM, WBS, WOB, WRAZ
N. Plainfield, WEAM
Ocean City, WIAD
Paterson, WBAN
Trenton, WMAL, WOAX

New Mexico:
State College, KOB

New York:
Albany, WNJ
Amsterdam, WPAS
Buffalo, WGR
Canton, WCAD
Cazenovia, WMAC
Ithaca, WEAI
Lockport, WMAK
Newburgh, WCAB
New York, KDOW, WBAY, WDT, WEAF, WJX, WJY, WJZ, WLAW, WSAP
Poughkeepsie, WFAF
Rochester, WABO, WHAM
Ridgewood, WHN
Schenectady, WGY, WRL
Syracuse, WDAI, WFAB, WLAH, WNAC
Tarrytown, WRW
Troy, WHAZ
Utica, WSL
Waterford, WFAG

North Carolina:
Asheville, WFAJ
Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

North Dakota:
Fargo, WDAY, WPAK
Grand Forks, WOAB
Mayville, KFHU, WRAC
Wahpeton, WMAW

Ohio:
Canton, WWB
Cincinnati, WAAD, WHAG, WIZ, WLW, WMH, WSAI
Cleveland, KDPM, WHK, WJAX
Columbus, WBAV, WCAH, WEAO, WMAN, WPAL
Dayton, WAI, WABD, WJAJ
Fairfield, WL2
Granville, WJD
Greenville, WCBB
Hamilton, WBAU, WRK
Lebanon, WPG
Lima, WOAC
Marietta, WBAW
Newark, WBBA
Sandusky, WABH, WQAF
Springfield, WNAP
Steubenville, WTAK
Stockdale, WJAK
Warren, WLAZ
Washington C. O., WGAX
Wooster, WGAU
Youngstown, WAAY, WDBF

Oklahoma:
Ardmore, WOAA
Chickasha, KFGD
Norman, WNAD
Okemah, WKAK
Oklahoma City, WKY
Okmulgee, WPAC
Tulsa, WGAF, WLAL

Oregon:
Arlington, KFGL
Baker, KFDA
Corvallis, KFDJ
Eugene, KFAT
Hillsboro, KFFO
Hood River, KFHB, KQP
Marshfield, KFBH
Medford, KFAY
Pendleton, KFFE
Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW
Salem, KFCD

Pennsylvania:
Allentown, WCBA
Altoona, WGAW
Clearfield, WPI
Easton, WMAP
Erie, WOAV
Grove City, WSAJ
Harrisburg, WABB
Johnstown, WTAC
Lancaster, WDBC, WGAL
McKeesport, WIK
Parkesburg, WQAA
Philadelphia, WCAU, WDAR, WFI, WGL, WIP, WNAT, WOO, WWAD
Pittsburgh, KDKA, KQV, WCAE, WJAS
Reading, WBBD, WRAW
Scranton, WQAN, WRAY
State College, WPAB
Villanova, WCAM
Wilkes-Barre, WBAX, WNAH

Rhode Island:
Cranston, WKAP
Edgewood, WEAG
Providence, WEAN, WJAR, WRAH, WSAD, WTAG

South Carolina:
Charleston, WFAZ, WNAQ, WOAH
Clemson College, WSAC
Greenville, WQAV
Orangeburg, WGAM

South Dakota:
Brookings, KFDY
Platte, KFIJ
Rapid City, WCAT
Sioux Falls, WFAT
Vermillion, WEAJ
Yankton, WNAX

Tennessee:
Knoxville, WNAV
Lawrenceburg, WOAN
Memphis, WKN, WMC

Texas:
Abilene, WQAQ
Amarillo, WDAG, WRAU
Austin, WCM, WNAS
Beaumont, WMAM
College Station, WTAW
Dallas, KFFZ, WDAO, WFAA, WRR
El Paso, WDAH, WPAT
Fort Worth, WBAP
Galveston, WHAB, WIAC
Houston, WCAK, WEAY, WEV, WRAA, WSAV
Laredo, WWAX
Orange, KFGX, WKAL
Plainview, WSAT
Port Arthur, WFAH
San Antonio, AS6, WCAR, WAOI
Stanford, WOAZ
Tyler, WOAF
Waco, WJAD, WLAJ, WWAC
Wichita Falls, WKAF

Utah:
Ogden, KFCP
Salt Lake City, KDYL, KZN

Vermont:
Bellows Falls, WLAK
Burlington, WCAX
Springfield, WQAE

Virginia:
Arlington, NAA
Blacksburg, WEAE
Fortress Monroe, WNAW
Portsmouth, WOAQ
Westhampton, WQAT

Washington:
Aberdeen, KNT
Bellingham, KDZB
Everett, KFBL
Lacey, KGY
Neah Bay, KFHH
Pullman, KFAE
Seattle, KDZE, KDZT, KFHR, KHQ, KJR, KTW
Spokane, KFDC, KFIO, KFZ
Tacoma, BEI, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFIQ

West Virginia:
Clarksburg, WHAK

Wisconsin:
Beloit, WKAW
Kenosha, WOAR
La Crosse, WABN
Madison, WGAY, WHA
Milwaukee, WAAK, WCAY, WHAD, WIAO
Neenah, WIAJ
St. Croix Falls, WRAL
Superior, WFAC
Waupaca, WPAH

Wyoming:
Casper, KFDF
Douglas, KFEV
Laramie, KFBU

Alaska:
Fairbanks, WLAY

Hawaii:
Honolulu, KDYX, KGU, KYQ
Libue, KFHS

Porto Rico:
San Juan, WKAQ

Canada:
Calgary, CHBC, CFAC, CFCN, CJCY
Edmonton, CFCK, CJCA
Fort Frances, CFPC
Halifax, CFCE, CJCS
Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCX, CHCS, CJGGC, CKQC
Montreal, CFCF, CHCX, CHYC, CJBC, CKAC
Nelson, CJCB
Ottawa, CHXC, OA
Regina, CKCK
St. John, CJCI, CKCR
Toronto, CFCA, CFTC, CHCB, CJCD, CJCH, CJCN, CJSC, CKCE, CKKC
Vancouver, CFCB, CFYC, CHCA, CJCE
Winnipeg, CHCF, CKCB, CKY, CKZC, CJNC

Cuba:
Havana, PWX
Tuinucu, 6KW

RADIO PATENT SURVEY

(Continued from page 4)

from selling receivers employing electron tube detector and amplifier circuits. Suit was also brought by the Radio Corporation against the same defendants under Langmuir patent 1,282,439, alleged to cover the grid leak; Lowenstein patent 1,231,764 on the Negative C battery; and Mathes patent 1,426,754, covering a resistance connected in the input circuit of a tube with a battery related therewith for bringing the grid to a different potential than the filament.

Sues Under Assignments

The Radio Corporation obtained the right to sue these defendants by a special assignment from the General Electric Company, owners of the Langmuir patent; and under the Lowenstein patent by an assignment from the American Telephone and Telegraph Company. The Western Electric Company assigned the Mathes patent to the American Telephone and Telegraph Company on November 11, 1922, and on November 13, 1922, the American Telephone and Telegraph Company transferred the right to sue these defendants to the Radio Corporation. The outcome of these suits will be of utmost importance to the industry and will decide whether anyone other than the Radio Corporation is entitled to vend a Radio receiving set.

Supreme Court Gives Setback

The only real setback experienced by the Radio Corporation since the series of suits was initiated occurred on February 19, 1923, when the Supreme Court of the United States handed down a decision in the Crown Die vs. Nye Tool Company suit, which meant that the Radio Corporation did not have the right to sue for infringement or injunctions against the sale of alleged infringements of patents purely assigned or licensed to them. In such a suit, the Supreme Court ruled, the patentee himself must be the plaintiff or a co-plaintiff in the suit. However, the R. C. A. has been able in most cases to secure the co-operation of the actual inventors in its multitude of suits, so that the merry march of legal procedure still continues.

List of Suit Victims

The art has witnessed the Radio Corporation file suits under the Fleming valve patent 803,684, DeForest electron tube amplifier patent 841,387, and the DeForest grid patent 879,532, against literally dozens of small defendants. The list of victims includes some well known names, such as: A. F. Scheff; A. E. Reymann; S & N Radio Supply Company; Schweitzer & Schweitzer; M. A. Modell, et al.; John Firth & Company; Wireless Appliance Corporation; Independent Electrical Supply Company; Greenfield & Greenfield Radio Guild, Inc.; Federal Engineering Corporation and I. Gottlieb; all in the United States Court for the Southern District of New York, and A. Rosasco, et al., in the United States District Court for the Eastern District of New York.

The industry has also witnessed the Wireless Specialty Apparatus Company, now a subsidiary of the Radio Corporation, file suits against the Freed-Eiseman Radio Corporation under the Pickard crystal detector patent Re. 13,798, the Pickard cat whisker patent 1,104,073, and the Miessner cat whisker patent 1,104,065, including a similar suit against the Pinkerton Company and the Brinnell Company. Suits were also filed by the Wireless Specialty Apparatus Company against F. A. D. Andrea and the Magnus Electric Company, both in the United States District Court for the Southern District of New York, under the Pickard pyrite detector patent 933,263, the Miessner cat whisker patent 1,104,065, the Pickard cat whisker patent 1,104,073, the Pickard crystal detector patents 1,137,714, 1,225,852 and Re. 13,798. The Specialty Company has also sued the Pacent Electric Company and R. H. Macy and Company under a number of crystal detector patents in the United States District Court for the Southern District of New York.

Freed-Eiseman Gives Battle

The Freed-Eiseman Radio Corporation filed counter suit in the New York Supreme Court against the Wireless Specialty Apparatus Company for an injunction pendente lite to restrain the specialty company from publishing to the trade warnings of patent infringement listing a great number of patents, whereas the subject matter of only a few of the patents warranted the attention of the trade. Freed-Eiseman were successful in this case both in the Lower Court before Judge O'Malley, and in the Appellate Court.

(TO BE CONTINUED)

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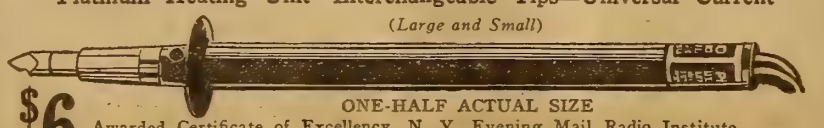
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With No. 502 Diamond Wound Coil, as shown in illustration.....$13.00
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CHICAGO

ADVANCE PROGRAMS

(Continued from page 7)

Friday, July 13

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Faust." Star Orchestra; "Break O' Day," Maud Parsons, contralto; Harry Adaskin, violinist; "Intermezzo" from "Naila," Orchestra, "Prohibitive Music," Maud Parsons; "Passepied," Orchestra; Harry Adaskin, violinist; "My Love and I," Maud Parsons; Selection from "The Lady of the Slipper," Orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:30 P. M., Farmer's Evening. Special farm program prepared by the National Stockman and Farmer; 6:45 P. M., Visit to the Little Folks, Dreamtime Lady; 7:20 P. M., Concert, Students from the Charles Le Sueur Studio.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee musicale, arranged by the San Gabriel Chamber of Commerce, featuring the world-famous "Mission Play"; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., Program arranged by the San Gabriel Chamber of Commerce.

KSD (Central, 546), 8:00 P. M., Opera, "The Gypsy Baron," Municipal Open Air Theatre.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 10:00-11:30, Musical program, Midwest Music House; Cope Harvey's Orchestra; Wendell W. Hall, KYW's Music Maker.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Rainbow Girls' Chorus.

WBZ (Eastern, 337), 7:30 P. M., Concert, St. John's Glee Club; 8:50 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Arcadia Cafe Concert Orchestra; 4:30-5:55 P. M., Musical program; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00 P. M., Special features from Stanley Theatre; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Talk, "Esperanto," courtesy of the 16th Annual Esperanto Convention; Songs, Sara Segalowitz; Songs, Frank Marshall; Novelties, Harry Holliday; 11:00 P. M., Musical program, "Mad," "Runnin' Wild," "Seven or Eleven," Sherwood Orchestra; Songs, Vaugh De Leath; "Wonder If She's Lonely, Too," "Morning Will Come," "Red Head Gal," "Carolina Mammy," Orchestra; Songs, Vaugh De Leath; "The Thief," "You Gave Me Your Heart," "Yes, We Have No Bananas," Orchestra.

WFAA (Central, 476), 12.30-1:00 P. M., Address, Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Mrs. Clyde Magee, reader, and assisting musicians.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Concert; 6:30 P. M., Meyer Davis Bellevue Stratford Orchestra; 7:00 P. M., Children's Own Half Hour, Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Musical program, "The Spinning Wheel," "The Butterfly," Jennie Gurkin, pianist; "On the Sunset Line," Dorothy Golub, reader; "Mazurka," Samuel Gurkin, violinist; "Lithuanian Song," Elizabeth Reohr, sporano; "Rondo Capriccioso," Jennie Gurkin; Address, "American 'Common Sense'", Charles Jarvis, Jr.; "Robin, Robin, Sing Me a Song," "There's A Lark In My Heart," Elizabeth Reohr; "Bolero," Samuel Gurkin, violinist; "Jimmie and the Brand New Baby," Dorothy Golub; "Ashes of Roses," "Serenade," Elizabeth Reohr; "Cradle Song," "Traumerei," Jennie Gurkin; 10:30 P. M., Musical program, "Soldier's Blood," "Dolgeville High School Orchestra; "Poet and Peasant," Orchestra; "Life," Mrs. Albert M. Van Denberg, soprano; "Thoroughbred," Orchestra; "Air Varie," Sylvan De Lucco, clarinetist; "Old Folks at Home and in Foreign Lands," Orchestra; "Andante and Finale Movements," from "Second Concerto," Daniel Green, Pianist; "Zampa," Orchestra; "Love Sends a Little Gift of Roses," Mrs. Albert M. Van Denburg; "Entrance of the Gladiators," "Stars and Stripes Forever," Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, under auspices of Mrs. John Harmon, Jr.

WIP (Eastern, Daylight Saving, 509), 3:00-4:30 P. M., Dance music; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilcut; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., Concert, News Orchestra; The Town Crier; Concert, Schmeman's Band.

Saturday, July 14

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "The Merry Wives of Windsor," Star Orchestra; "At Dawn," Naomi Wedd, soprano; "Melodie," Jaques Sterin, cellist; "Pizzicato Polka," Orchestra; Naomi Wedd, soprano; "Prize Song," from "The Meistersingers," Orchestra; "Salut D'Amour," Jaques Sterin; "Songs My Mother Taught Me," "Slumber Boat," Naomi Wedd; "Wiener Blut," Orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Westinghouse Band, T. J. Vastine, Director; 6:45 P. M., Visit to the Little Folks, Dreamtime Lady; 7:20 Concert, Westinghouse Band, T. J. Vastine, Director, Mrs. Nellie Sheets, contralto, Olive Carnahan, soprano.

KHJ (Pacific, 395), 2:30-3:30, Matinee musicale; 6:45-7:30 P. M. Children's Hour; Bianaca Blackburn, reader; 8:00-10:00 P. M., De Luxe Program.

KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater talent.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, Selections on Kimball Pipe Organ; Cope Harvey's Orchestra; 8:00-8:35 P. M., "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum, leader of the Barnum Bible Class of First Methodist Church.

WBZ (Eastern, 337), 7:30 P. M., Bastile Day, Program by Professor J. Ernest Phillle of St. Joseph's Church; Concert, Chorus of St. Joseph's Church; 8:50 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Talk, Vaughn De Leath; Hawaiian music, White Way Trio; Songs, Augusta Spett.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton; 8:30-9:30 P. M., Vocal program, pupils of Marie Altona; 11:00-12:00 P. M., Violin recital, Walter J. Fried with assisting musicians.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Blue Bird Orchestra; Reading, "An Interesting Historical Episode."

WMC (Central, 500), 8:30 P. M., Concert, Brittlings Cafeteria Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30 P. M., Dance Program, P. S. C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30 P. M., Concert, Schmeman's Band.

Sunday, July 15

WBZ (Eastern, 337), 7:30 P. M., Church services, conducted by Rev. G. Pitt Beers, pastor of the Park Memorial Church.

WFAA (Central, 476), 2:30-3:30 P. M., Radio Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church; 9:30-10:00 P. M., Musical program, East Dallas Presbyterian Church; 10:00-11:00 P. M., Concert, Orchestra from East Dallas Presbyterian Church.

WGY (Eastern, 380), 9:30 A. M., Church services, First English Lutheran Church; Sermon, "Hidden Light," Rev. Herbert D. Shimer, First English Lutheran Church; 6:30 P. M., Church services, First English Lutheran Church; Sermon, "The Two Awakenings," Rev. Herbert D. Shimer.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church Services, Calvary Baptist Church, Sermon, Rev. T. J. Barksdale, pastor; 4:00-5:00 P. M., Concert, under auspices of Isabelle Wetzelberger.

WMC (Central, 500), 11:00 A. M., Church services, St. Mary's Episcopal Church, Dean H. Noe; 4:00 P. M., Memphis-Chattanooga baseball game.

WWJ (Eastern, 517), 11:00 A. M., Church services, St. Paul's Episcopal Cathedral; 2:00 P. M., Concert, News Orchestra; 3:00 P. M., Concert, Schmeman's Band.

Monday, July 16

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; 2:00-3:00 P. M., Song recital; Arcadia Cafe Orchestra; 4:30-5:55 P. M., Special musical features; Talk, "Affairs of the Heart," Betsy Logan; 7:30-8:30 P. M., Bedtime stories, Dream Daddy.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Song and piano recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00-7:30 P. M., Children's Own Half Hour, Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Swing Song," Music Study Club Chorus; "First and Second Movements," "Seventh Concerto," Gladys Terriault, violinist; "Diamond Cut Diamond," Helen M. Abbott, reader; "Love Sends a Little Gift of Roses," "Just A-Wearying For You," Anna D Aston, soprano; "Bagatelli," "Danse Negre," "Polonaise," Ruth S. Hardy, pianist; "Still as the Night," "Until," Mildred C. Schilling, Marvin J. Roeck, vocal duet; "The Bobolink," "If We Only Understood," " In 1822," Helen M. Abbott, reader; "The Land of the Sky Blue Water," "Rose in the Bud," Mrs. Frank Catricala, soprano; "The Bee," "Sonata in A Major," First Movement," Gladys Terriault; "Eleanor," "For You," William A. Scott, tenor; "Bendemeer's Stream," Music Study Club Chorus; "Concerto in A Minor," Ruth S. Hardy.

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Song recital; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Musical program, Roger Hill Dance Orchestra; "It Was Not Thus To Be," Walter Phillips, baritone; Selections by orchestra; "Nola," "Caprice Espagnolo," Anna Knova, pianist; "When Pa Pays the Monthly Bill," Catherine McPherson, reader; Xylophone solo, "Russian Rag," Anna Knova; "To Spring," "Rhapsody No. 11," Catherine McPherson, pianist.

WMC (Central, 500), 8:30 P. M., Concert, Hotel Gayoso Orchestra, Gaspar Pappalardo, director.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., WOO Orchestra, Robert E. Golden, director; 9:30 P. M., Organ recital, Mary E. Vogt; 10:30 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra, Walter Miller, director.

SPECIAL OFFER LIST

(Continued from page 2)

mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A).

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Decima 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.).

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Decima Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 2 Ratio.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Decima 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier); Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B.

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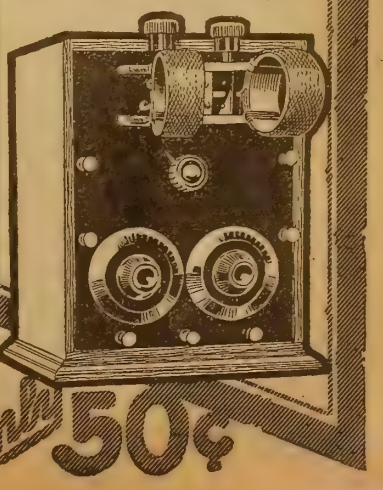
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Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. VI Chicago, Saturday, July 14, 1923 No. 1

Interference Located

The Radio Amateur Is at Last Vindicated

OFFICIAL observations made by engineers of the Bureau of Standards for a period of seven months, and still being continued today, point to the fact that it is not the amateur that causes most of the interference to reception of concerts from broadcasting stations, but it is the broadcasting stations themselves.

Centering their observations on two broadcasting stations—one KDKA at Pittsburgh and the other WLB at Minneapolis—the engineers sought to discover the effect their messages had on nearby and distant receiving stations. They conclude that "the reliability of signals from a station first decreases and then rises as we increase the distance from that station."

In their reports from between 200 and 1,000 receiving stations, monthly, the engineers were able to classify the sources from which interferences were being experienced. After tabulating these sources they showed that an average of 30.9 per cent of the interference came from other broadcasting stations, while amateurs with spark sets furnished 3.5 per cent of the trouble, and those with C. W. sets only 2.3 per cent.

Simple Receiving Sets

Very Few Essentials Required in Circuits

WHAT are the absolute essentials of a Radio receiving set? The basic requirements for making Radio waves audible are two; an instrument to rectify the incoming waves and a receiver to turn the electrical energy into sound. The latter device is familiar to everyone. The rectifying is accomplished by a vacuum tube and apparatus used in conjunction with it, or in the simpler sets by a crystal of some suitable mineral, contact being made with a fine wire or metal surface.

While a detector and telephone receiver will receive the signals of a powerful station close by, even without an antenna, reception over moderate distances requires both the antenna and some device for tuning to the incoming wave. The variometer, the variocoupler and the variable condenser are among the more familiar instruments for tuning.

The simplest form of practical receiving apparatus is a crystal set which contains a detector, a coil of wire with a slider or switch to vary the number of turns in use and a small fixed condenser. This set with a normal antenna will receive broadcasting up to a distance of ten or fifteen miles. Occasionally stations several hundred miles away are heard on such sets using an outdoor aerial.

Vacuum tubes sets may be classified into groups such as non-regenerative, regenerative, Radio frequency and super-regenerative sets.

The circuit of the simple non-regenerative set is similar to that used with the crystal set, the chief point of difference being the use of the vacuum tube detector. The range of this set is somewhat greater than that of a crystal set and the inconvenience of adjusting the crystal is eliminated.

A large majority of the popular receiving sets today are of the regenerative type. They vary widely in detail, but all employ some variation of the feedback circuit developed by Major Armstrong. The Copp, Reinartz and many other popular circuits belong in this class. Distances exceeding 1,000 miles frequently are covered by the various regenerative receivers. The consistent range is several hundred miles.

Radio frequency amplification forms the basis of the third class of receivers mentioned. This form of amplification makes reception possible over great distances even with a loop or indoor antenna. Sets using Radio frequency amplification give remarkable results when properly handled, but it is difficult for the novice in Radio to obtain the same results as does the expert operator. Reflex and neutrodyne circuits come in the Radio frequency class, but often are satisfactory, and simple to operate.

RADIO INDI-GEST

SOCIETY NOTES OF WALLA WALLA

WALLA WALLA.—Rozee, author, Jennie Jerome and Goofey, co-authors of "In Search of a Kanoofis", left here last week on the annual weekly mail boat following their successful termination of the Kanoofis hunt. The Kanoofis, a beautiful thing, was boxed up in a gold-plated cage and will be exhibited in the States at all of the 336,782,195 National Radio Exhibitions, due to be held ere 1924 yawns. The departure was touching. The three were broke, so it was necessarily touching, very. Willie Bazoo, native basso (picture herewith), sang a tear-bringing farewell, entitled, "Properly Adjust Your Grid Bias With Your Potentiometer M'dear, For I'll Broadcast to You on Electromagnetic Waves When You're Gone." (A trust song. Wotta we care about the trust?) The picture was taken of Willie just as he threw the dice on his parting shot. He parted with everything he had but it's warm in Walla Walla.

Willie Bazoo

The Walla Walla Chamber of Commerce is planning a drive for a greater Walla Walla. Of course, the Indi-Gest broadcasting station will come in for a large part of the advertising campaign. C. F. Jenkin's invention, Radio Movies, will be used to exploit and broadcast the beauties and grace of the unbleached and uneducated youthful maiden dancers. Sweet Cookie, premiere danseuse, is depicted. (Well what do you know about that?) Although she is here shown greatly reduced, she was formerly much larger but took Indi-Gest's broadcast weight-dissolving exercises. Sweet Cookie attributes all her grace to Al Brown, who drew her.

Sweet Cookie

The contest for a name for the Indi-Gest plant is growing very heated. Natives of Walla Walla are betting every bead on various contributors. Brambdin Bray, announcer, wants more names. Send 'em in now before the Christmas rush.

SURPRESSED DESIRE

We oft'times have our secret desires
And little dreams of life. *(Do tell.)*
However, I've no thoughts of fame;
Too late—I have a wife. *(Lost hope.)*

But just the same I have one wish
Although I am not single, *(Oui, oui.)*
I hope some day to accomplish the
Last line of this jingle. *(Drive on.)*

For four long weeks I've waded through
A would-be poem, balmy, *(Coo, coo.)*
That traveled to the South Sea Isles
From the land of the salami. *(Hot dog.)*

I am a simple sort of man,
A peace loving goofus, *(How quaint.)*
But I would like to kick the pants
Of the guy that wrote "Kanoofis." *(Zowie!)*

ROTOR E. GAPP.

Clipping from the New York Evening Mail tells just how careful Miss Eleanor Fitzgibbons is of her brand new pet flock of Jersey cows. Sez it, "Absolute cleanliness and Radio concerts are other items which go to make them (the cows) contented." Never would we wish to dispute Miss Fitzgibbons' reference to the cows, but we say that this sounds like the opposite sex to us.

A-B-C Lessons for Indigest Beginners

Chapter IV—A Brass Band Sleuth, So to Speak

BY GOSH

DIS for detector,
(Not of the Sherlock brand)
That changes Radio wavelets
Into "Skinktown's Marine band."

We'd Say, "Well, Georgie, How's Things?"

Indi: Do you think there must be blood on the moon when Station WOC broadcasts material like this?

SANDMAN (enthusiastically):

"Now, little boys and girls, Betsy Ross heard a knock and she opened the door and there stood —why, whom do you suppose?—Why, there stood George Washington! Now, little boys and girls, what would YOU do if you heard a knock and opened the door and saw George Washington standing there——"

Yes, little boys and girls, what WOULD you do? I imagine that his presence on MY front porch would make me well——er——nervous, to say the least!

LE MOQUEUR.

How to Transform a Transformer

Dear Indi: (For your Kinks Department.) Having been troubled with an incessant induction for several weeks from a nearby leaky power transformer, I found I could eliminate the racket by placing a stick of picric acid behind said transformer and igniting same. This method is very effective.

P. S.: Excuse me, I forgot to enclose $1.00. Maybe I can send it next Friday. Please send me a Kanoofis.

EDDY CURRENTS.

Here lies Francis
Alagonquin Kline.
Who plugged in his phones
On a high-voltage line.

No, We Need Something Stronger

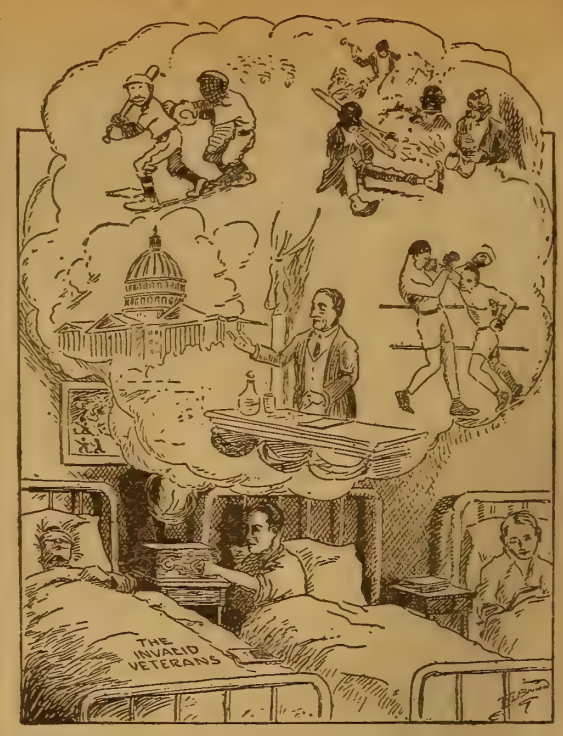
My Dear Sir: Having noted your anxiety over a name for your super bum broadcasting station at Walla Walla, I hasten to submit all the words in the unabridged edition of Webster's great work. This surely ought to win the grand prize with ease.

AUNT ENNA.

We'll Bite. What Is It?

Dear Indi: Hah! I have you at last. You thought you could get away with something when you let Jennie Jerome end the "Kanoofis" hunt by finding it in the form of the silk thread off the corner of a dark red Turkish towel. BUT Turkish towels have no silk threads. I know as a result of many Saturday night experiences. Now, tell the truth. What IS a Kanoofis?

ALOGONQUIN TONSILS III.



Condensed

By DIELECTRIC

Another broadcasting station has been flattered in having a Wisconsin infant use their call letters to form the name Wallace Gordon Yadon. The initial letters will be recognized as associated with the popular Schenectady station WGY. In the south, not long ago, the call letters of a well-known station were used in naming a little girl "broadcaster." In this case, it will probably be either an announcer or Radio operator. What has the station given its name-sake?

In the case of a shortage of engineers in some railway work, a Radio message broadcast recently brought a supply of college men who are pursuing courses in engineering. This is a pretty sure way of reaching those you are seeking, for the news is quickly spread and even though you are not the one fitted for the work your interest in the broadcast will lead to telling others who may not have receiving sets. It is surprising how seldom Radio is resorted to for this emergency when it is considered how effective it is.

In carrying on chess games between passengers aboard two ships nothing startling has been disclosed, except that the games may be called on account of losing contact with each other. This same form of pastime has been indulged among Radiophans ashore and has given the impetus to arranging contests of debating, etc., which not only enlarges the field of sport but carries it to the most modern arena—the expanse of air. It seems to me entirely possible that we shall learn of a new game to be played by certain passengers coming to our shores from abroad, which will consist of large paunches and various shaped bottles; the object being to empty as many of the latter as possible into the former before reaching the three mile limit.

It is yet entirely too early to presume a prediction that vertical antennae prevent static interference acceptable as fact. From the result attained by two men in California, who raised an antenna vertically by means of a kite, hope may be given to despondent summer fans. Experts have been working hard to find a real way in which the annoyance of static might be eradicated. None genuine has yet been found. We will await further experiments with the vertical idea before tearing down the aerials now in use.

Any fan living within a few doors of a single circuit operated by a new "bug" will readily appreciate the effectiveness of scrambled speech for preventing clear reception. The A. T. & T. made the announcement that they had successfully carried on experiments in transmitting messages unintelligible to any save the one with a set capable of unscrambling them. Privacy may be had, but at what expense? That is the point which most concerns us just now.

Many a watch, some grown to clock-like proportions and others still in their midgetcy, is unsheathed before the receiving set and made to conform with the time sent out from Arlington twice daily. This is an important feature in broadcasting and eliminates the necessity of having a wave length in tune with the naval station. Farmers especially profit from the broadcasting stations relaying the time signals. In Paris it has become impossible to transmit time accurately because of the vibrations in the city upsetting the delicate adjustments of the instruments. Hence they must take time to transport time to a less disturbing location.

First Steps for Beginners in Radio

Chapter IX—Radio Frequency Amplification

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter X—Audio Frequency Amplification.
Chapter XI—How Super Regeneration Is Accomplished.
Chapter XII—Reflex Circuit Operation.
Chapter XIII—About Headsets and Loud Speakers.
Chapter XIV—Batteries Used in Radiophony.

RADIO frequency amplification is a simple method of increasing the energy in the Radio receiving set before the signals are detected and the modulation wave made audible by a tube or crystal detector. Strictly speaking an amplifier of this type amplifies the carrier waves but should be so designed as not to distort the modulation wave. The advantage of this form of amplification lies in the fact that it will not amplify currents at audible frequencies and can therefore

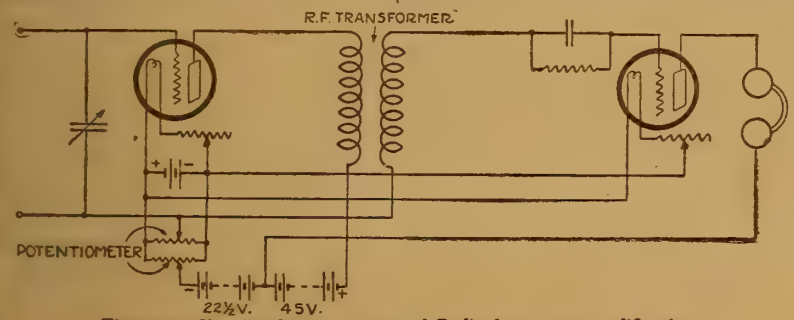


Figure 40—Showing how one stage of Radio frequency amplification is transformer coupled to detector

be carried further than audio frequency amplification which is limited to two or at best three stages. The other features of Radio frequency amplification are that it makes the set more selective and enables one to take advantage of the square law of the detector.

Intensity of Impulses

It is a well known fact that certain minute Radio impulses will not cause a detector tube to function but after the impulses reach a certain intensity the response in the plate circuit varies approximately as the square of the grid potential change. Thus, when the grid charge is doubled the plate current change is four times as great. With Radio frequency amplification we can take an extremely weak signal and intensify it to a point where it will operate the detector tube at its highest efficiency. On the other hand audio frequency amplifiers can only amplify detected waves and weak signals that do not affect the detector are not heard at all.

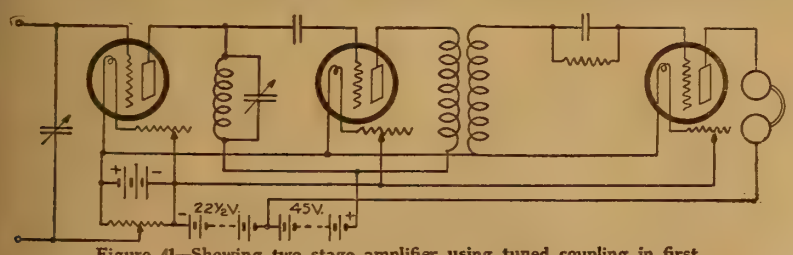


Figure 41—Showing two stage amplifier using tuned coupling in first stage and transformer in second

There are numerous stumbling blocks in the way of obtaining high amplification per stage at Radio frequencies and for that reason more stages are necessary to obtain a given increase in energy at Radio frequencies than required at audio frequencies.

The chief obstacle is the high capacity existing between the elements in a tube itself. Actually this capacity is low but it is sufficiently high to cause trouble at Radio frequencies. This tube capacity can only be reduced by proper tube design so one has to get along the best way possible.

Several Tubes in Cascade

The use of several tubes in cascade implies the use of some means of coupling the plate circuit of one tube to the grid of the next and we have three methods in common use for accomplishing this, namely, by transformer coupling, resonance, or impedance coupling or resistance coupling.

The first method makes use of small transformers either wound on a small finely laminated iron core or a nonmetallic form. The extremely high frequency of the currents forbids the use of any kind of iron other than the softest, built up from very thin sheets. Iron core transformers are difficult to design for this purpose and those on the market are usually the result of cut and try methods.

Air core transformers are easier to build and are often described in the technical press. They usually consist of two coils of fine wire wound close together on a wood or fibre form. The disadvantage of transformer coupling lies in the fact that a transformer operates efficiently over but a short band of wavelengths and when a wide range of wavelengths are tuned some means are required to change the inductance values of the windings on the transformers. Thus a certain make of transformer is rated to cover a wavelength range from 200 to 500 meters. As a matter of fact this transformer operates at its highest efficiency on a wavelength midway between these limits and when waves either side of that value are tuned the increase of energy per step of amplification is reduced.

Radio Frequency Amplifiers

Just how a vacuum tube functions when acting as a Radio frequency amplifier may be explained by Figure 40. Here is shown one stage of Radio frequency amplification coupled to a detector tube. It will be remembered in the chapter on the tube detector a curve was shown to illustrate that variations in grid potential would affect the plate current in a certain manner.

The curve of a tube when used as a Radio frequency amplifier with a high voltage on the plate will have practically the same shape but will be further to the left of the zero line and higher. When the tube is connected into a circuit like the one shown in Figure 40 the grid potential is adjusted by means of the potentiometer to such a value that the plate current is halfway down the slope of the curve. Now when a current flows in the aerial tuning circuit it will alternately impress negative and positive potentials on the grid.

When a positive potential is impressed upon the grid it will increase the slight positive potential already there and the plate current will be increased. When a negative potential is applied it will reduce the positive potential and less current will flow in the plate circuit. The plate current will then rise and fall in exact reproduction of the current flowing in the aerial circuit at Radio frequencies but of much greater values.

Function of the Transformer

The function of the transformer is then to transfer these currents to the second tube where they are detected and made audible. Obviously the more effective this coupling can be made the more energy acts upon the grid of the detector tube and the louder will be the signals. When additional stages of amplification are used the same method of coupling is employed between them. We must be careful, however, to keep the grid potentials of such a value as not to push the plate current over the bends in the curve. Should this occur the plate current wave will not follow exactly the grid current wave and distortion will result.

Resonance Coupling

As a rule transformer coupling is not as efficient as impedance or resonance coupling. In Figure 41 is shown a circuit employing resonance coupling or tuned Radio frequency amplification between the first and second tube with transformer coupling between the second tube and detector.

It will be remembered in the chapter on regeneration it was shown that an inductance in the plate circuit would transfer part of the energy back into the grid circuit through a condenser. In a resonance coupling we have practically the same thing except that the energy is transferred to the grid of a second tube. The inductance and condenser shown connected between the positive battery and the plate form a tuned circuit.

When the set is functioning and the plate current of the first tube varies in synchronism with the grid currents the plate circuit is tuned to resonance by means of the variable condenser across the inductance. Due to the high impedance of this tuned circuit the resultant reactive effect of the inductance is transferred through the condenser to the grid of the second amplifier tube. The energy from the second tube is then passed on by the transformer to the detector tube. When a fixed impedance is used in this circuit it is connected in place of the inductance and variable condenser but has the limitation of functioning only over a narrow band of wave lengths similar to a transformer.

Tuned Radio frequency makes the circuit extremely selective and when used the simplest form of tuning may be employed in the aerial circuit. It acts in all respects like a two circuit tuner with extremely loose coupling. Its use is not advised beyond one stage as it makes the selectivity of the set so fine that it is difficult to pick up a distant station.

Coupling Beween Tubes

The use of resistance coupling between tubes for Radio frequency amplification

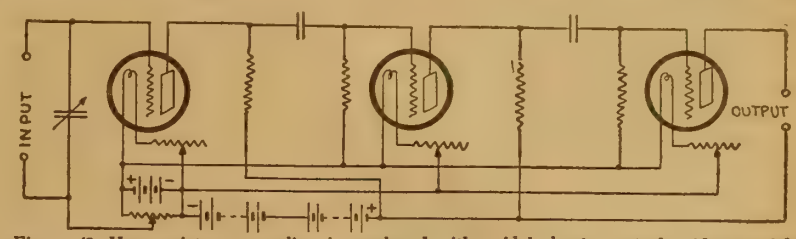


Figure 42—How resistance coupling is employed with grid leaks to control grid potentials

has not the disadvantage of working only over a narrow band of wave lengths but is not usually used for the reason that it is very inefficient on waves below 1000 meters. The principle on which this type of coupling works is similar to the others, utilizing a high resistance instead of a high impedance.

The transformers and tuned resonance amplifiers have a high impedance, that is, they offer a high resistance to the high frequency currents but have a low direct current resistance. This is, of course, due to the inductive action of the windings. The resistance coupling on the other hand offers a high resistance to both plate current and to the high frequency currents. A typical circuit using 2 megohm units as coupling between tubes is shown in Figure 42.

The operation of this circuit may be outlined thus: When put into operation there is a certain voltage drop across the coup-

(Continued on page 14)

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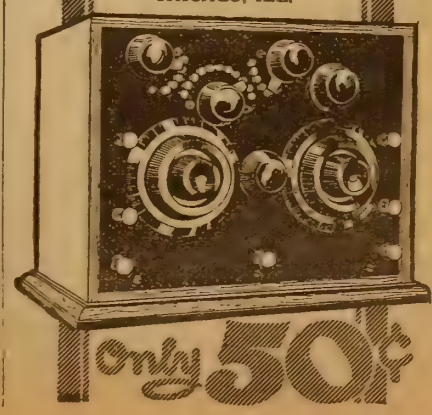
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Phantom Receiver for Vacation Use

Little Aerial Needed to Bring in Stations

By Leon W. Bishop, 1XP

One of the most interesting circuits for a single tube that may be constructed for vacation use and which may be used in car or at camp and requires little or no aerial, is the phantom receptor. The circuit is the adaption of two Armstrong principles which really produce distance and clarity for a small constructional cost.

The success of any circuit depends upon the constants used, particularly this one which would seem to be a standard regenerative circuit but is completely changed by a large tickler and variable grid leak.

This circuit has been designed for the new wave bands of 2,000 to 550 kilocycles (150 to 545 meters) and includes the amateur. The circuit is more efficient on the shorter wave bands so it is possible to get the class A stations as loud as the class B, which is not possible with other types. Due to great flexibility the circuit will work equally well on phone, CW, ICW, and spark which will insure you of all classes of service no matter where you are.

Works Excellently on Short Aerial

When using this one tube circuit in a car with a 4-foot aerial it is equal to a three stage Radio frequency amplifier and detector. Due to the short aerial used it is possible to receive through bad static (QRN) and for this reason alone is of considerable value during the summer months.

The two best tubes to use are the UV-199 and UV-201A. The rheostat should have the resistance advised by the makers of the tubes. The B battery can be anywhere from 45 to 90 volts. The two fixed condensers .00025 and .002 mfd. should be of the mica dielectric type. The variable condenser should have from 17 to 23 plates (.0003 to .0005 mfd.)

How to Make Leak

The variable grid leak is important and should be variable over a range of from 50,000 ohms to 5 megohms. Several commercial types that were tried did not have the range claimed, so it might be advisable to build your own.

For that purpose purchase a ten cent roll of black picture binding paper tape whose dull black surface is slightly conductive and whose resistance can be readily lowered with an extra soft lead pencil. This grid leak can be arranged with a sliding arm or switch and contacts but it must be variable over a wide range and capable of fine adjustment.

Coupler Special Also

Like the grid leak, the coupler is of special design and the following values should be adhered to. The best combination to use is the rotor and stator of a standard coupler wound as follows. The tube (stator) should be wound with as large a wire as possible. Starting with 20 turns on the rotor side of the tube, tap every 10 turns until you reach 120 turns, which will leave 11 taps.

The rotor is also a real job for it is tapped in a similar manner. Start on one side of the rotor with 40 turns and tap off every 10 turns until you have wound on 120 turns and you then will have 9 taps. These taps can be passed through the rotor shaft to switch points on the panel or a switch may be mounted on the rotor. Fine wire may be used on the rotor to accommodate the necessary 120 turns.

A warning is given against the use of shellac on the windings. Firm windings may be obtained by drilling holes at each tap off and binding the wires in them.

Do not use honeycomb coils. Either double or single switch arms may be used. The 180 degree types of mounting rotor can be used. Do not tap the coils any coarser than 10 turns, but finer if possible.

Operation of Circuit

The best antenna or collector system is to connect the variable condenser at point A to a good ground. No other connection is necessary. There are five adjustments on the set; the grid tuning coil, the tickler coil, the coupling between these coils, the variable grid leak, and the variable condenser. The filament rheostat is not critical so this is not regarded as an adjustment.

As the tickler coil and grid leak are increased, a super-regenerative condition will be met. The pitch of this note can be varied by the grid leak and should be adjusted until it is above the point of audibility and only a slight hiss is heard in the phones. At this point a wonderfully sensitive condition exists for all classes of phone and CW and will tune in contrastingly clear as compared with any single tube circuit.

A given wave length is tuned in by means of the variable condenser and grid circuit tuning coil. The tickler and grid leak are merely adjusted to conform to this condition. The resistance of the grid leak should be so arranged that it will give out a bad screech as it is increased and follow through an intermediate series of pure notes until it passes out of audibility, with a range of adjustment on either side.

The correct polarity of the tickler coil in the plate circuit will have to be tried out by reversing the leads until the best results are obtained.

Can Be Used as Transmitter

This is a standard circuit and may be used as such with an aerial and ground by reducing the tickler coil turns with the switch. With an aerial and ground the circuit can be used for transmission with a power tube and increased B voltage. All classes of super results may be obtained which makes it an ideal vacation outfit.

There are several aerial combinations that work well. One of the most interest-

(Continued on page 14)

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if he only knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in securing such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

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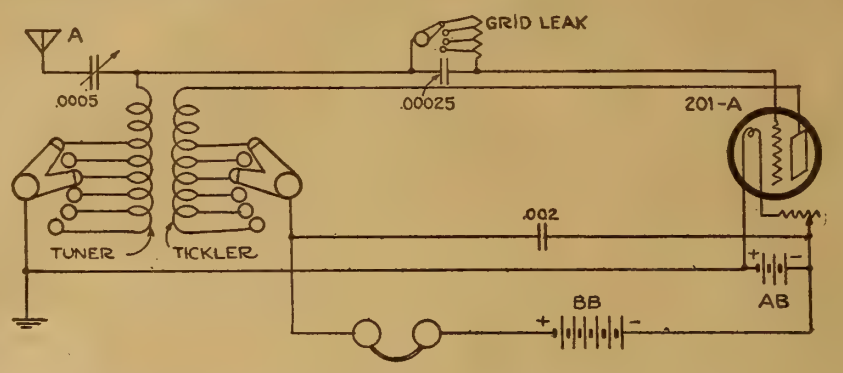


Recharging Storage Cells

Both the filament and plate batteries should be tested at regular intervals to be certain that the voltage has not fallen below the value necessary to normal steady operation, as current variations resulting from run down batteries produce harsh notes in the receiving telephones resembling static disturbances. Storage batteries of the lead-acid type need recharging when the potential has dropped to 1.75 volts per cell. When the voltage of a block of B battery normally rated at 22.5 volts has fallen to 15 volts the battery should be renewed.

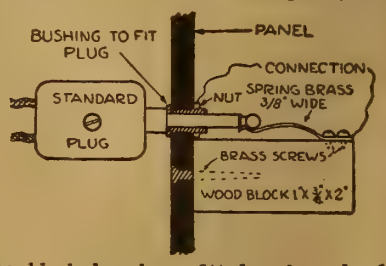
Resistance of Grid Leak

An important feature in securing proper operation of a detector tube is the resistance of the grid leak. A leak of the pencil mark type offers the advantage of being easily varied by increasing or decreasing the width of the mark and thus adjusting the resistance until maximum amplification is produced by the tube. Grid leak mountings which permit the interchange of resistances provide an easy method of experimentally determining the proper resistance for a particular tube, these resistances being obtained commercially in units varying from .05 megohm to 5 megohms.

Easy Way to Construct an Open Circuit Jack

The accompanying illustration will show how to make an open circuit jack, with a small piece of wood, some brass screws and a piece of spring brass about ⅜ inch wide, a short piece of brass tubing to fit the stem of a standard plug, which is threaded full length and is long enough to pass through the panel and have two thin nuts on both sides (unless the tubing can be strongly threaded into the panel itself, in which case the nuts may be eliminated).

The drawing is almsot self-explanatory but it might be a good idea to put a thin coating of a good strong glue on the end of the wood block next to the panel, after



the block has been fitted and ready for the long brass screw inserted and tightened. This will prevent the wood block from turning.—C. W. Pomeroy, St. Louis, Mo.

A Suggestion

Wooden rotor balls, panels and paper tubes should be boiled in paraffin before winding to prevent shrinkage and to further improve their insulating properties.

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How to Make a Camper's Portable Reflex Set

Part IV—Wiring Details, Tubes to Use, Tuning, Conclusion

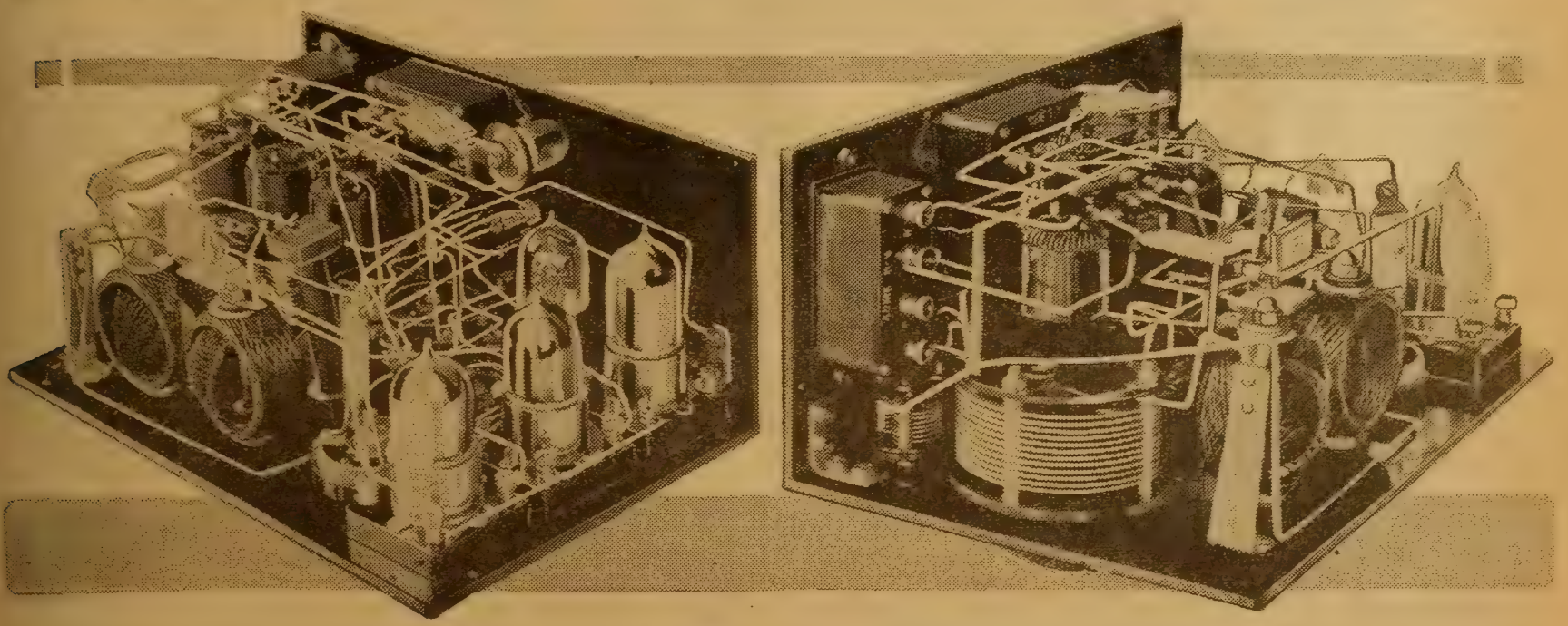
By H. J. Marx

IN WIRING this set the writer found it most convenient to put in all the battery leads first—running from the battery binding posts to the battery switch or direct to the sockets, rheostats and potentiometers. A little time should be spent in laying out these leads in the shortest, most direct and neatest manner. Contacts at terminals should be firm and solid; binding posts and thumb nuts should be locked in place if possible. A portable set gets a lot of knocking around which may loosen the connections. All soldered joints should be carefully and well made. Careless work will be a constant cause of trouble and will necessitate repeated opening of the set for repairs.

A common source of trouble is the tendency to solder leads to fixed condensers. This is permissible if the constructor is real handy with the soldering iron. Unfortunately the average fan is not sufficiently skilled to make a good soldered connection, with the result that when the heat is applied to the condenser terminals it is transferred to the plates and mica dielectric. This fuses and breaks down the condenser or alters its capacity value. It is best to use wire terminals fastened to the condensers with brass machine screws and nuts. The leads should be soldered to the terminals before they are bolted to the condensers.

The battery leads from the transformers should next be put in. After these the grid and plate leads are taken care of. Naturally these are the greatest trouble makers and care should be taken to see that they are made as short as possible and avoid parallel runs.

The wiring is completed with the addition of all by-pass condensers. Too many fans do not realize the importance of these condensers and that is usually where the trouble starts. Poor grades of condensers will cause lots of trouble. Since they are added last there is a tendency towards carelessness in the rush to complete the job. The writer has seen a number of sets where the sole trouble was due to such carelessness. Condensers touching other leads and apparatus change the circuit to such an extent that reception is either impossible or very unreliable.



The plate battery voltage depends on the type of tubes used. In reflex circuits, regardless of the tube, it is best to try various plate potentials until maximum volume desired is reached or where the distortion begins. More than 90 volts will hardly be necessary. Four of the usual small size 22½ volt units will fit in across the battery section. Naturally the dry cell tubes were used. This called for two 1½ volt dry cells which are also placed in the battery compartment. For the terminals on the side panel, the small plug and jacks were used, thus permitting rapid connections to be made with the least amount of difficulty.

A small loud speaker and the head phones also fitted into the battery compartment without crushing, thus making the set a completely portable unit including loud speaker and loop.

Use of Outdoor Aerial

If desired, an outdoor aerial can be used by adding a variocoupler and connecting the secondary to the loop terminals of the set. The aerial and ground connections are then made direct to the primary.

Tuning Operation

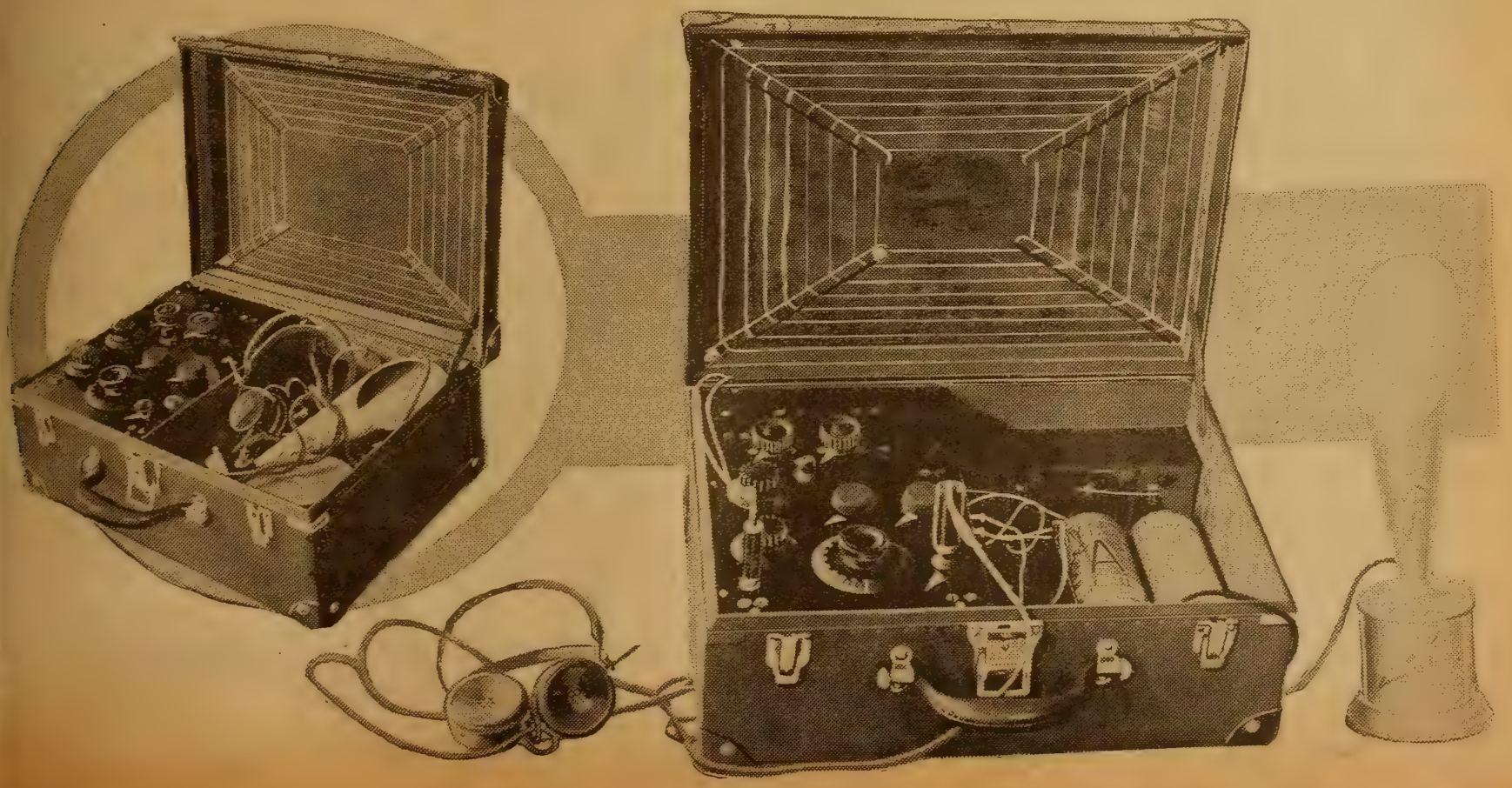
In tuning these circuits there are four types of controls to keep in mind. First, and naturally most important, is the variable condenser for tuning to wave length. The second set are the rheostats. These control the filament lighting and are therefore the main controls of electron emission. These can be turned on just a certain distance, beyond which the set spills over. This adjustment is varied somewhat in conjunction with the potentiometer adjustment. The rheostats then should be turned on to the point of quiet operation. The third controls are the potentiometers. These govern the grid potential and not only effect the volume, but also the clarity or modulation. They should not be advanced too far or reception will be distorted. The fourth set of controls are the variometers, since they have two distinct functions; the one to control the plate circuit oscillations of the first Radio frequency tube and the other to control the feed back or reflexing of the audio frequency current into the grid circuit of the second tube. Both then have an adjustment not necessarily very critical which will balance the circuit as a whole. These adjustments vary slightly for different wave lengths but not so much as to make tuning difficult.

After the knack of setting the rheostats correctly is accomplished, the wave length control by means of the condenser is simple, but it is the potentiometers that often worry the beginner. Directions here are difficult since their setting varies with the tubes, the plate potentials and the rheostat settings. It is just a matter of a little experimenting.

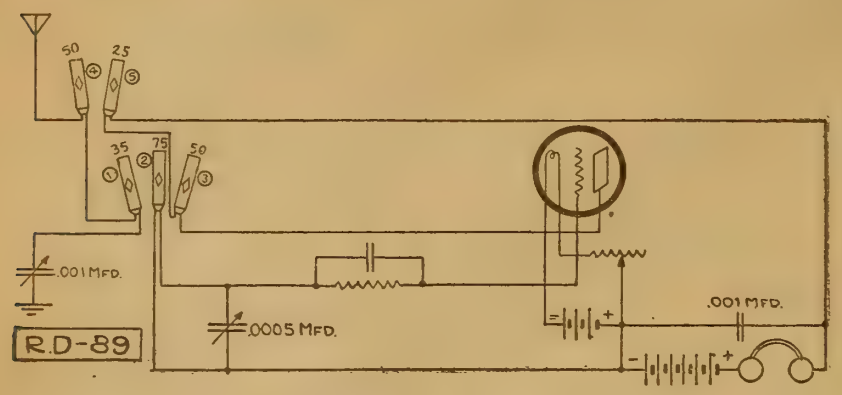
(THE END.)

Core for Transformers

Radio frequency amplifying transformers using an air core have a natural period at which they should be operated to produce satisfactory amplification. The employment of a special type of high frequency iron for the core of these transformers results in obtaining increased voltage amplification and also permits the satisfactory use of the transformer on a greater range of wave lengths. Due to the fact that the use of an iron core has an effect similar to inserting resistance, the amplifier is prevented from setting up high frequency oscillations.



MORROW DOUBLE REGENERATOR



DR. B. F. MORROW, New York City, does a lot of experimenting with new hook-ups and when he gets something good he passes it on to us and the rest of the fans. Double regeneration has been tried a number of different ways, but there is always another method, so here it is for our experimental fans to use. It works all right!

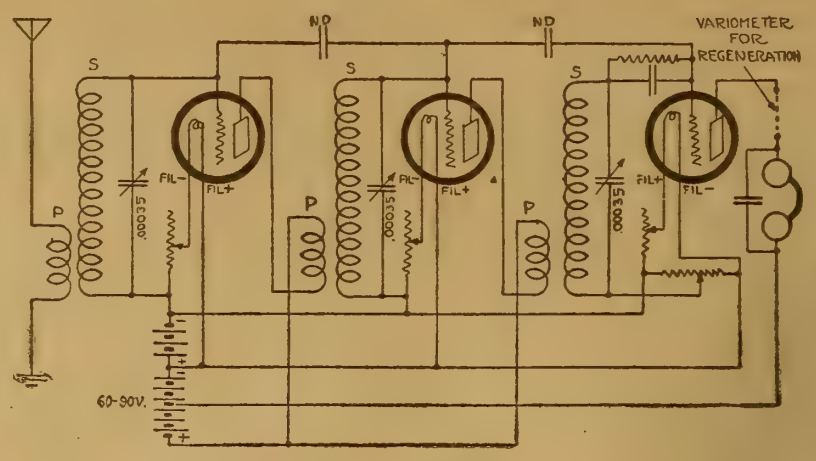
Here is what the Doctor says:—

"Enclosed find another of my freak hook-ups for some of your readers to try these hot days. After all, if we don't keep on switching wires we'll never get anywhere, and just for fun I present the following arrangement of parts through which I get better results than I had before.

"The fundamental idea is not only for feedback to the grid circuit, but make a separate feedback to the aerial circuit which gives me the theoretical combination of a triple circuit for selectivity and single circuit for volume.

"Coils 1 and 2 now have a transformer effect and throw to the grid energy which has been greatly built up by the feedback of coil 5 into coil 4. At first glance it would appear that the circuit is difficult to tune, which is not the case. I advise close coupling between coils 4 and 5, loose coupling between coils 1 and 2, and varying movements of coil 3. It is important in building the set to make sure that regeneration is obtained with both feedback coils or they will practically neutralize each other and then somebody is going to call me names."

HAZELTINE NEUTRODYNE ERRATA



IN the June 30 issue of Radio Digest was shown a diagram for the construction of a two-step Radio frequency neutrodyne receiver. In this diagram the grid of the first Radio frequency tube was connected to the plate of the same tube by a short line which should have been omitted in the diagram shown above. This error of commission may be corrected by breaking the lead described. The corrected diagram is illustrated herewith.

The Hazeltine neutrodyne circuit is proving quite popular to the great body of Radio experimenters on account of its remarkably high ratio of amplification on Radio frequency stages.

FIRST STEPS IN RADIO

(Continued from page 11)

ling resistance and between the plate and filament of the tube.

Consider now that the grid of the first tube is made positive for half a cycle by the incoming waves. This draws more electrons out of the filament and reduces the resistance of the plate to filament part of the circuit.

The additional current flowing in the plate circuit increases the drop across the coupling resistance and this increase of voltage is impressed upon the grid of the second tube through the small fixed condenser. Thus the second tube further amplifies the wave, repeating the action through all the tubes.

Super-Heterodyne Circuit

This type of coupling is practically useless for short wave work by reason of tube capacities by passing part of the current and reducing the potential applied to the grids of the tubes. Its advantage lies in the wide range of waves over which it will work but they must be above 1000 meters. To overcome this Armstrong devised the Super-Heterodyne circuit. The principle of operation of this circuit is rather complicated but the idea is beautiful in its simplicity.

The first tube in the series is connected like a simple detector tube but the grid circuit is loosely coupled to a tube that is kept oscillating. The oscillations impressed upon the grid of the first tube are of such a frequency that they form a beat current with the carrier wave of the incoming signals.

This beat current is due to the waves of the two currents coinciding and then opposing at fixed intervals giving rise to a current in the plate circuit of the first tube that is of a lower frequency than the carrier waves received. This beat current is still at a Radio frequency, having a wave length of about 3,000 meters. At this wave length the current is fed into a series of resistance coupled amplifier tubes, usually five stages, and finally detected and passed through one or two stages of audio frequency amplification. By this means the resistance coupling is made to operate efficiently and such a receiver is considered the best it is possible to build at the present stage of the art.

Some Radiophans have excellent results with Radio frequency amplifiers while others seem to fail entirely when they attempt to build this type of apparatus, as in one case to the writer's knowledge where a fan installed a five stage amplifier and found his set worked better without it. Failure is usually the result of inattention to details and a little experimenting will often clear up the trouble.

General Rules Necessary

By following a few general rules good results are assured. Use only apparatus of known quality. Cheap instruments are usually worth just what they cost, if not less. Use only mica condensers and tube sockets that have all metal carrying parts well spaced from each other.

Where but one stage of Radio frequency is desired it is best to use a tuned type of coupling thus obtaining good efficiency and selectivity for the set. More stages can be employed using transformers if desired. Where one is willing to make the necessary adjustments two stages of tuned Radio frequency will prove highly satisfactory.

Tuned Radio frequency amplifiers have a tendency to self oscillation and this can be prevented by the use of potentiometers and by care in wiring. Keep the wires as far apart as possible, keep the leads short and let wires cross each other at right angles.

Some constructors shield their panels and instruments but from the writer's experience this is not always advisable. The use of a shield introduces capacity effects that sometimes renders the amplifier useless.

The better method is to build the amplifier without shielding, mounting the tubes and other apparatus well back from the panel and lengthening the control shafts. If body capacity is then troublesome the panel can be shielded as a last resort.

Hard Tubes Used

Hard tubes are used exclusively for Radio frequency amplifiers with a high plate voltage, 60 to 90 volts being used. For local reception where there is plenty of energy received a hard tube can be employed as a detector with a high plate voltage to give louder signals. Where distance is the goal a soft tube in the detector stage with a lower B battery is advised. Crystal detectors are often employed with these amplifiers and prove entirely satisfactory with two stages of audio frequency behind them to obtain loud signals. As a matter of fact a crystal detector gives clear reception with less trouble than a tube. The next chapter will take up audio frequency amplification and discuss the use of a crystal detector with both types of amplifiers.

(TO BE CONTINUED.)

GOOD PHANTOM CIRCUIT

(Continued from page 12.)

ing is to connect the point G to ground and touch the moistened finger to point A. For apartment houses two combinations can be used: (1) Connect the point G to ground and the point A to some metal object or a small aerial in the room; (2) Just connect the point A to ground.

To operate the set in a car connect the point G to the frame of the car through the steering wheel and the point A to the metal top or a small aerial in the top of the car.

When camping out the best collector seems to be a wire from the point A to a ground connection about 6 or 8 feet from the set. A short aerial may also be used.

If this is a super it is far superior to anything you have ever tried before in that line and it may be due to the fact that there are no large coils, condensers, or resistances to impede the real action of what a super might be if given a chance.

Mechanical Theory

You have often turned the variable condenser of a standard regenerative set up to zero and received an awful howl in the phones and said that the tube was spilling over. This is a negative charge that accumulates on the grid and leaks off in minute discharges which can be governed by a grid leak. These charges are negative so we can assume that the grid is negative most of the time and that an impressed EMF on the grid circuit would tend to build to infinity during the interval the grid was negative. This seems to prove out, as only a short aerial is required.

As the wave length is halved the amplification is squared by virtue of the increased frequency as compared with the rate of leakage. This may account for the marked results on the shorter wave bands.

This circuit is the result of a year's experimental work on the ultra regenerator which was originally published in a Boston newspaper August 22, 1922. The work was carried out at Radio Station 1XP.

The French steamship line plans to equip all its passenger ships sailing out of New York with Radio receivers and amplifiers for the reception of broadcast programs.

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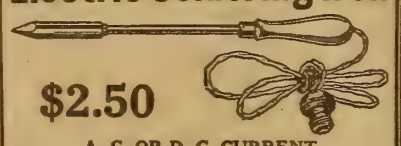

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Questions and Answers

Distortion

(2478) MGS, Memphis, Tenn.

I am using an Aeriola, Sr., detector and two stages of amplification using VT2 Western Electric vacuum tubes as amplifiers, 6-volt battery, and 90 volts on the plates of the amplifier. Music from the local station comes in much distorted and sounds just like the ring in a tin pan struck by a wooden instrument. Music from foreign outside stations such as WJZ, WOC, WHB, etc., comes in with a very tinny vibration, also renders the music disgusting to hear. I changed my 90 volts on the plates of the amplifiers to 45 volts and still the music is tinny both on ear receivers and loud speakers, regardless of the amount of amplification or reduction on the detector.

Listening in with my detector tube only the music comes in from the local station clear in tone and distinct, and no better could be desired, but as soon as the amplification is added distortion and the tinny vibration begins regardless of the quantity of power used.

My amplifying tubes are new and have signal corps VT2 Western Electric stamped across the base, therefore I believe them to be genuine.

The distortion evidently takes place in the amplification and not in the detector.

Can you suggest a cause and a remedy for this condition as other owners in the city use 90 volts on the plates of the amplifier and are getting beautiful music from the local stations. It seems impossible for me to use more than 45 volts on the plates and get anything like good reception. I am also using Western Electric type 10D loud speaker.

A.—Noting specifications and difficulties of reception with receiver cited, will advise that it should employ 90 volts or over on the amplifiers.

While the distortion may be in the tickler we are more than inclined to believe that it is in the amplifying transformer, probably in the first stage. As a simple test try another transformer in your first stage and note if distortion ceases. If so, the transformer is at fault. Transformers frequently go wrong as the wire used in them is so small that they burn out easily.

Non-Code Reinartz

(3570) AIA, Austin, Minn.

I have constructed a Reinartz circuit receiver as per directions furnished in your special booklet on that subject. Using one WD-11 tube and an 80-foot antenna, I have enjoyed Radiophone programs from stations at Davenport, Iowa; Minneapolis, Minn.; Detroit, Mich.; Omaha, Neb., and Kansas City, Mo. Seems to be working O. K. in that respect. However, one object in building this set was to be able to instruct my Boy Scout troop how to make similar sets with the primary object of affording them means of listening in on code messages. So far I have not heard the least sign of any dots and dashes. Kindly advise as to the reason for this and tell me what change, if any, can be made so I can get these code messages.

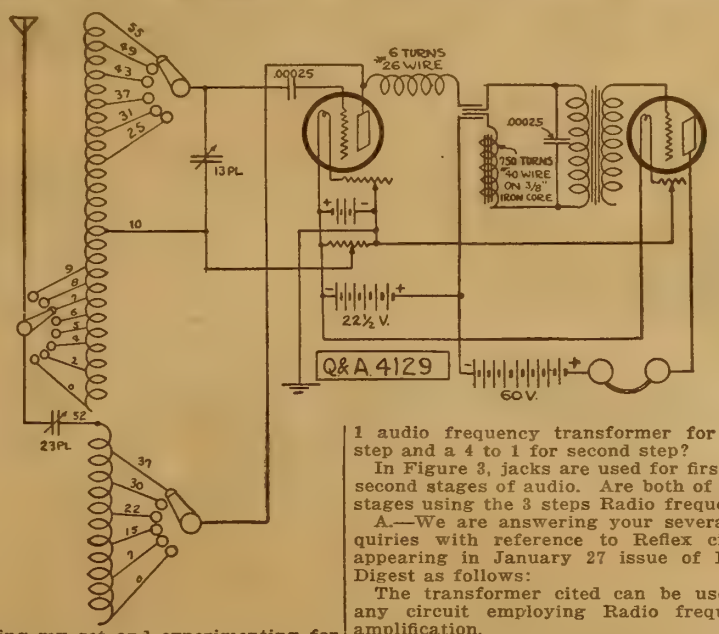
A.—Noting your specifications and requirements, we are advising the substitution of an 11-plate for 23-plate variable condenser in the secondary circuit and placing of 23-plate in place of 43-plate between the antenna and tickler coil and placing the 43-plate condenser in series with antenna, all of which is necessary to accomplish reception of code signals. This requires only the addition of an 11-plate condenser and shifting of those now employe in circuit. These combinations will also better receive on from 360 to 400 meters wave length. Code is transmitted by amateurs on a 200-meter wave length.

Charger and Reinartz

(4129) RH, Seattle, Wash.

I made a 98-volt 49-cell lead battery. I have been charging a 21-cell Edison 24-volt battery using a rectifier in three hours from the AC lighting current. Can I use the same system for the new battery?

I notice your readers are interested in the Reinartz tuner. After changing and



rechanging my set and experimenting for 18 months I think I have the hook-up as near right as I can get it. We get some very good results on DX work.

I am enclosing hook-up, hoping to help some amateur like myself. If this hook-up is made properly it will give good results.

You do not need a grid leak but you do need a vernier on the 13-plate condenser and also the detector rheostat.

A.—Answering your inquiry with reference to battery charger for 98-volt 49-cell battery, we are advising that you can charge it in the same manner as used for the 24-volt battery. However, it will be necessary to divide the battery in two parts as its voltage is too high to be charged from 110 volts. Separate the cells so that one unit is of 24 cells and the other of 25 cells and charge these separately in the same manner as you are now using it with a 21-cell unit. A 60-watt lamp will serve as a resistance.

We are expressing our appreciation of your interest in behalf of readers of Radio Digest in submitting diagram of Reinartz circuit. We are pleased to pass it on to our readers.

Reflex Transformers.

(3092) AD, Chicago, Ill.

I desire to build a reflex circuit as described in your valuable magazine of Jan. 27, page 13, either Figure 1 or Figure 2, and would like some help from you.

I have an Erla R. F. transformer type AB1, made of straight Radio frequency with the secondary circuit open through which audio frequency will not pass. Is there any place where I can use it in the three or four tube circuits in conjunction with other R. F. transformers?

Will an all wave coupler be efficient in these circuits?

Is there any advantage in using a 10 to 1 audio frequency transformer for first step and a 4 to 1 for second step?

In Figure 3, jacks are used for first and second stages of audio. Are both of these stages using the 3 steps Radio frequency?

A.—We are answering your several inquiries with reference to Reflex circuit appearing in January 27 issue of Radio Digest as follows:

The transformer cited can be used in any circuit employing Radio frequency amplification.

An all wave coupler would have no greater value than a short wave coupler.

Both audio frequency transformers should be of four to one ratio.

Referring to jacks: A stage of Radio frequency is cut out with each stage of audio frequency cut out. We are directing your attention to the fact that in Figure 3 the third jack is not connected correctly. A connection should be made from the first spring to the base of jack.

Vacuum Tubes.

(3031) LGC, Casper, Wyo.

All text-books I have read say that when the grid is positive the greater the plate current. Why? The usual answer is that it adds to the positive charge of the plate. But what is there to prevent the filament to grid current? Is there such, or is it so small as to be neglected?

A.—Referring to vacuum tubes: It is true that when grid is positive the plate current is greater. The amount of current flowing from plate to filament depends upon the number of electrons which the filament radiates. If the grid is charged positive the filament radiates more electrons than if charged negative because a positive charge attracts a negative charge, Electrons are negative charges, and as the plate is charged more positive than the grid it does not allow the electrons to stop at the grid, but takes them on to the plate. This we trust is clear. There is, however, a slight accumulation of electrons on the grid—in order to avoid an excess of grid potential a grid leak is added to serve as a safety valve releasing the surplus or excess accumulation of electrons.

Damage to Phones

Receiving telephones must not be connected in the plate circuit of a power amplifier, as serious injury to the windings will result. If the secondary of an amplifying transformer is connected in the power amplifier circuit so that it operates as a step down transformer, the receiving telephones may be connected to the primary winding and clear reception of signals may be obtained without damaging the receiving telephones.

An alarm clock has been invented by a Frenchman which responds to a certain Radio wave length when sent out by the Eiffel tower station.

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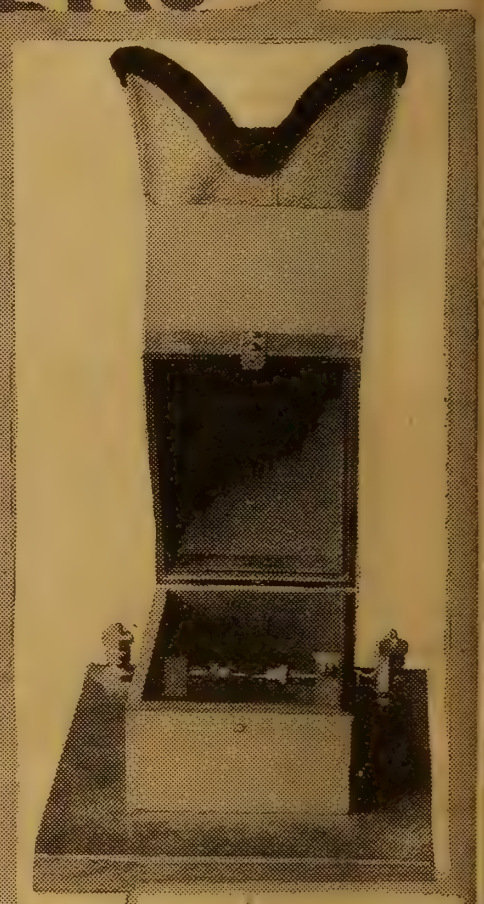
Radio Illustrated

The woods are beginning to be filled with music these days. Permanent camps, lodges, tents and even in the open may be found the familiar receiving set and entertainment fresh from the city may be turned loose through the mystery box. It is soothing and relaxing for the vacationist
© Wide World



This piece of apparatus should be as much of interest to Radiophans as the old electric incandescent globe or the first street car that stands in front of the Edison plant is to the average individual. The mysterious "black box," as it is called, is another of Edison's inventions in the laboratory in which he discovered the Radio spark of today © K. & H.

An ideal way to spend a hot afternoon at the beach, providing you have a canoe and a portable Radio receiving set © U. & U.

Who is the most ardent baseball fan? Did you ever peek through a knot hole when there was not enough coins in your pocket to pay entrance fee to see a game? Well, that is the boy. Radio helps the boy out of his dilemma. This is a baseball club listening in on the returns from the big leaguers © K. & H.

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AUG 24 1923

One Tube Reflex; 215A Tube Data; 23 Programs

Radio Digest

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Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, JULY 21, 1923 | No. 2

MYSTERY WAVES FAKED

Nellie Breen, dancer in the "Passing Show," Apollo Theater, Chicago, takes her portable set to Wilson Beach with her and stays in the shade, because sunburn doesn't mix with musical comedy
© Radio Digest

WDAP OPENS AFTER EXTENSIVE CHANGES

NEW ANTENNA SYSTEM IS IMPORTANT FEATURE

All Leads from Transmitter Are Laid in Conduits, Out of Way—Counterpoise Covers Roof

CHICAGO.—WDAP, broadcasting station of the Chicago Board of Trade, recently reopened its plant after being shut down for alterations.

While the station has been inactive many changes have been made for the betterment of its broadcasts. The most notable of the changes effected are in the transmitting equipment and antenna with a view towards making the station more powerful.

The antenna system now consists of four bird cage aerials radiating from a central mast on the roof of the hotel. A counterpoise, spreading out from the foot of the central mast, covers the entire roof of the building and looks very much like the ribs of a huge umbrella.

In the operating room all of the wiring has been laid in conduits which take the wires out of sight and also prevents the chances of accidents due to contact with the high power leads.

After the program was completed, an exceptionally fine one in the opinion of Radiophans, a reception was given prominent local Radio men in the studio. The general opinion of these gentlemen is that the efficiency of the equipment of WDAP has been greatly increased.

NO 'STOPPING' WAVES COME FROM NAUEN

"Reports Are Nonsense"

Dr. A. Meissner, German Scientist, Brands Auto Halting Reports as Foolish

(By T. C. Deutschman, Special Correspondent)

BERLIN, GERMANY.—"These reports are foolish, utterly stupid and nonsense!" declared Dr. A. Meissner in an interview here when asked regarding the reported secret waves with which Station POZ, better known as Nauen, is alleged to have been experimenting recently. Many American newspapers have been carrying reports telling how automobiles have been stopped and French airplanes forced to land as a result of the radiation of these waves.

Dr. Meissner is probably the greatest authority in Radio in Germany, and besides being a Radio inventor of international import, is chief engineer for the Telefunken Company, the commercial Radio communication company here. No scientist can doubt the word of the Doctor when he says, "Nauen made no such experiments."

(Continued on page 2)

WAVES CARRY MUSIC TO 12 DETROIT PARKS

City Installs Sets to Save on Summer Concerts

DETROIT.—The Detroit Department of Parks and Boulevards has selected twelve city parks as locations for Radio band concerts for the summer. WWJ, the Detroit News station, has placed its equipment at the disposal of Scheman's concert band for the public entertainments. About $500 will be spent by the city for equipment and an operator engaged for each of the parks.

It is found by using Radio the city will save a large sum of money during the summer hiring park bands.

Nation Listens In to "Biggest Band"

WJAX Broadcasts Music by Massed Grotto Musicians at Cleveland

CLEVELAND, O.—Music, real music, by what is said to have been the biggest band ever assembled for a Radio concert, was broadcast under the auspices of the Cleveland News recently by WJAX, the powerful station of the Union Trust Company here. Keokuk, Ia.; Oshkosh, Wis., Kennebuck, Me., and Wetumpka, Ala., heard and knew the Grotto had been in Cleveland.

Alice Brady of movie fame was recently interviewed at the microphone of WOR, Bamberger's of Newark, by Regina Cannon, writer for a weekly motion picture publication

MANY MORE PARTS PUT ON OFFER LIST

ENTHUSIASM OVER SPECIAL OFFER AWARD GROWS

Fans Keep Sending in Large Numbers of Coupons for Valuable Radio Accessories

SPECIAL REWARD OFFER
Coupon Number 8

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

A greater flood of coupons into this office is expected with the addition of many new and valuable accessories to the already long list of parts. Some fans have sent in as many as four series for various parts needed to construct their sets.

Send in as many series as you like, the only stipulation being that the coupons must be consecutively numbered. The coupon numbers do not have to start with number one, but may begin with any number, just so long as the rest of the coupons follow progressively numbered.

There is also no limit to the number of coupons which a fan may send in. Just select your parts and enclose coupons with the necessary cash remittance and the parts will be shipped to you immediately upon receipt of the letter.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .0006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount. Type B.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Variocoupler on Flewelling Super.
(Submitted by J. E., Brooklyn, N. Y.)

Question. I am using a variocoupler on the Flewelling Super, tapped at 30, 40, 50, 75, 100, 115 and 125 turns. Are these taps close enough? Rotor is 90 turns of No. 28 wire. Is this enough? Volume is excellent, but do not secure much distance. Why?

Answer. You will have no trouble with a variocoupler tapped as you state. You should be able to tune in any broadcaster with this arrangement. Rotor will work with 90 turns, but would suggest about 125 turns. Your trouble with distance may be caused by some shielding effect of neighboring buildings, etc. No trouble is ordinarily had from this source. The Super is at its best on distant stations.

Flewelling Antenna and Ground.
(Submitted by W. B., Cleveland, Ohio)

Question. I have built a Flewelling set according to instructions and find that I can get no effect whatever from the variable condenser. Why? Also what can I do to overcome this?

Answer. The single condenser Super has been shown with the tuning condenser in series, with the tuning coil and the antenna, or, if the set is connected to the ground without any antenna, then the ground is connected to the top post so that the condenser is in series with the ground and the tuning coil. Now if the set is used without either antenna or ground, it is necessary in order to secure any effect from the condenser, to do either of two things: connect the antenna and ground posts together, thus placing the condenser across the tuning coil, or use a substitute antenna, such as a short wire 10 to 15 feet long, a stove or other metallic body, even your own body will serve as an antenna if you hold the antenna post firmly in your hand. This matter of ground and antenna with the Flewelling is of very great importance and is one reason for failure. Any ground or antenna may be used. One will work practically as well as the next, but compensate or make up for these different values by change of either inductance or capacity in tuning the set.

DENIES SECRET WAVES

(Continued from page 1)

When asked concerning the statement of C. C. Winn, dean of the College of Engineering, Detroit Institute of Technology, Dr. Meissner was emphatic in his answer, "Winn has false information."

The statement of Dean Winn was given in the June 30 issue of the Digest. In it he supported the so-called secret waves as possible and entirely logical, even going so far as to state that similar experiments as those attributed to Nauen by the American newspaper dispatches, had been carried out successfully in the laboratory of the Detroit Institute of Technology.

The stories branded by Dr. Meissner as foolish are unaccounted for in Germany, where they have also been rumored widely. It is the belief of many authorities that the dispatches gained credulence through the desperate condition of Germany and a natural desire on the part of the Germans to gain an upper hand over the French. The reports, however, are utterly false and German correspondents for many American daily newspapers are either uninformed or deliberately manufacturing the propaganda.

Dr. Meissner, many Radiophans will recall, is the inventor of the famous Meissner circuit, widely used in transmitting, especially by the code amateurs.

Voltage is the pressure behind electrical current. Amperage is the current.

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Looking Ahead

How to Graduate Your Variable Condenser Dials to Read in Wave Lengths and a discussion on the use of variable capacities in oscillating circuits, will be the topic of an article in next issue by H. J. Marx.

Thomas W. Benson's Series for Beginners next week will be devoted to a thorough explanation of super-regeneration, the latest Radio Development.

Hook-Up Diagram R.D.-91—to appear in the July 28 issue—will show a new development of the Ultra Reinartz. This circuit will employ the tuning unit described several months past in the Digest series on the Ultra Reinartz.

The Survey of the Radio Patent Tangle—by John B. Brady—will continue next week, ending week after next. This explanatory study of the invention muddle is worth keeping on file.

More Broadcast Advance Programs Than Any Other Source—Every issue the detailed programs are given for the country's leading stations that are able to supply this information far enough in advance. Twenty-three are included this issue. Watch the department grow.

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MASTER HEARS LAST WORK OF HIS PUPIL

RADIO INSTILLS LIFE IN STUDENT'S MASTERPIECE

Italian Musician Listens In to Final Composition of His Famous Protege

SAN FRANCISCO.—Probably not more than a dozen persons were cognizant of the drama of the air that was enacted recently, when Guiseppi Bartalo, aged teacher of Luigi Mancinelli, author of the motion picture opera "Frate Sole," which was presented at the Civic Auditorium in San Francisco, sitting in far off New Orleans, heard his pupil's last composition broadcast here from Station KPO, Hale Bros, Inc., of San Francisco.

It was Bartalo, Italian maestro, who, many years ago, shaped the musical foundation of little Luigi Mancinelli in far off Milan, when the little boy with the serious eyes came to him for his initial instruction. Proudly he watched the fruits of his labors, as Mancinelli developed into a noted composer, whose operatic and symphonic scores were familiar to musical thousands.

Pupil Becomes Famous

While Mancinelli was climbing the thorn-strewn pathway to fame, Bartalo was establishing himself in America. Their roads parted. Mancinelli climbed to the top of his profession, but he never forgot the little instructor to whom he owed his beginning. Frequently he wrote him, and sent him copies of his newest scores. And Bartelo's breast would swell with pride, and he would tell his friends tales of his Luigi as he always remembered him.

In 1922 Mancinelli died. Bartalo was heartbroken. He collected all of his dead pupil's works that he could find. But some of his latest works he overlooked. One such was "Frate Sole," which he had never heard. No more had America. When arrangements were made to bring "Frate Sole" to this country, no one thought of little Bartalo in New Orleans until the broadcast.

World Hears Opera

When a pre-audition was arranged through Station KPO that the Radio world might hear a fragment of the dead composer's work, friends recalled the aged maestro in New Orleans. Telegrams were interchanged. As a result of them, little, old, bent Guiseppi Bartalo sat at a Radio instrument half across the American continent, and with tears streaming down his cheeks, as he later explained by a telegram to KPO and his friends, heard again through the wizardry of a broadcast wave the living fire of "Little Luigi" in his ears.

The whole coast listened to "Frate Sole." But only a few, those who had arranged the matter, visualized the greater drama which was being enacted in New Orleans as Guiseppi Bartalo, at his Radio set heard the last work of his beloved pupil.

RACE CONTESTANTS ARE RADIO EQUIPPED

Five of Entries in Balloon Classic Have Radio Sets Aboard

INDIANAPOLIS, IND.—Five of the contestants in the national balloon race which started from Indianapolis July 4 were equipped with Radio receiving sets, using dry cells and peanut tubes. The sets weigh less than eighteen pounds and have a range of more than 1,000 miles.

The sets were used to pick up special weather reports, telling of various air currents at different altitudes, prepared by the weather bureau and broadcast from Washington, Detroit, Chicago and Schenectady, N. Y. In view of the fact that the winner of the race was the balloon that got the greatest distance from the starting point, the reports on air currents were of great value.

"CHURCH WILL GROW BY SERMONS IN AIR"

COLUMBUS, O.—"Radio will soon be the biggest asset in bringing people to the church because people will want not only to hear the pastor, but to see and meet him," Rev. Dr. Andrew W. Blackwood said in his talk a few days ago to pastors who are attending the summer school of pastors at Ohio State university. His topic was, "The Most Popular Preacher."

UNCLE JOE KEEPS IN TOUCH BY AIRPHONE

DANVILLE, Ill.—Out of politics forever and back to this, his own old home town, Uncle Joe Cannon, for many years speaker in the House of Representatives, keeps in touch with the outside world by means of Radio. A complete Radio set was presented the venerable gentleman on his 87th birthday, and Uncle Joe is now an ardent fan.

UP AMONG THE ETHER WAVES

Steeplejack Michael Bourke of Brooklyn just drops a wire from his small crystal set at noon hour and listens to all the locals. In this instance he is enjoying Station WDT between bites

© K. & H.

Desolate Miners' Village Relies on Air for News

Town Is Four Days from Rails; Gets Mail Every Six Weeks

DETROIT.—The Detroit News, Station WWJ, recently received a communication from E. E. Carter, Holt Mine, McColl, Idaho, which shows how Radio is appreciated by persons shut from the world during a large part of the year. Mr. Carter's letter reads in part: "We are located at an altitude of 7,000 feet and a four day trip to the nearest railway. To travel anywhere we have to navigate 10 to 30 feet of snow. We get mail once every six weeks brought in by ski riders—but only letters at that, for newspapers are too bulky.

"We put in supplies to last at least eight months of the winter. You can imagine how much the enlightenment and the entertainment received from WWJ and other broadcasting stations has meant to us."

FEATURE STARS AT WMAQ'S REOPENING

EXCELLENT MODULATION MARKS REBUILT PLANT

Two Huge 135-Foot Towers, Atop Hotel, Give Antenna Total Height of 450 Feet

CHICAGO.—WMAQ, the Chicago Daily News, latest addition to Chicago's many high powered broadcasting stations, recently opened its brand new studio with an exceptionally fine program, in fact two programs, as they broadcast two different times during the evening: 7 to 8 and 9 to 10.

Some of the outstanding features of the earlier program were Willie and Eugene Howard and Emily Mills of Passing Show fame; the three Doners Tad, Rose, and Kitty of the Dancing Girl; Edythe Baker, pianist, who is scheduled as the star of the Music Box Revue for the coming season; Edith Fletcher, coloratura soprano of the Cleveland Opera Company, and a talk by Earnest Stevens of the LaSalle Hotel. Mr. W. S. Hedges, Radio Editor of the Daily News, also gave a short address.

Later Program

The later program from WMAQ was along different lines. Miss Myrna Sharlow, leading soprano of the Chicago Civic Opera Company, sang several numbers and Vera Poppe, English cellist, well known to Radiophans throughout the country, provided excellent entertainment.

The Studio of WMAQ is an example of the newest ideas for Radio Broadcasting. The studio, comprising two large rooms, is located on the eighteenth floor of the Hotel LaSalle, with a commodious reception room adjoining. The walls have been specially treated and are hung with taupe velour. Several prominent acoustic engineers who inspected the studio said that it is perfectly arranged for broadcasting, there being absolutely no echoes. Thick carpet covers the floor to muffle any noise which might arise from that source.

Several microphones placed about the studio proper have lines running to the control station at one end of the room and are so connected that one or more may be connected simultaneously, according to the demands of the occasion.

On Top of Twenty-Two Stories

Located in a penthouse on the roof of the hotel, is the operating room. The latest equipment is used, consisting of a 500-watt transmitter. Two steel towers, each 135 feet high and spaced 100 feet apart, support the antenna. As these towers are located on the roof of the twenty-two story hotel building, the antenna is the highest of any in the city. An interesting feature of these towers is that they are coated with a fireproofing cement for half their height.

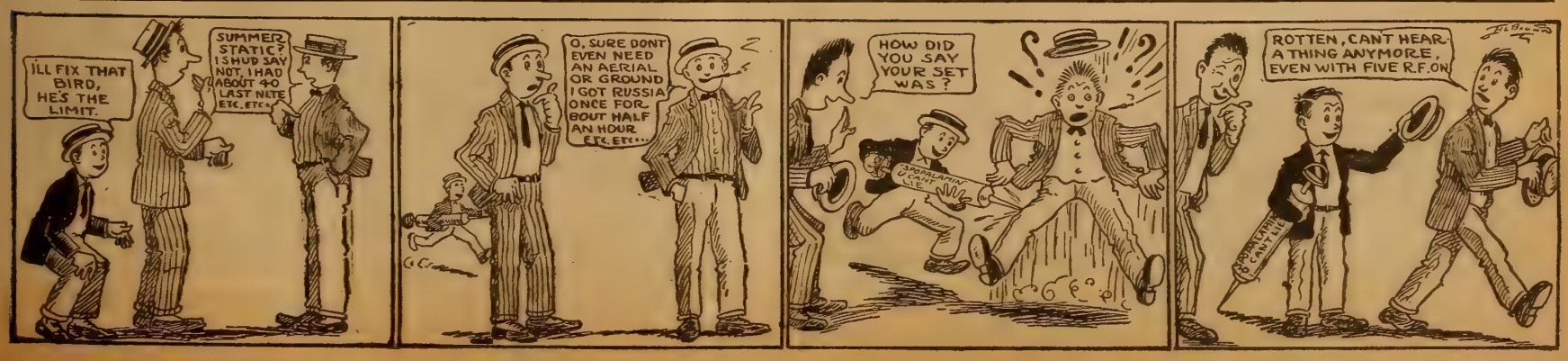
SIGNAL OFFICER IS GIVEN NEW POST

Major Maubourgne, Headquarters, Chicago, Goes to Experimental Laboratory at Washington

WASHINGTON.—Maj. J. O. Maubourgne, former chief signal officer of the 6th corps area, headquarters at Chicago, has been placed in charge of the Signal Corps laboratory at the Bureau of Standards. Maj. Maubourgne expects to begin a new series of experiments in the laboratory July 15.

One of the first is the development of suitable terminal apparatus for transmitting Gen. George O. Squier's new universal speed code alphabet. In view of the fact that the alphabet is intended to increase the speed of automatic transmission in cable, wire and Radio dispatches, the development of the necessary apparatus is very complicated. As soon as the apparatus can be built the army message center here plans to conduct long distance speed transmission tests.

THE ANTENNA BROTHERS Spir L. and Lew P. Inject this in Your DX Friends



The Week's Advance Broadcast Programs

Tuesday, July 17

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Keltic." Star Orchestra; "A Song of Sunshine," Mrs. Isobel G. Callow, contralto; "Concerto," Manny Roth, violinist; "Serenata," Orchestra; "Salaame," Mrs. Isobel G. Callow; "Badinage" Orchestra; "Spanish Dance," Manny Roth; "Cossack Lullaby," "Serenade Espagnole," Orchestra; "Yesterday and Today," Mrs. Isobel G. Callow; 'A Ball Scene," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, "Prelude in G Minor," "Waltz in E Major," "Paraphrase Rigoletto," Esther Burnett, pianist; "Love in Idleness," "In the Deep Cellar" "Rocked in the Cradle of the Deep," Harvey Anshuetz, bassoon Harve Lauderbaugh, bass; E. Godfrey, reader.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program devoted to Child Training; **10:00-11:00 P. M.,** Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert, Belsden's Bon Ton Ballroom Orchestra; 2:30-3:30 P. M., Matinee musical, Orris Cook Concert Trio; 6:45-7:30 P. M., Children's hour, "Uncle John"; 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Concert, Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Lyon & Healy Concert Dept.; Cope Harvey's Orchestra; Herb Mintz, pianist; 9:00-9:05 P. M., Book review, Llewelyn Jones.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Cahoon's Texas Hotel Orchestra.

WBZ (Eastern, 337), 7:00 P. M., Concert, William Davison, tenor; Avis Harriman, soprano; Mrs. E. H. Ruhe, pianist; 8:30 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Musical selections; 4:30-5:55 P. M., Song recital; Talk, Betsy Logan.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Popular songs; "Midnight Road," "Long Lost Mama," "When the Sun Shines for Me," "Ten Thousand Years," "Honey Moon Time," "Bebe—Slow Poke," "Bug House Fables."

WFAA (Central, 476), 12:30-1:00 P. M., Address, De Witt McMurray; 8:30-9:30 P. M., Violin recital, Edith Beilharz and assisting musicians; 11:00-12:00 P. M., Musical program, J. I. Wright's Male Quartet.

WFI (Eastern, Daylight Saving Time, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Piano recital, Loretta Kerk; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00-7:30 P. M., Children's Own Half Hour, Cousin Sue; 8:00 P. M., Boy Scouts Radio Corps; 8:30 P. M., Song recital; 10:30 P. M., Dance Music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Business report, Roger W. Babson; Joseph Ecker, baritone; Mrs. Grace Phillips, pianist; Talk, George Brinton Beal, Editor Boston Sunday Post.

WGY (Eastern, 380), 1:00 P. M., Address, "The Woman of Today," Mrs. Charles E. Hyson; 7:45 P. M., Musical program, "Vfennese Carnival Pranks," Ruth Don, pianist; "The Cloths of Heaven," "The Crying of Water," Everett T. Grout, tenor; "Solfeggietto," "Allegro di Molto," Ruth Don; "Onaway, Awake, Beloved," Everett T. Grout; "Sonata in A Major," Alice Clough-Wilsey, violinist; "Concerto," Ruth Don; "Trabblin' to de Grave," "Hard Trials," Everett T. Grout; "Danse Negre," Ruth Don; "The Rosary," Everett T. Grout; "Andante," "Melodie," Alice Clough-Wilsey; "Prelude and Fugue No. 21," "Prelude No. 22," Ruth Don.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Mary Anderson Theater Orchestra; Carolyn Pell, soprano; Richard Wymond, violinist; Double piano concerto, Mrs. Lawrence Evans, Ruth Sharp; Bryan Holloway, baritone; Mrs. Lawrence Evans, pianist; Elizabeth S. Steiger, Robert F. Muth, readers; Ruth Sharp, pianist.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; 3:00 P. M., Artist recital, song and piano; 6:00 P. M., Dinner music, WIP Little Symphony Orchestra, Dick Regan, director; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:30 P. M., Musical program.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., "The Mountebank's Song," Mabley and Carew Glee Club; Vocal solo, Mr. Sanders; Henry Grad, baritone; "Anchored," Glee Club; Vocal solos, Mr. Sanders, Mr. Grad; "The Day Is Declining," Glee Club; Circle Orchestra.

WMAQ (Central, Daylight Saving, 448) 4:30 P. M., Program furnished by Bush Conservatory of Music; 7:00 P. M., Talk, "Fishing," Edward C. Taylor; 9:15 P. M., Vocal selections, D. R. Wederman, tenor.

WMC (Central, 500), 8:30 P. M., Concert, Jannssen's Hawaiian Orchestra; **11:00 P. M.,** Midnight Frolic.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., News Orchestra; Town Crier; George F. Mullan, baritone; Albert Munck, pianist.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Marie Emery Lahr, soprano; Howard Nielson, tenor; Cope Harvey's Orchestra; Harry Geise.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Ft. Worth artists.

WBZ (Eastern, 337), 7:00 P. M., Concert, Mrs. Lila L. Morgan, soprano; John Clark, pianist; Lloyd Stoneman, pianist; 8:20 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater: Dinner music Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Song recital and short talks; 4:30-5:55 P. M., Dance music; 7:30-8:00 P. M., Dream Daddy; 8:00 P. M.-1:00 A. M., Talks, song recital, dance music, Arcadia Cafe Dance Orchestra; Howard Lanin, director; Songs, Harry Glyn.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, "Wonder," "Oh How She Lied," Ruby Cowan, singer; Willie White, pianist; Comedy songs, Bernie Grossman; "Oh Sister Ain't That Hot?" Ruby Cowan; "Chattahoochee," sung by composer; Songs, Brooks and Ross; 7:00-7:50 P. M., Sandman's story, Lila Lee; Piano recital, Jascha Samoos; "My Grief May Be Quiet," "Polianka," "Flower, Wine and Love," Sophia Maximova, Gypsy singer; Miss Alexander, actress; "As the King Went to War," "Aria from the Opera Demon," "Aria from the Opera Pique Dame," Mr. Kotylansky, bass; "Today We Have Parted," "It May Be," "Troika," Madame Maximova; "The Two Grenadiers," "I Will Never Be Grieved," "Ei Uchniem," Mr. Kotylansky.

WFAA (Central, 476), 12:30-1:00 P. M., Musical program, Melba Theater talent.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00 P. M., Children's Own Half Hour, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "Science Up to Date," Scientific American.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Courier-Journal Quartet; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Recital; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Musical program, "La Cinquantaine," "Ein Albunbiatt," Frances Stoffregen, cellist; Aichele Novelty Orchestra; Swimming lesson, Stanley Brauninger; Popular songs, Gussie Bishop; "She's Got That Too," "Thelma," "Somebody Else," Aichele Novelty Orchestra; "Spanish Caprice," Mildred Steinwert, pianist; "Serenade," Mitchell Dane, viola; "Bach Concerto for Two Violins in D Minor," Mitchell Dane, Irwin Korb, violinists: "Prelude in G Sharp Minor," "Witches Dance," Mildred Steinwert; "Liebesfreud," Mitchell Dane; Aichele Novelty Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program furnished by Cosmopolitan School of Music and Dramatic Art; **7:00 P. M.,** Stories, Georgene Faulkner; Frances Aiken, pianist; Mrs. Beatrice Solomon, violinist; **9:15 P. M.,** Program arranged by Lyceum Arts Conservatory.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde G. Kern; **8:00 P. M.,** Organ recital, Erwin Swindell, organist; Musical program, Rita Harris, contralto; Amy Kileen, soprano; T. M. Arnold, trombone; **10:00 P. M.,** Musical program, Davenport Chapter, Order of the DeMolay.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt; 8:00 P. M., Recital.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., News Orchestra; Town Crier; Julius Sturm, soprano; Lilah G. Grant, soprano; Deora Wolfe, pianist.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, July 19

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "Cavalleria Rusticana," Star Orchestra; "Nervana," Fred S. Hamer, tenor; "Nina," Jaques Sterin, cellist; "Le Retour," Orchestra; "A Farewell," Fred S. Hamer; "Espana," Orchestra; "Ritornell," Jaques Sterin; "The Last Watch," Fred S. Hamer; "Serenade," Selection from "Katinka," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Elmer Hennig, cellist; William Hennig, Jr., pianist.

KGW (Pacific, 492), 3:30-4:00 P. M., Lecture, "The Analysis of a Simple Bank Statement," Andrew Miller, Field Secy. Oregon Bankers Assn.; **10:00-11:00 P. M.,** Dance music, Georg Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Concert; 6:45-7:30 P. M., Children's hour, "Uncle John"; 8:00-10:00 P. M., De Luxe program.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Cope Harvey's Orchestra; Herb Mintz, pianist; Margaret M. Miller, soprano; Geo. S. Cuthbertson, tenor; Clyde W. Foster, baritone; 9:05-9:25 P. M., "Twenty Minutes of Good Reading," Rev. Claude J. Pernin.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Florence Riggins' Orchestra.

WBZ (Eastern, 337), 7:00 P. M., Concert, William Levin, pianist; Cecil Lussier, soprano; Lillian De Laurier, violinist; WBZ Trio; 8:20 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:50 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; Feri Sarkozi, direotor; 2:00-3:00 P. M., Arcadia Concert Orchestra; Talk, Betsy Logan; 4:30-5:55 P. M., Song recital.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Popular program, "Snakes' Hips," "I'm Going Away," Spencer Williams; "You're Always Messing Around With My Man," "Low Down Papa," "Cotton Belt Blues," Lizzie Miles; "Black Man, Be On Your Way," "Down Hearted Blues," "Gulf Coast Blues," Edna Hicks; Songs, Spencer Williams.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "The Courts and the People," Judge Royall R. Watkins; 8:30-9:30 P. M., Musical program, arranged by D. L. Whittle Music Co.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Song recital; 3:45 P. M., Concert;

(Continued on page 9)

Wednesday, July 18

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Selection from "Il Trovatore," Star Orchestra; "The Dwarf," Arthur Fisher, baritone; Cornet solo, W. Woods; "Serenade," Orchestra; "Jogging Along the Highway," Arthur Fisher; "My Dreams," Orchestra; Cornet solo, W. Woods; Selection from "Chu Chin Chow," Orchestra; Baritone solo, Arthur Fisher; "Lysistrata," Orchestra.

KDKA (Eastern, 326), 7:20 A. M., Concert, KDKA Little Symphony Orchestra, Victor Saudek, director; Earl Renner, tenor.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program; stories, Aunt Nell; 8:00-9:00 P. M., Concert; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Musical program; 2:30-3:30 P. M., Matinee concert; 6:45-7:30 P. M., Children's hour, "Uncle John"; 8:00-10:00 P. M., De Luxe program.

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are being obtained by thousands of satisfied users of the

EASTERN COIL SETS

for the

COCKADAY CIRCUIT

The remarkable features which are making this circuit more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

COMPLETE SET OF B, C AND D COILS—PRICE **$2.75**

Hook-up, directions and material list furnished free with each set of coils.

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MARGO $1.00 Vacuum Tube 1½ Volt Socket 25c

Operates on one dry cell, either with or without B battery. Wiring diagram FREE with each tube. 10c extra for parcel post insured.

	For Phones	Parcel Post Ins. Add
PHONES		
Dietzen 3,000 Ohm	$3.75	$0.12
Dictograph	5.75	.14
COUPLERS		
King Variocoupler	1.15	.12
VARIABLE CONDENSERS		
Dietzen 14-Plate Vernier	2.65	.14
Dietzen 24-Plate Vernier	2.95	.16
Dietzen 46-Plate Vernier	3.45	.18
TRANSFORMERS (Audio Frequency)		
Dietzen	3.45	.12
TRANSFORMERS (Radio Frequency)		
Cotoco	2.45	.12
Owl	.95	.10
MISCELLANEOUS		
Ritter Portable Loop	1.00	.10
Argus Lightning Arrester	.95	.09
Welsh Peanut Tube	2.00	.08
Peanut Tube Socket	.50	.03
Switch Lever, Fada Type	.19	.06
Ammeter Testing B Battery	.49	.08
Two Slide Tuning Coil	1.25	.12
Hydrometers	.49	.08
Double Phonograph Attachment	1.15	.08
SETS		
Giblin Crystal Set	4.95	.30
Aerex Crystal Set	7.95	.45
Victor Single Tube, completely assembled	12.50	.45
Victor Two Stage Amplifier	12.50	.45
RHEOSTATS		
Klosner Vernier	1.25	.14
Bradleystat	1.49	.10
Union Radio	.65	.08
SOCKETS		
Bell V. T. & W. D. 11	.89	.10
V. T. Bakelite	.50	.10
LOUD SPEAKERS		
Music Master	27.50	.50
Reflex	9.85	.30
DIALS		
2-inch (Bakelite)	.25	.06
3-inch (Bakelite)	.35	.08

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FLEWELLING CIRCUIT
Every part complete, including drilled panel and book of diagrams and instructions **$11.95**

REINARTZ CIRCUIT
Every part complete, including drilled panel and book of diagrams and instructions **$10.95**

Two-stage Audio-Frequency Amplifier. Every part complete for either of the above circuits at **$11.00**

CONDENSERS

3 Plate Variable; value, $1.75	$1.05
13 Plate Variable; value, 2.50	1.20
23 Plate Variable; value, 3.50	1.35
43 Plate Variable; value, 4.50	1.95
13 Plate Vernier; value, 5.50	3.75
23 Plate Vernier; value, 6.00	4.00
43 Plate Vernier; value, 6.50	4.25
Honeycomb Coils, 50 turns mounted	.95
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Double Coil Mountings	2.45
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Reinartz Coils, Increased wave length and mounting	1.55
Jacks, Single Circuit; value, 65c, special at	.30
Double Circuit; value, 90c; special at	.45
Multiple Point Inductance Switch with Knob and Dial (15 Switch Points)	1.45
Lightning Arresters, approved	.90
Three-inch Dials, unbreakable, heat resisting composition, high finish; special	.30
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Audio Frequency Transformer. Designed for use with W. D. 11 tubes; list, $4.50; price	2.75
Variocoupler—Litz Wire Wound Secondary; value, $4.50; special	2.25
Ball Bearing Inductance Switch; value, 75c; special	.30
V. T. Sockets, nickeled, brass, sleeve, composition base; value, $1.00; special at	.40
Aluminum Loud Speaking Horn, nickel plated, highly polished; $8.00 list	3.75
Filament Rheostat, 6 ohm	.65
Filament Rheostat, 20 ohm	.80
Filament Rheostat, 50 ohm	.90

With 2" Dial, 15c extra.

Every article advertised above is guaranteed by the manufacturer and by us. Mail orders filled immediately. Transportation PREPAID on all orders of $5.00 or over, east of the Mississippi River. All others include postage.

Just Consider

—the essential features necessary to make an audio frequency transformer a good one—

1. *High Amplification.*
2. *Minimum Distortion.*
3. *Low Interstage Linkage.*
4. *Convenient Mounting.*
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Cotoco transformers make these ideal features facts. And the finish will surely please you.

"Built First to Last"

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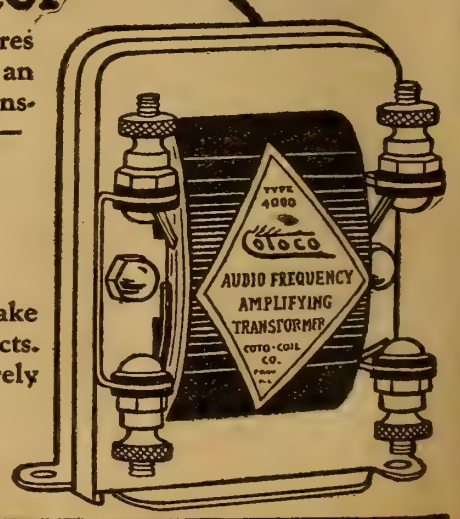
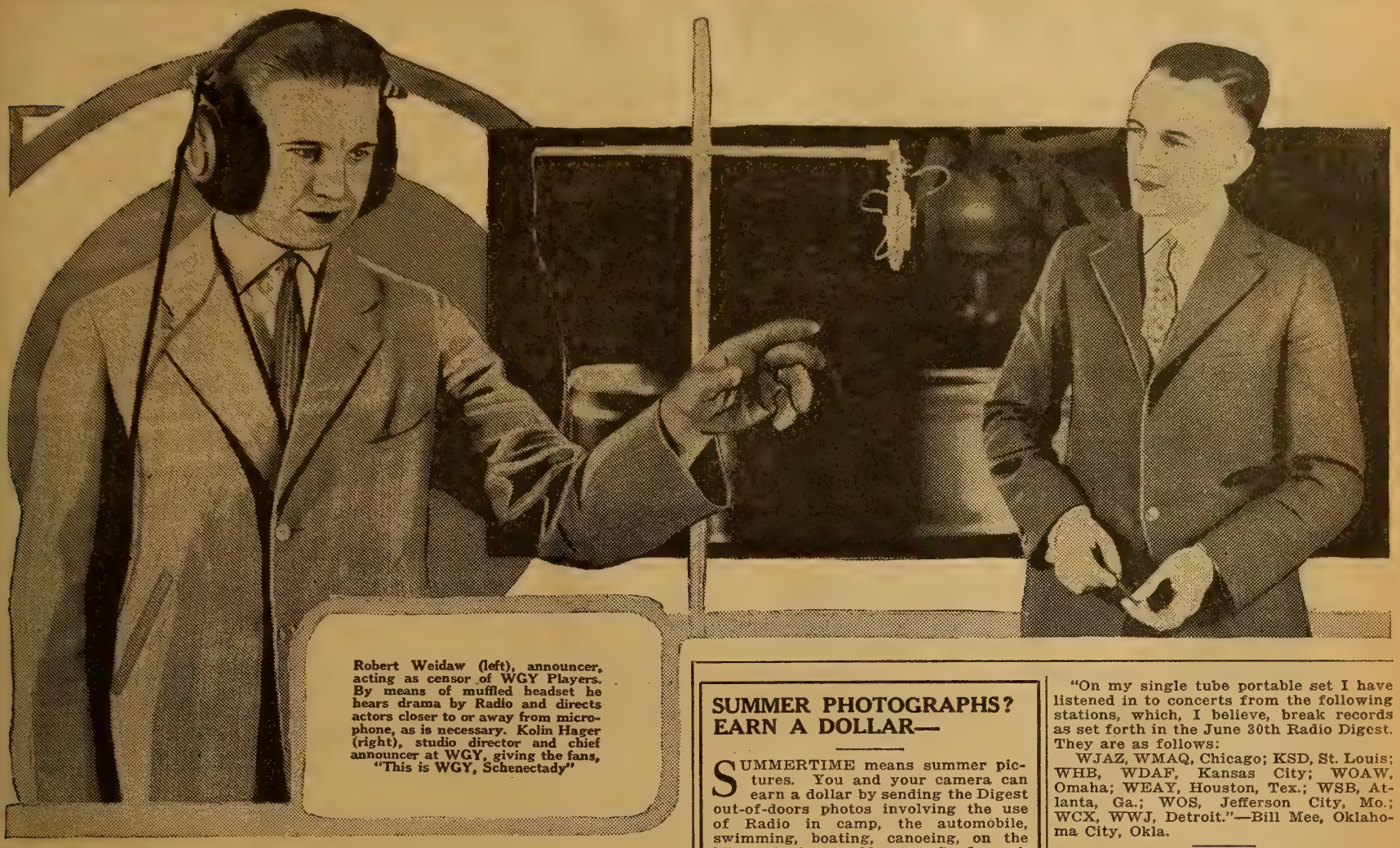
LOS ANGELES



COTO-COIL CO. PROVIDENCE

A VISIT TO WGY, SCHENECTADY



Robert Weidaw (left), announcer, acting as censor of WGY Players. By means of muffled headset he hears drama by Radio and directs actors closer to or away from microphone, as is necessary. Kolin Hager (right), studio director and chief announcer at WGY, giving the fans, "This is WGY, Schenectady"

Radiophans So Enthusiastic Over WGY They Even Christen Their Babies After It

Kolin Hager Outstanding Figure of Popularity at Famous Eastern Station of General Electric Company Does Interesting Experiments in Drama and Remote Control Broadcasts

By Vera Brady Shipman

The Radiophans are so enthusiastic about WGY that they even name their babies after it. Out in Kansas, the fond parents have written that their son and heir is named William Gordon Yadon. There you are—WGY for a lifetime.

I had always thought of Schenectady as something out of a comic opera back in the days of Fay Templeton singing "On the Day I Left Schenectady" in George M. Cohan's "Forty-Five Minutes from Broadway." Foreign correspondents have even more complications of name and spelling than we Radiophans. Mail comes to the General Electric Company, Schenectady, New York, addressed to every word combination from Electric, New York to "The General" himself.

"KH" Is Graduate Musician

"This is WGY, Schenectady. One minute please." You know the voice. And above is Kolin Hager himself, director and chief announcer of WGY. His voice is well modulated. I was interested to find out what kind of training had produced a voice that gives WGY one of the best carrying qualities on the air.

"KH" as he is known, is a graduate musician, a singer, was overseas in the service and produced several musical comedies of soldier talent in France, and in addition is a trained public speaker. That is a combination which brings the excellent modulation for Radio. I watched him announce a number, I saw that his pause before each word was as studied as though the audience was seen. Probably greater care was taken than if the audience was before him to give added confidence. You see on the Radio, you are never quite sure how well your voice "gets over," while before visible audience, expressions tell tales of the interest.

WGY Drama Experiments

WGY has specialized on Radio plays, directed by KH. A censor with muffled ears to shut out all studio sounds, listens in to the Radio sounds of the play and catches the slightest errors of phrasing or voice inflection.

The WGY Players sometimes write their own plays. Many plays are written especially for them or are modified to suit the Radiophan needs. For instance, a play which depends upon sight for its climax is worthless in Radio. But the play which can carry emotion and implied action by the speaking voice, is the Radio play at best.

The WGY dramatic stock company rehearses weekly and usually three rehearsals are given before appearing on the air. KH directs these and frequently plays leading parts. Other announcers, whose voices are schooled in the work, are recruited into the plays. They carry a repertoire of about ten plays.

Has Symphony Orchestra Too

A WGY symphony orchestra is a stock organization directed by Leo Kliewen and Edward H. Smith. This orchestra plays regularly from WGY and rehearses as faithfully as its dramatic contemporaries.

Cities surrounding Schenectady are connected to the General Electric plant by remote telephone control, operative by direct telephone communication to the central broadcasting service. Church services are given in alternating cities. For instance, the Lutheran Church of Amsterdam, will be followed the next Sunday by the Presbyterian church of Saratoga Springs, broadcast direct from the churches themselves, and not merely studio chapel services.

Bank Puts on Program

On the evening that I visited WGY, the entire early program was given by the Commercial National Bank of Albany, twelve miles away. The orchestra, soloists and male quartet motored to the studio and gave their program while the officials, their employes and families listened in at Albany at their annual banquet. Then when the program was ended the musicians motored back to Albany and furnished dance music till the "wee small" hours. This bank has made a special effort toward employe welfare. Its recreation rooms are used as clubrooms and rehearsal studios for music and dramatic clubs of the bank.

By its system of remote control, WGY has broadcast affairs of public interest in all the surrounding territory. The New York inauguration (for the entrance of Al Smith into New York's gubernatorial chair was of national interest) was broadcast from Albany, and the Yale-Harvard game in detail from the field.

Travel Night Feature

KH has instituted an interesting form of travel night in which he features a country, its music and its characteristics as told by a native speaker and native musicians or compositions. Several of these have already been given and more are to follow.

WGY carries its records of distances. An interesting phase was told in a daylight reception in a steel car traveling from Kansas City to St. Paul, which recorded a WGY afternoon program.

The General Electric Company is building another great station at Oakland, California which will be in operation within a year. This will emulate the principles of WGY broadcasting, and will no doubt have as much popularity in the West as has its parents in the East and Central West.

SUMMER PHOTOGRAPHS? EARN A DOLLAR—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending the Digest out-of-doors photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

SUMMER PHOTO DEPARTMENT,
Radio Digest,
123 Madison St., Chicago.

RECEIVING RECORDS? SEND 'EM IN—

(The following extracts are from letters of Radiophans, who have been doing good distance work. Readers submitting letters for publication should describe or diagram their sets.—DX Record Editor.)

"On my single tube portable set I have listened in to concerts from the following stations, which, I believe, break records as set forth in the June 30th Radio Digest. They are as follows:

WJAZ, WMAQ, Chicago; KSD, St. Louis; WHB, WDAF, Kansas City; WOAW, Omaha; WEAY, Houston, Tex.; WSB, Atlanta, Ga.; WOS, Jefferson City, Mo.; WCX, WWJ, Detroit."—Bill Mee, Oklahoma City, Okla.

"The best station record I have been able to make is KHJ, Los Angeles, Calif. I heard this on one tube using a portable set."—Foster McKenzie, Cleveland Heights, O.

"These stations have been received by myself with only a single tube set:

KFAF, Denver; WGAQ, Shreveport, La.; WNAC, Boston; WLAG, Minneapolis; WHB, WOQ, WDAF, Kansas City; WOS, Jefferson City, Mo.; WMAK, Lockport, N. Y.; WEAF, New York City; WGY, Schenectady, N. Y.; WNAD, Norman, Okla.; WOO, Philadelphia; WAAK, WIAO, Milwaukee, Wis.; WBAP, Ft. Worth, Tex.; WEAY, Houston, Tex.; WOAI, San Antonio, Tex.; WOK, Pine Bluff, Ark.; KQV, Pittsburgh; WOI, Ames, Ia.; WGR, Buffalo, N. Y.; WBL, Anthony, Kans.; WQAM, Miami, Fla.; WFAA, WDAO, Dallas, Tex.; WAAP, Wichita, Kans.; WAAM, Newark, N. J.; W. O. A. W., Omaha, Nebr.; WHAZ, Troy, N. Y., and WKY, Oklahoma City, Okla."—William Cockrell, Swannanoa, N. C. (17 miles east of Asheville).

Plan Largest Private Station

CHICAGO.—Station WTAS, owned and operated by Charles E. Erbstein at his country home, Villa Olivia, near Elgin, Ill., will be greatly enlarged and improved in the near future, so that it will become the largest privately owned station in the world, according to the plans of Mr. Erbstein.

The New Grebe Broadcast Receiver

Point No. 4 YOU MAY RECEIVE all broadcasting with this Receiver—its range 200—600 metres covers the wavelengths of all broadcasting stations.

Just One of its Seven Points of Satisfaction

Licensed under Armstrong U. S. Pat. No. 1,113,149

Ask Your Dealer

A. H. GREBE & CO., Inc.
Richmond Hill, N.Y.

GREBE RADIO

SURVEYS INDUSTRY'S TANGLE OF PATENTS

"Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

By John B. Brady

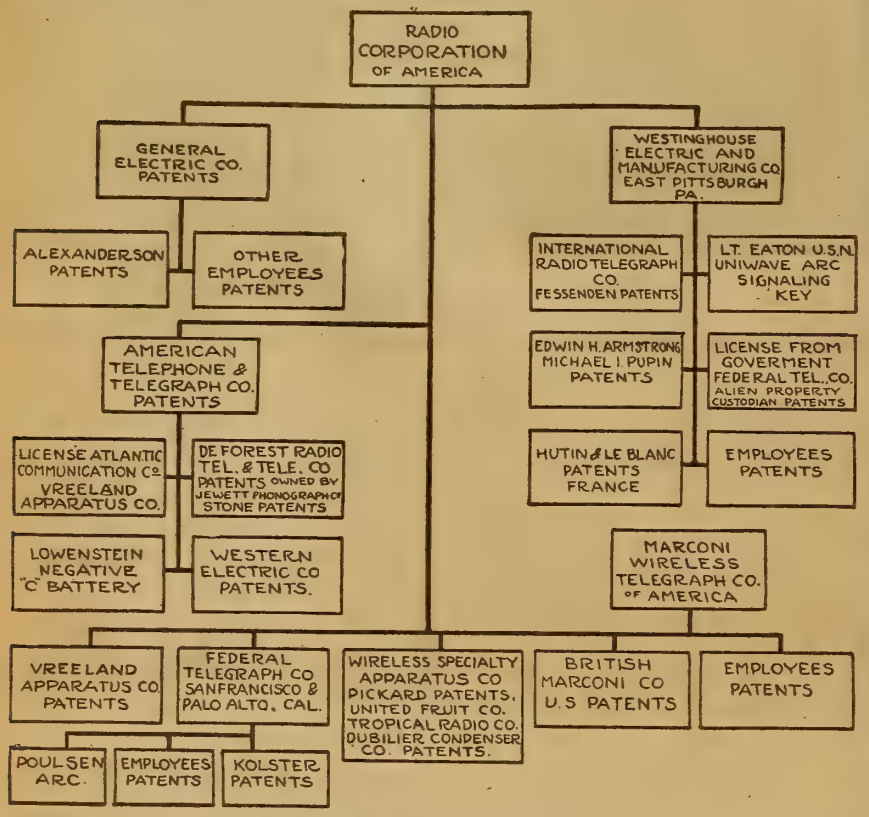
(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation started last issue.)

PART II

THE Radio Corporation has also used a number of other defendants under the Langmuir grid leak patent 1,282,439 including the Radio Stores Corporation, the Sleeper Radio Corporation and John Firth & Co., Inc. These suits were brought in the United States District Court for the Southern District of New York.

The Westinghouse Company, also a part of the Radio Corporation, sued in the name of Edwin H. Armstrong in the United States District Court for the Southern District of New York under the Armstrong regenerative circuit patents 1,113,149, the Radio Guild Co., Inc., and the Standard Assembling Co., composed of Harrietts, Wolfe, Jr., Jolly et al., and secured a temporary injunction under the adjudicated Armstrong patent effective upon filing security.

With all of these suits against small manufacturers or their distributors the independents may well view with alarm the aggressive patent policy of the Radio Corporation which is slowly but surely tending to drive competitors out of the industry.



Radio Patent Organization Chart

How R. C. A. Formed Monopoly

How was the Radio Corporation patent monopoly formed?

When the United States entered the war the commercial companies foresaw that the Government would require patriotic co-operation and large quantities of Radio apparatus for the army, navy and coast guard. The American Telephone and Telegraph Company and Western Electric Company entered the Radio field on a large scale only by securing a patent situation under contract with the De Forest Radio Telephone and Telegraph Company in which they secured certain rights under the important three electrode electron tube patent and the De Forest amplifier patent, among the various others. They purchased the Lowenstein invention of the negative C battery for biasing the grid of the electron tube, a patent particularly important in tube transmitters.

Licenses Secured

A license was secured under patents of the Atlantic Communication Company and the Vreeland Apparatus Company. The General Electric Company was developing a Radio patent situation upon the inventions of Langmuir, Alexanderson, Coolidge and others. The Marconi Company had continued to build its patent situation, utilizing among others the invention of Weagant on various circuits and of Hill and Clark on the wave changer construction used in quenched gap ship transmitters in the navy.

The Federal Telegraph Company had assigned to the government its patents controlling the manufacture and operation of high power arc transmitters including among others, the inventions of Pederson, Poulsen, Schou, Fuller, Marx, Rodman, Watkins, and Beal. The Westinghouse Electric and Manufacturing Company were becoming interested in the manufacture of Radio equipment for the government.

The patent situation was such that manufacturers would not accept orders for Radio apparatus unless the purchaser agreed to hold the manufacturer harmless from any damage arising out of the infringement of patents. The government as a war emergency requiring Radio apparatus as a vital necessity, agreed to save the producer harmless from infringement of patents and, therefore, with the co-operation of all, a large production program ensued and the government secured the much needed Radio equipment for the successful prosecution of the war.

(TO BE CONTINUED)

Broadcasts Another Beauty Talk

COLUMBUS, O.—The second of a series of physical education lessons by Radio was given recently by Station WPAL, the Superior Radio & Telephone Equipment Company here.

SYMPHONY RECEIVER, 3 STAGE AMPLIFIER

HOW TO OPERATE UNITS CLEARLY EXPLAINED

This Single Circuit Tuner, with Regenerative Feedback System Gives Unusual Selectivity

See Photo Diagram On Facing Page

The standard receiving set illustrated on page seven is a Symphony No. 503 detector and three stage audio frequency amplifier, manufactured by the Jones Radio Co. of Chicago, Illinois. A single circuit hook-up, comprising a tapped inductance and variable condenser in series is used. The tapped inductance is made up of the stator winding of a variocoupler and a diamond-wound coil mounted on the stator shell for building up the required inductance. The rotor of the variocoupler provides the regenerative feature, since it is connected in series in the plate circuit.

(Continued on page 13)

Amrad Two Stage Amplifier

Complete in mahogany cabinet. Wonderful buy. $40.00 value. Limited quantity.. $17.95

List Price		Our Price
$25.00	Amrad Portable Set	$22.75
40.00	Amrad Reflex Set No. 3366. Complete in mahogany cabinet	34.98
20.00	CROSLEY V. ONE TUBE SET	17.95
42.25	Erla Reflex Circuit. Complete parts to build this set, including diagram.	27.95
2.00	Filkostat	1.80
1.00	25 Ohm Rheostat	.65
.50	2" Dial	.19
.50	Fada Switch Lever	.18
25.00	DX Crystal Set, complete with Phones, ready to "listen in." Bargain	8.95
2.00	Gold Grain Detector (Panel Mtg.)	.89
2.50	Gold Grain Detector (Base Mtg.)	1.39
1.00	Variable Grid Leak (0-5)	.39
2.50	11 Plate Variable Condenser	1.16
3.50	23 Plate Variable Condenser	1.29
5.00	43 Plate Variable Condenser	1.68
.25	Spaghetti, 3 ft. (any color)	.08
1.00	Rheostat	.45
11.50	U. S. NAVY TUBE	4.95
6.50	Turney Spider Web Coils and Mtg.	3.95
3.00	Brach Lightning Arrester	1.65
1.25	Univernier with Dial (Splithair adj.)	1.08
3.50	Lefax Radio Handbook	2.98
12.00	NATHANIEL BALDWIN PHONES (MICA DIAPHRAGM)	8.35
6.50	WD-11 TUBES	5.45

Everything guaranteed as firsts. Send for Special Price List. We pay the postage.

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SPECIAL SUMMER SAVING!

On Type 400 MELCO RECEIVER

at distributor's price of only... $17.50

Regular List Price $35

Two-stage amplifying unit for use with the Melco-400, also regularly costing $35, now only $17.50

The **Melco Type 400 Radio Receiver** covers all broadcasting ranges thoroughly from 165 to 600 meters and assures a great degree of selectivity on the average small outdoor aerial. The **Melco** is the ideal summer set because it is least affected by electrical disturbances. Sold with our absolute money-back guarantee.

Shipped immediately on receipt of purchase price—F. O. B. N. Y.

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AMSCO PRODUCTS, Inc.
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Boorme & Lafayette St. New York City

AUXILIARY TUNER

THIS new instrument connected to your present receiving set with one wire enables you to easily bring in both the long and short wave stations which you cannot get with your present equipment. It also enables you to eliminate that local interference so you may listen to distant stations.

Copyrighted diagram and complete instructions for building and operating this instrument $1.00, or with all parts, including Condenser, Coils, Switches, Panel and Cabinet, $10.00. Complete instrument, $15.00. All goods prepaid.

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1925 Western Avenue, Minneapolis, Minn.

REFLEX

Erla Reflex Transformers

DEALERS: SEND FOR LITERATURE

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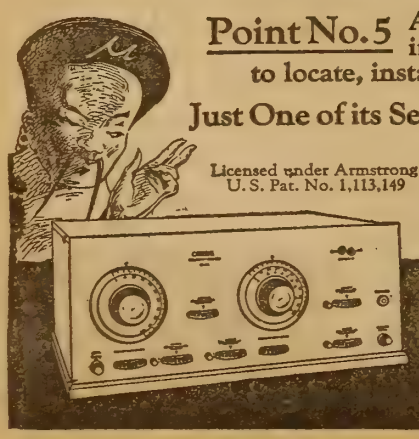
The New Grebe Broadcast Receiver



Point No. 5 A TUNING DIAL, graduated in wavelengths, enables you to locate, instantly, the station you desire.

Just One of its Seven Points of Satisfaction

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Richmond Hill, N. Y.

"MAKE PERFECTION YOUR SELECTION"

	List Price	Our Price
PHONES		
ACME—has no peer for receiving clear.	$ 8.00	$3.95
Western Electric	12.00	7.95
N. & K., 6000 Ohms	16.00	6.50
Rico, 3000 Ohms	6.50	3.95
Dictagraph, 3000 Ohms	8.00	6.50
Ambassador, 3000 Ohms	....	3.98
Nathaniel Baldwin, Original	12.00	8.75
Nathaniel Baldwin, Single, with Cord	6.00	4.45
VARIOCOUPLERS & VARIOMETERS		
Queens	5.00	1.95
Fisher	5.00	1.95
Raven	5.00	1.95
Tuska with Dial	6.00	2.95
Pathe	6.00	2.95
Columbia	6.50	3.95
Workrite	6.00	2.95
Eagle Bakelite	8.50	4.95
Fisher, Large	6.50	2.95
Pearlco Bakelite	6.50	4.45
VARIABLE CONDENSERS		
3 Plate	2.00	1.25
11 Plate	3.50	1.75
17 Plate	4.00	1.95
23 Plate	4.00	1.95
43 Plate	5.00	2.25
11 Plate Vernier	6.00	3.25
17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
43 Plate Vernier	7.50	3.95
TRANSFORMERS		
All American	....	3.95
Earla Reflex	....	4.50
Thordarson	....	2.95
Acme Audio or Radio	....	3.75
Tri-Coil Radio	....	1.50

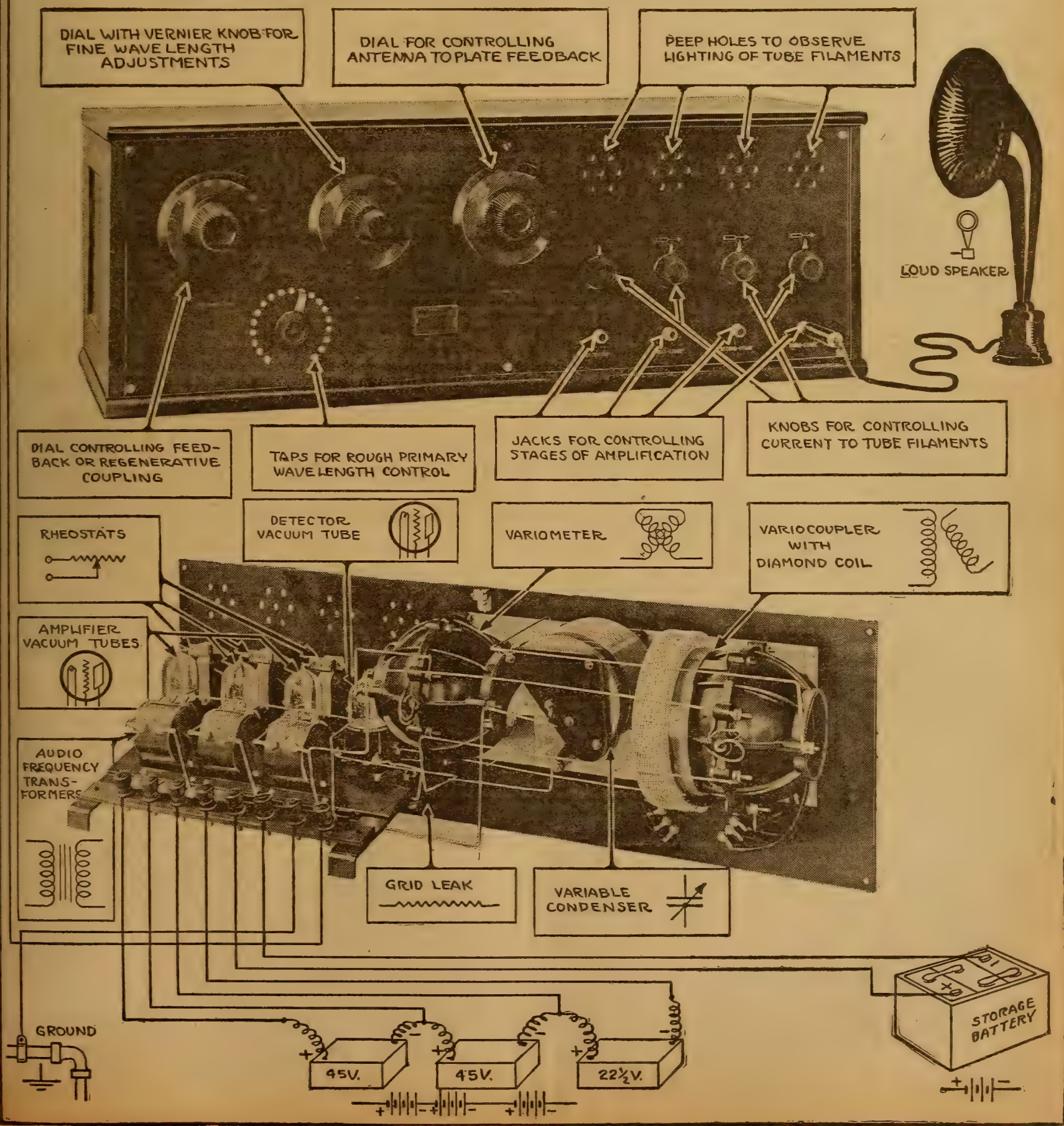
	List Price	Our Price
MISCELLANEOUS		
Tungar 5 Amp	$28.00	$22.50
Tungar 2 Amp	18.00	14.95
Mica Diaphragms	2.00	1.25
RHEOSTATS		
Cutler Hammer	....	.85
With Vernier	....	1.25
C. H. Potentiometer	....	1.25
Klosner Vernier	....	1.20
SETS		
Aeriola Jr.	18.00	5.95
Cutting & Washington 3-Tube Type II	125.00	55.00
Tuska Regenerative	35.00	22.50
Crosley Regenerative	....	19.00
Crosley 2-Step Amplifier	....	17.00
2-Step Amplifier, Assembled	....	11.95
General Radio 1-Step Amplifier	8.00	6.95
LOUD SPEAKERS		
Magnavox Type R3	35.00	24.95
Atlas	25.00	17.50
Western Electric	55.00	Special
Music Master	30.00	24.95
Wooden Horn	8.50	5.75
Aluminum Horn	10.00	4.95
TUBES		
UV-199, UV-201-A, WD-12, WD-11, All Genuine	....	5.75
VT-2 Western Electric	....	7.95
De Forest DV-6	....	3.75
UV-200	....	4.50
COMPLETE PARTS FOR		
Flewelling Circuit	....	13.95
Reinartz Circuit	....	11.95
Neutrodyne Circuit	....	35.00
Cockaday	....	13.95
2-Step Amplifier	....	9.95

PERFECTION RADIO CORPORATION, 59 Cortland St., NEW YORK CITY
Six New York Retail Stores Add Parcel Post Do Not Send Stamps

Radio Receiving Sets

The Symphony Receiver and Amplifier

As another of the series of standard receiving sets, Radio Digest presents herewith the photo diagram of the Symphony No. 503 detector and three stage audio frequency amplifier, manufactured by the Jones Radio Co. of Chicago, Illinois. This receiver combines a single circuit hook-up with a variometer connected between the aerial and plate circuit. A tapped inductance is connected in series with an antenna tuning condenser. These two working in conjunction enable the operator to select the proper values of inductance and capacity. As a result, selective tuning is unusually efficient. Naturally this type of hook-up makes the circuit regenerative, licensed under Armstrong patent 1,113,149. Operating instructions and description will be found on page six. Although the reader may not own a Symphony, points of similarity in standard receivers will repay him for studying the diagram.



Radiophone Broadcasting Stations

Corrected Every Week—Part I

AA3, Denver, Colo. 440 meters. 1,500 mi. Fitzsimmons Gen. Hospital. (Educational Dept. U. S. Army). Fri. 8-9 pm, music, entertainment. Mountain.
AQ6, Canton, O. 425 meters. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.
AS6, San Antonio, Tex. 360 meters. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.
AV7, St. Paul, Minn. 400 meters. 500 mi. 6th Inf. Minn. Nat'l Guard, St. Paul Armory. Daily ex Sun. 2-2:30 pm, music, announcements. Tues, 8:30-10 pm. Thurs, 8:30-9:15 pm. Central.
BEI, Tacoma, Wash. 400 meters. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Thurs, Sun, 6-7 pm, music, announcements, lectures. Pacific.
CFAC, Calgary, Alta., Can. 430 meters. 1,000 mi. Calgary Daily Herald. Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 meters. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45 pm, concert. Eastern Daylight Saving.
CFCB, Vancouver, B. C., Can. 440 meters. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.
CFCE, Halifax, N. S., Can. 440 meters. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Monday, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. 400 meters. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.
CFCK, Edmonton, Alta., Can. 410 meters. Radio Supply Co. Daily ex Sun, 8-8:30 pm, music. Sun, 3:30-4:30 pm, Concert. Mountain.
CFCN, Calgary, Alta., Can. 275, 440 meters. 1,500 mi. W. W. Grant Radio Ltd. Slogan, "Voice of the Prairies." Mon, 9 pm, music. Fri, 10:30-12:30 pm, dance music. Sat, 10-12 pm. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.
CFCX, London, Ont., Can. The London Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Can. Marconi Co. No regular program.
CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Motreal, Que., Can.. B. L. Silver.
CHYC, Montreal, Que., Can. 410 meters. 1,500 mi. Northern Elec. Co. No regular schedule.
CHXC, Ottawa, Ont., Can. 450 meters. 50 mi. J. B. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.
CJBC, Montreal, Que., Can. 420 meters. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.
CJCA, Edmonton, Alta., Can. 450 meters. 1,000 mi. Edmonton Journal, Ltd. Slogan, "The Sunniest Spot in Sunny Alberta." Club, "Igloo Hut." Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour. 8:30-9:30 pm, concert, reports. Tues, 11-12 pm, Club. Mountain.
CJCB, Nelson, B. C., Can. 400 meters. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 meters. 200 mi. T. Eaton Co., No regular program.
CJCE, Vancouver, B. C., Can. 420 meters. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 meters. 75 mi. McLean, Holt & Co., Ltd. Mon, Wed, Fri, 7:30-9 pm, music. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCX, Olds, Alta., Can. 400 meters. 1,500 mi. Percival W. Shackleton. Tues, Thurs, 9:45-11 pm, music. Sat, 8:45-10 pm, music. Mountain.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 meters. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
CJNC, Winnipeg, Man., Can. 400 meters. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm, Fri, 8-10. Alternate Sun, 8:30-10 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram. Licensed only.
CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily ex Sun, 2 pm, 3:30, weather, news, markets. 5-5:15, music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-10 concert, Sun 4-5:30 pm, music. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9 concert. Sun, 9 pm, sacred concert. Mountain.
CKCR, St. John, N. B., Can. 400 meters. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.
CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.
CKOC, Hamilton, Ont., Can. 410 meters. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 meters. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKY, Winnipeg, Man., Can. 450 meters. 500 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-1:45 pm, news, markets, music; 1:45-2:00 pm. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDKA, E. Pittsburgh, Pa. 326 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. 270 meters. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 360 meters. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Sun, 11:30-12:00 am, sermon. Pacific.
KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.
KDYM, San Diego, Calif. 252 meters. Savoy Theater.
KDYQ, Portland, Ore. 360 meters. 200 mi. Oregon Institute of Technology. Temporarily discontinued.
KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.
KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Hughes & Co. Temporarily discontinued.
KDYX, Honolulu, T. H., Hawaii. 360 meters. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.
KDZB, Bakersfield, Calif. 360 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.
KDZE, Seattle, Wash. 360 meters. 500 mi. Seattle Radio Assn. Daily ex Sun, 10:30-11 am. 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed. 8-9 pm, concert. Pacific.
KDZF, Los Angeles, Calif. 278 meters. Automobile Club of Southern California.
KDZI, Wenatchee, Wash. 360 meters. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.
KDZK, Reno, Nev. 360 meters. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal). Sun, 7-8 pm. Pacific.
KDZQ, Denver, Colo. 360 meters. Pyle & Nichols.
KDZR, Bellingham, Wash. 261 meters. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZT, Seattle, Wash. 360 meters. Seattle Radio Assn.
KFAD, Phoenix, Ariz. 360 meters. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock reports. Mountain.
KFAE, Pullman, Wash. 360 meters. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.
KFAF, Denver, Colo. 360 meters. 1,500 mi. Western Radio Corp. Slogan, "Voice from the Rockies—Out Where the West Is." Daily ex Wed and Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 360 meters. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Ida. 360 meters. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.
KFAP, Butte, Mont. 360 meters. Standard Pub. Co.
KFAQ, San Jose, Calif. 360 meters. City of San Jose.
KFAR, Hollywood, Calif. 280 meters. Studio Lighting Service Co.
KFAT, Eugene, Ore. 275 meters. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Pacific.
KFAU, Boise, Ida. 270 meters. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.
KFAV, Venice, Calif. 258 meters. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.
KFAW, Santa Ana, Calif. 360 meters. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.
KFAY, Medford, Ore. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.
KFBB, Havre, Mont. 360 meters. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.

Serially Continuously—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-fourth appearing this week, the second quarter to appear next week, and the third part the week following and the fourth will have the state, city and station index.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

KFBC, San Diego, Calif. 278 meters. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.
KFBE, San Luis Obispo, Calif. 360 meters. 50 mi. R. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.
KFBG, Tacoma, Wash. 360 meters. First Presbyterian Church.
KFBK, Sacramento, Calif. 283 meters. 300 mi. Kimball-Upson Co. Slogan, "Heart of California." Daily ex. Sun, 6-6:45 pm, concert, news, codes. Wed. 8-9:30 pm, concert. Sun, 10-11 am, church service; 8-9 pm, concert Pacific.
KFBL, Everett, Wash. 224 meters. 50 mi. Leese Bros. Daily ex Sun, 7:15-8:15 pm. Sun, 2-3 pm. Pacific.
KFBS, Trinidad, Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. 360 meters. Bishop N. S. Thomas.
KFCD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.
KFCF, Walla Walla, Wash. 360 meters. Frank A. Moore.
KFCH, Billings, Mont. 360 meters, 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. 360 meters. Colorado Springs Radio Co.
KFCL, Los Angeles, Calif. 360 meters. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am. 1:15-1:45 pm, 4-4:30, 8-8:20, live stock reports. Thurs, 9-9:20 pm. Pacific.
KFCM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Slogan, "Out Where the West Ends." Daily ex Sun, 1-2 pm, music. Tues, Fri, 8-9 pm, music. Pacific.
KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare.
KFCV, Houston, Tex. 360 meters. 1000 mi. Fred Mahaffey, Jr. Daily ex Sun, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, entertainment. Central.
KFCY, Le Mars, Ia. 360 meters. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.
KFCZ, Omaha, Neb. 360 meters. Omaha Central H. S.
KFDA, Baker, Ore. 360 meters. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFDB, San Francisco, Calif. 509 meters. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures; 7-7:30 pm, reports. Pacific.
KFDI, Spokane, Wash. 285 meters. 25 mi. E. B. Craney. Temporarily discontinued.
KFDD, Boise, Idaho. 252 meters. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.
KFDF, Casper, Wyo. 360 meters. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.
KFDH, Tucson, Ariz. 360 meters. 200 mi. Univ. of Ariz. Temporarily discontinued. Mountain.
KFDJ, Corvallis, Ore. 360 meters. Oregon Agri. College.
KFDL, Denver, Colo. 360 meters. Knight-Campbell Music Co.
KFDO, Bozeman, Mont. 360 meters. H. Everett Cutting.
KFDP, Des Moines, Iowa. 278 meters. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3-3:45 pm, reports, music. Mon, 9-11 pm, music. Thurs, 9-11 pm, music, entertainment. Central.
KFDR, York, Neb. 360 meters. Bullock's.
KFDS, San Francisco, Calif. 360 meters. John D. McKee.
KFDU, Lincoln, Neb. 240 meters. Neb. Radio Elec. Co.
KFDV, Fayetteville, Ark. 360 meters. 300 mi. Gilbrech & Stinson. Slogan, "Southern Gateway to the Ozarks." No regular schedule. Central.
KFDX, Shreveport, La. 360 meters. First Baptist Church.
KFDY, Brookings, S. D. 360 meters. S. D. State College of Agri. & Mech. Arts. Mon, Sat, 8:30 pm, music. Tues, Thurs, 11 am, music, lectures, news. Central.
KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.
KFEC, Portland, Ore. 360 meters. 75 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, weather, reports; 4-5 pm, music; 6:30 pm, weather, crop, markets, reports. Thurs, 9-10 pm, concert. Sat, 11 am 12 m, children's hour. Pacific.
KFEJ, Tacoma, Wash. 360 meters. Guy Greason.
KFEL, Denver, Colo. 360 meters. Winner Radio Corp. Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4 pm, music. Mon, Fri, 9-10 pm, 12-1 am, concerts. Sun, 9-10 am, church services. Mountain.
KFEP, Denver, Colo. 240 meters. Radio Equipment Co.
KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.
KFER, Fort Dodge, Ia. 231 meters. Auto Electric Service Co.
KFEV, Douglas, Wyo. 263 meters. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.
KFEX, Minneapolis, Minn. 275 meters, 600 mi. Augsburg Seminary. Mon, Wed, Fri, 10:30 am, chapel. Tues, Sat, 6 pm, music. Sun, 9:15 pm, church services. Central.
KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.
KFEZ, St. Louis, Mo. 360 meters. American Society of Mech. Engrs.
KFFA, San Diego, Calif. 244 meters. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.
KFFB, Boise, Ida. 273 meters. 70 mi. Jenkins Furn. Co. (Owyhee Hotel). Daily, 8-9 pm, concert. Mountain.
KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.
KFFO, Hillsboro, Ore. 229 meters. Dr. E. H. Smith.
KFFP, Moberly, Mo. 275 meters. 300 mi. First Baptist Church. Slogan, "The Gospel Messenger of the Air." Sun, 10:45 am, 8 pm, church services. Central.
KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Marksheffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.
KFFR, Sparks, Nev. 360 meters. 50 mi. Jim Kirk. Wed, Fri, 8-9 pm, "Sagebush Canaries." Pacific.
KFFV, Lamoni, Iowa. 360 meters. 600 mi. Graceland College. Wed, 9:20 am, music appreciation. Thurs, 8 pm, entertainment. Central.
KFFX, Omaha, Nebr. 278 meters. 600 mi. The McGraw Co. Daily, 2:30-3:50 pm. Central.
KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.
KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes Amusement Co.
KFGC, Baton Rouge, La. 254 meters. Louisiana State University. No regular schedule.
KFGD, Chickasha, Okla. 248 meters. 50 mi. Chickasha Radio & Elec. Co. Slogan, "Queen of the Washita." Daily ex Sun, 11:30-12 am; 9-9:30 pm, music. Central.
KFGH, Stanford Univ., Calif. 360 meters. 500 mi Leland Stanford Junior University. No regular schedule.
KFGJ, St. Louis, Mo. 266 meters. National Guards Missouri.
KFGL, Arlington, Ore. 234 meters. Arlington Garage.
KFGP, Cheney, Kans. 229 meters. Cheney Radio Co.
KFGQ, Boone, Ia. 226 meters. Crary Hardware Co.
KFGV, Utica, Nebr. 224 meters. 50 mi. Heidbreder Radio Supply Co. No regular schedule.
KFGX, Orange, Tex. 250 meters. First Presbyterian Church. Sun, 11 am, 7:30 pm, church services. Central.
KFGY, Baudette, Minn. 224 meters. Gjelhaug's Radio Shop.
KFGZ, Berrien Springs, Mich. 268 meters. Emanuel Missionary College.
KFHA, Gunnison, Colo. 360 meters. Colorado State Normal School. "Where the Sun Shines Every Day." Daily ex Sun, 8:30 am, weather, markets. Tues, 7:30 pm, entertainment. Mountain.
KFHB, Hood River, Ore. 280 meters. 50 mi. P. L. Boardwell. Daily ex Mon, 6:20-6:35 pm, sports, news. Sun, 1-1:45 pm, music. Special programs 11 pm. Pacific.
KFHD, St. Joseph, Mo. 226 meters. 50 mi. Utz Electric Co. Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat, 8-9:30 pm, concert. Central.
KFHF, Shreveport, La. 266 meters. Central Christian Church.
KFHH, Neah Bay, Wash. 283 meters. Ambrose A. McCue.
KFHI, Wichita, Kans. 224 meters. Charles V. Dixon.
KFHJ, Santa Barbara, Calif. 360 meters. Fallon Company.
KFHL, Oskaloosa, Ia. 227 meters. Penn College.
KFHP, Kearney, Neb. 246 meters. Radio Bug Products Co.
KFHQ, Los Gates, Calif. 242 meters. Curtis Bros. Hdwe. Store.
KFHR, Seattle, Wash. 270 meters. Star Elec. & Radio Co.
KFHU, Mayville, N. D. 261 meters. M. G. Satereu.
KFHY, Trinidad, Colo. 242 meters. R. S. McEwan.
KFI, Los Angeles, Calif. 469 meters. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 5-6 pm, 6:45-7:30 pm. 8-11 pm, Wed, Fri, Sat, 8-12 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.
KFIB, St. Louis, Mo. 244 meters. Franklin W. Jenkens.
KFIC, Denver, Colo. 224 meters. Phillip Laskowitz.
KFID, Iola, Kans. 246 meters. Ross Arbuckles Garage. Daily, 5:15-5:45 pm. Mon, Thurs, Sat, 7:30-8 pm. Tues, Sat, 9-10 pm. Central.
KFIF, Portland, Ore. 360 meters. Benson Tech. Student Body.
KFIJ, Platte, S. D. 236 meters. Sidney I. Thorean.
KFIK, Gladbrook, Iowa. 234 meters. Gladbrook Elec. Co.
KFIL, Louisburg, Kans. 234 meters. Windisch Elec. Farm Equip. Co.
KFIO, Spokane, Wash. 252 meters. North Central High School.
KFIQ, Yakima, Wash. 224 meters. 200 mi. Yakima Valley Broadcasting Assn. Slogan, "The Station That Will Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Fri, 8-9 pm, concert. Pacific.
KFIU, Juneau, Alaska. 226 meters. Alaska Elec. Light & Power Co.
KFIV, Pittsburg, Kans. 240 meters. V. H. Broyles.
KFJA, Grand Island, Nebr. 244 meters. Central Power Co.
KFJB, Marshalltown, Iowa. 248 meters. Marshall Elec. Co.
KFJD, Greeley, Colo. 236 meters. 300 mi. Weld County Printing & Pub. Co.
KFKA, Greeley, Colo. 248 meters. Colorado State Teachers College.
KFKH, Lakeside, Colo. 226 meters. Denver Park Amusement Co.
KFLE, Denver, Colo. 268 meters. National Educational Service.
KFZ, Spokane, Wash. 283 meters. 300 mi. Doerr-Mitchell Elec. Co. Slogan, "In the Heart of the Inland Empire." Tues, Fri, 7:30-9 pm, music. Sun, 6-7 pm. Pacific.
KGB, Tacoma, Wash. 360 meters. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.
KGG, Portland, Ore. 360 meters. 500 mi. Hallock & Watson Radio Service. Slogan, "The Rose City." Daily ex Sun, 5-6 pm, music, entertainment 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.
KGN, Portland, Ore. 360 meters. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 360 meters. 300 mi. Altadena Radio Lab. No regular schedule.
KGU, Honolulu, Hawaii. 360 meters. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 492 meters. 1,500 mi. Oregonian Pub. Co. Slogan, "KGW, Keep Growing Wiser." Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30 pm, weather, 10-11 pm, music. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 7-7:30 pm, lecture; 11-12 pm, Hoot Owls. Sun, 7-8 pm, concert. Pacific.
KGY, Lacey, Wash. 258 meters. 250 mi. St. Martins College. Slogan, "Out Where the Cedars Meet the Sea." Tues, Fri, Sun, 8:30-9:30 pm, news, concert, lecture, bedtime story. Pacific.
KHJ, Los Angeles, Calif. 395 meters. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific.
KHQ, Seattle, Wash. 360 meters. Louis Wasmer.
KJQ, Stockton, Calif. 360 meters. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.
KJR, Seattle, Wash. 270 meters. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.
KJS, Los Angeles, Calif. 360 meters. 100 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30 pm, 6-6:45, 8-9, church services. Pacific.
KLN, Del Monte, Calif. 261 meters. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Tues, Fri, 7-7:30 pm, 8-8:30, concert. Pacific.
KLS, Oakland, Calif. 360 meters. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm. Sun, 12-1 pm. Pacific.
KLX, Oakland, Calif. 360 meters. 500 mi. Oakland Tribune. Daily ex Sun, 3:15-5:15 pm, sports; 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.
KLZ, Denver, Colo. 360 meters. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.
KMJ, Fresno, Calif. 360 meters. 300 mi. San Joaquin Lt. & Pr. Corp. Sun, 8-10 pm, music. Pacific.
KMO, Tacoma, Wash. 360 meters. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7 pm, 9:15-10, concert, news, lecture. Pacific.
KNT, Aberdeen, Wash. 263 meters. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert. Pacific.
KNV, Los Angeles, Calif. 360 meters. Radio Supply Co.
KNX, Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.
KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.
KOP, Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.
KPO, San Francisco, Calif. 423 meters. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 1-2 pm, 4:30-5:30 pm, music. Mon, Tues, Thurs, Sun, 8-10 pm, concert, lectures. Sat, 8-12 pm, music. Sun, 11-12:30 pm, church services. Pacific.
KQI, Berkeley, Calif. 360 meters. Univ. of Calif.
KQP, Hood River, Ore. 360 meters. Apple City Radio Club. Slogan, "Apple City of the West." Mon, Wed, Fri, 6:30 pm, music. Wed, 9 pm, special. Pacific.
KQV, Pittsburgh, Pa. 360 meters, 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.
KQW, San Jose, Calif. 360 meters. 1000 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.
KRE, Berkeley, Calif. 278 meters. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.
KSD, St. Louis, Mo. 546 meters. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Central.
KSL, San Francisco, Calif. 360 meters. 50 mi. The Emporium. Temporarily discontinued.
KSS, Long Beach, Calif. 229 meters. Prest & Dean Radio Co. No regular schedule.
KTW, Seattle, Wash. 360 meters. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.
KUO, San Francisco, Calif. 360 meters. 1,500 mi. San Francisco Examiner. Slogan, "The Voice of the West." Daily ex Sun, 9-10 am, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 m, 6:45 pm, weather reports. Sun, 9-10 am, 5-6 pm, news. Pacific.

(NOTE—The second part of the station schedule list will appear next week.)

ADVANCE PROGRAMS

(Continued from page 4)

8:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 8:00 P. M., Recital.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, Rachael Thompson; Talk by an eminent psychoanalyst; Concert, Irving Crocker, baritone; Bernard Eyges, pianist.

WGY (Eastern, 380), 7:35 P. M., Talk, "Pike and Pickerel Fishing," Jud Landon; 7:45 P. M., Program, Salvation Army Band, Samuel Slater, director; "Omnipotence," Band; "Scenes That Are Brightest," Arthur Stone, cornetist; "The Ideal Man," Lillian Marsh, reader; "Gems of Haydn," Band; Euphonium solo, "Rocked in the Cradle of the Deep," Albert Tompkins; "La Chute," from "Les Miserables," Mme. Chantemerle, reader; "Andante," Brass quartet; "American Melodies," Band; "Heroisme de L'Obeisance passive," Mme. Chantemerle; "Hoffeld," Band; Euphonium solo, "By the Sea," John Galloway; "Mardstone," "Penzance," Band.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Mrs. Jane Webster Murrell: Sunday school lesson, David Sweets; Talk, Mrs. Chas. B. Semple; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bocawitz, Germantown Theater; 3:00 P. M., Artist recital; 7:00 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talks; Musical program; 9:00-9:30 P. M., Organ recital, Karl Bonawitz.

WJAX (Eastern, 390), 8:00 P. M., Concert, W. Tech Girls' Band and Bamboo Garden Orchestra.

WLW (Eastern, 309), 10:30 P. M., Musical program, Elmer Behne's Dance Orchestra; Vocal solo, Mrs. C. Fern Flint; Vocal duet, "When the Great Red Dawn Is Shining," Mrs. C. Fern Flint, Mr. A. J. McClintoc: "Concerto," Harry Tomarin, violinist; Old songs with guitar accompaniment, Ed Decker, tenor; Elmer Behne's Dance Orchestra; Vocal solo, A. J. McClintoc; "In the Garden of Your Heart," "Oh, That We Two Were Maying," Mrs. C. Fern Flint, A. J. McClintoc; Harry Tomarin, violinist; Elmer Behne's Dance Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program furnished by Lyceum Arts Conservatory; 7:00 P. M., Talk, "Auto Trails," Rockwell Stephens; Talk "A Scout Citizen," G. L. Schemburg; Radio lesson in syncopation, Axel Christensen; 9:15 P. M., Vocal selections, Giobanni Gennaro, tenor.

WMC (Central, 500), 8:30 P. M., Concert, Hotel Chisca Philharmonic Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., News Orchestra; Town Crier; Laura Henkel, soprano; Gordon Marsh, violinist; Mrs. Herbert Ziel, soprano; 10:00 P. M., Concert, News Orchestra; Laura Henkel, soprano; Gordon Marsh, violinist; Mrs. Herbert Ziel, soprano.

Friday, July 20

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "May-Day," Star Orchestra; Thomas Dunn, baritone; "Canzonetta," Orchestra; "Prelude to the Deluge," Harry Adaskin, violinist; "Gondoliera," Orchestra; Thomas Dunn, baritone; "A Day in Venice," Orchestra; "Mazurka," Harry Adaskin; Thomas Dunn, baritone; "Entrance of the Rosaren," Orchestra.

KDKA (Eastern, 326), 7:26 P. M., Concert, E. Pauline Keys, pianist; Charles Wyllis Hall, tenor; Leo Kruzcek, violinist.

KGW (Pacific, 492), 8:00-8:45 P. M., Concert, George Olsen's Orchestra; 8:45-9:00 P. M., Vocal solos; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra; 11:00-12:00 P. M., Hoot Owls.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Concert; 6:45-7:30 P. M., Children's hour, "Uncle John"; 800-10:00 P. M., De Luxe program; Address, Dr. Eugene Francis Storkes.

KSD (Central, 546), 8:00 P. M., Opera, "The Merry Widow," Open Air Theater, Forest Park.

KYW (Central, Daylight Saving, 345), 10:00-11:30 P. M., Musical program, Cope Harvey's Orchestra; Herb Mintz, pianist; Harry Geise.

WBAP (Central, 476), 9:30-10:45 P. M., Concert Double Octette of the First Methodist Church.

WBZ (Eastern, 337), 7:00 P. M., Concert, Alice Brigham, pianist; WBZ Trio; 8:20 P. M., Bedtime stories for grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:45 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00 P. M., Song recital, talk, Betsy Logan; 4:30-5:55 P. M., Dance music; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00 P. M.-1:00 A. M., Song recital, dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Songs by Harry Glyn.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Talk, "Tasty Things to Eat," Vaughn De Leath; Recital, Frank Marone, violinist; "Where the Sacramento River Flows," "Susan," "Drowsy Head," "The World Is Waiting For The Sunrise," Ada Gist, singer; Pearl O'Neil, reader; 11:00-12:00 P. M., Concert, Broadway Musical Alphas.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "John, The Apostle," Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Musical program, Joseph Ramsay Brown, tenor; Alex B. Kennedy and assisting singers.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Recital, Loretta Kerk, pianist; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00 P. M., Children's Own Half Hour, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "Silversmith Series," David M. Cheney; Concert, Mary Flaherty, soprano.

WGY (Eastern, 380), 7:45 P. M., Music program, "Valse Arabesque," Katharine D. Seaver, pianist; "April Morn," Celia Lamson Herrington, soprano; "On the Road to Mandalay," "The Voice of the Sword," Walter J. Thomas, baritone; "If," Ruth Edmonds, reader; "Serenade," Katharine D. Seaver; "Comin' Through the Rye," "Bonnie, Sweet Lassie," Celia Lamson Herrington; "Dreaming Alone in the Twilight," "Boy o' Dreams," Walter Thomas; "Pillow Fight," "Jane, the Disturber," Ruth Edmonds; "Greeting," Celia L. Herrington; "The Mallets Masterpiece," Ruth Edmonds; "Because," Walter Thomas; "Valse Impromptu," Katharine D. Seaver; 10:00 P. M., "Vyskocila," The Solka Orchestra; "Spring's Awakening," Ethel Thomas, soprano; "Myslivicek," Orchestra; "Columbine," James Early, pianist; "Koline, Koline," Orchestra; "Roses, Roses, Everywhere," Ethel Thomas; "Vlastovicka Lita," Orchestra; "Sequidilla," James Early; "Vsecky Mysl na sebo," Orchestra; "Hope On," "Lovely Celia," Ethel Thomas; "Green Groves," Orchestra; "Rhapsody in G Minor," James Early; "Sousedska," Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Shawnee Terrace Dance Orchestra; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Song recital, 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program arranged by Columbia School of Music; 7:00 P. M., Musical lecture, Mrs. Mark E. Oberndorfer; 9:15 P. M., Vocal selections, Carl Craven, tenor.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOO, (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., Recital; 8:45 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., News Orchestra; Town Crier; Julia Wenderph, soprano; Schmeman's Band.

Saturday, July 21

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, selection from "Carmen," Star Orchestra; Ernest Morgan, baritone; "Traumeri," Jaques Sterin, cellist; "Orientale," Orchestra; Ernest Morgan, baritone; "Caprice Veinnois," Harry Adaskin; "Dance Trepak," Orchestra; W. Woods, cornetist; Ernest Morgan, baritone; "You're in Love," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Westinghouse Band, T. J. Vastine, director; Nazareno La Marca, tenor.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's stories, Aunt Nell; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30 P. M., Matinee musical, Harry J. Beardsley, baritone, reader and author; Edwin Jacobson, violinist; 8:00-10:00 P. M., De Luxe program, Naomi Sweeney Brown, whistler.

KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Jewell Floyd, soprano; Jean St. Anne, baritone; Cope Harvey's Orchestra; Harry Geise; 9:05-9:25 P. M., "Under the Evening Lamp," Youth's Companion.

WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum.

WBZ (Eastern, 337), 7:00 P. M., Concert, Old Fashioned Minstrels; Joe Norcross; Mary L. Waters, accordian; Frank Chase, pianist; 8:20 P. M., Bedtime story for grown-ups, Orison S. Marden.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Song revue, Vaugh De Leath.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comments," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Mrs. Margie Reagan Cate, reader; Mrs. Cecil Obenchain Reims, violinist; 11:00-12:00 P. M., Recital, Martha M. Whitaker, pianist; Mr. and Mrs. Walter J. Fried, violinists.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "New England Business Problems," Arthur R. Curpick; Radio drama, Amrad Players.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Musical program, Myrtle George Stinger, soprano; Mrs. Mary Belle Bennett, reader; Mrs. Murray Nicol, soprano; Paul Kelley, tenor; Gaye McBride, baritone; Reading, "An Interesting Historical Episode;" Concert, Mary Anderson Theater Orchestra.

WMAQ (Central, Daylight Saving, 448), 8:00-9:00 P. M., Concert, Chicago Theater talent.

WMC (Central, 500), 8:30 P. M., American Legion program.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Schmeman's Band.

Sunday, July 22

KYW (Central, Daylight Saving, 345), 7:30 P. M., Church services; Sermon, Rev. E. G. Dahlin, pastor of the Swedish Congregational Church.

WBZ (Eastern, 337), 7:30 P. M., Church services; Rev. E. G. Dahlin, pastor of the Swedish Congregational Church.

WFAA (Central, 476), 2:30-3:30 P. M., Bible class, Dr. William M. Anderson, Jr., pastor of First Presbyterian Church; 9:30-10:00 P. M., Musical program, Male Quartet from Church of the Incarnation; 10:00-11:00 P. M., Concert, Britling's Dallas Cafeteria Orchestra, Lou Goldberg, director.

WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Church services; 7:30 P. M., Church services, Arch Street Presbyterian Church.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., Adventure hour, Youth's Companion; Concert, Edison Laboratory Phonograph; 8:30 P. M., Talk, "World Unity," conducted by Mass. Federation of Churches; Musical program, Mrs. Jessie Whitworth, soprano; Fred Hayes, soloist.

WGY (Eastern, 380), 9:30 A. M., Church services, First Reformed Church; Sermon, Rev. Clayton J. Potter; 6:30 P. M., Studio services; Sermon, "The Voices of God's Trees," Rev. Robert W. Anthony, First Presbyterian Church.

WHAS (Central, 400), 9:57 A. M., Organ; 10:00 A. M., Church services, Associate Reform Presbyterian Church; Rev. H. B. Blakely, pastor; 4:00-5:00 P. M., Concert, Central Christian Church.

WMC (Central, 500), 11:00 A. M., Church services, St. Mary's Episcopal Cathedral.

WWJ (Eastern, 517), 11:00 A. M., Church services, St. Paul's Episcopal Cathedral; 4:00 P. M., Concert, Schmeman's Band; 5:00 P. M., Concert, News Orchestra.

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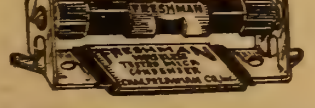

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(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:30	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba.	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	360	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 9:00	5:30- 6:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WEAF, New York, N. Y.	492	5:30- 8:00	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	4:30- 5:00	4:30- 5:00	4:30- 9:30	4:30- 5:00	6:30- 8:30	7:00-10:00	5:30- 6:30
WGI, Medford, Mass.	360	.....	7:30- 9:00	5:45- 7:30	8:30-10:00	8:30-10:00	7:30- 9:00	8:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	7:00- 8:00	6:30- 7:30
WHA, Madison, Wis.	360	7:00- 9:00	7:00- 8:00	7:00- 8:00	7:00- 9:00	7:00- 8:00	7:00- 8:00	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	390	5:00- 5:30	5:00- 5:30	7:00- 8:45	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:45
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 5:30	5:00- 5:30	8:10-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	6:30- 8:00	.....	.....	.....	6:30- 8:00	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00	.....	.....	.....	6:00- 9:00	.....	.....
WOR, Newark, N. J.	405	7:00-10:00	5:15- 6:30	7:00-10:00	5:15- 6:30	5:15- 6:30	7:00-10:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	6:30- 7:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	.....	6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

Monday, July 23

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theatre; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00 P. M., Arcadia Cafe Concert Orchestra; Talk, Betsy Logan; 4:30-5:55 P. M., Song recital.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Musical program; 3:45 P. M., Song recital; Piano selections; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00 P. M., Children's Own Half Hour, by Cousin Sue.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Prelude in G Minor," Edna Schuyler, pianist; "Just a Little Joy Ride," Rosina Holmes, reader; "There's a Lark in My Heart," Mrs. Fred Harris, contralto; Address, "Roshanara Goes Camping," "The Butterfly," Edna Schuyler; "Invocation to Life," Mrs. Fred Harris; "The Sign of the Cross," Rosina Holmes, reader; "Homing," Mrs. Fred Harris; "A Sisterly Scheme," Rosina Holmes; "Liebestraume," Edna Schuyler.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Lena Pope, pianist and singer.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Musical program; 6:45 P. M., Radio Baseball Dope, by Monte Cross, old-time baseball star; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00-9:00 P. M., Zoo Opera Company; 9:00-9:30 P. M., Roger Hill Dance Orchestra; Talk, "Useful Hints to Campers," Jay P. Gariough, editor of the "Sportsman's Digest;" 9:45-10:15 P. M., The Zoo Opera Company.

WMC (Central, 500), 8:30 P. M., Concert, Hotel Gayoso Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., WOO Orchestra; Robert E. Golden, director; 9:30 P. M., Organ recital, Mary E. Vogt.

A Radio set was recently installed in the Assembly in Albany, N. Y., so that members can listen in on concerts and other entertainments during their dull periods.

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone State 4844-4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. VI Chicago, Saturday, July 21, 1923 No. 2

Growing Usefulness

Private Communication and Testing Disease

IN THE press dispatches we read that the governor of the state of New York addressed the people of the entire commonwealth by Radio. He sat in the governor's chair in the executive suite where Radio experts had prepared the proper transmitting devices. Out in California the president of a transporting company Radioed his address at the annual meeting so that the various communities in the central portion of the state, served by the company, could hear him speak. The announcement comes that an invention has been perfected to solve the problem of maintaining privacy in Radio communication. Dr. Albert Abrams of San Francisco announces the invention of a super Radio set to test disease. And so it goes.

Radio today is annihilating distance. Its greatest usefulness will be felt when through unified organization the service of experts can be broadcast to the people of the country on a definite schedule.

Interest Increases in Learning Code

When Signals Are Mastered the Enjoyment Is Broadened

USUALLY the beginner, upon hearing some code signals, will throw up his hands and proceed to condemn such stations for interference with his broadcasting program. If, on the other hand, such a man would take the trouble to learn this same code, he would find his fun increased 100 per cent.

The code is not such a difficult thing to learn, if the beginner will but sit down and practice it every night for an hour or so. It is just like learning the piano; it is mostly practice. Do not think by listening to it once in a while for a brief spell that you will soon be in a position to receive everything that goes through the air, because you will surely be disappointed. Practice, with a capital P, is what is needed.

Before any receiving is to be attempted, first get a buzzer, a battery and a key, and practice sending until you have learned all the characters. Be sure to include the numerals in this practice, and although they are not hard to remember, they sometimes prove confusing when receiving a higher rate of speed.

Demand Is for Quality

Critics Insist That Stations Produce Best Talent

WHEN Radio broadcasting first became popular the person listening in was thrilled upon recognizing sounds as music or as someone was speaking. This listener in was generally, at that time, an amateur Radio telegraph operator, as no one yet had purchased apparatus to listen to the experiments being conducted by one of two prominent Radio experts. In fact the Radio amateur may be said to be the one who sold Radio broadcasting to the public, for the average person usually wants to have a demonstration before he invests money in a new idea.

Since that day many changes have taken place. The public has become a large body of critics and the big station of today, to court favor, must produce the goods. The Radio listener of today, generally a man, woman or child without any knowledge of the Radio code, and probably not much interest in it at that, sits back and carefully compares the quality of the different stations within reach of his apparatus. The average person has now become quite well acquainted with needed apparatus and how to operate it to get best results.

It is needless to say that the period of wonderment has passed and the one who listens in realizes that the quality of music and talent from the original broadcasting station could be very much improved.

Radio will be a part of every household for the same reason that the phonograph became successful. People want music and instead of going to the music, it is now brought to them. From the present viewpoint, there is yet no limit to what Radio may be called upon to do, but it is not necessary to here repeat the many and varied activities to which Radio can be applied.

RADIO INDI-GEST

INDI-GEST BORED TO TEARS WHEN SONGSTRESS PUTS HERSELF ON AIR

WALLA WALLA. — Indi - Gest, famous builder of the nameless broadcaster on this notorious isle, was overcome with emotion yesterday evening as the sun was rising when the postman delivered the noon mail. The cause, as many had very improperly hypothecized, was not due to drawing his boots over a bunion, but was found to be the receipt of a hand painted snapshot of his friend Yuma Yama, prima donna of awful repute.

"Many's the time we have eaten missionaries together," said Mr. Gest when interviewed almost exclusively for this column. "And now to think," continued he gravely, "Yuma has volunteered her services free, gratis, and without charge, that her slightly cracked voice may be graven on the Walla Walla microphone. Why, her singing will bring the house down." As a precautionary measure, however, the cables will be doubled by Mike and Izzy, the antenna raisers, so that Yuma's voice will not bring down the antenna as well.

Caught as Catch Could

Said a Radiophan,
As he tuned in his set:
"This is catch-as-catch-can,
I must take what I get."
Then he turned on a wheel
And the stuff that he got—
A political spiel—
Made him swear quite a lot.

WALT DRUMMOND

So Is this Joke

Dear Sir: Suthin's gottabe did. Yessir, things is almost miserable relative to the purchasing of Radio parts. The dealers don't even keep 'eh fresh. Nosiree! Why just thuther day we read where one of those bimboes wuz selling variocouplers, variometers and condensers that wuz *moulded.*

SPIDER WEBB.

Or Perhaps Sermons

First Farmer: "How does yer hired man like your new Radio, Josh?"

Second farmer: "Fine. Only he mistakes everything he hears for bedtime stories."—*American Legion Weekly.*

A-B-C Lessons for Indigest Beginners

Chapter V—How to Acquire a Large Vocabulary

BY GOSH

EIS for errors
We make in hooking up,
Put forty volts across the tube
And hear our cash go—plup!

This Adv. Cost 40c an Agate Line

Dear Indi: The other day I was digesting a grid leak when I stops the feedback stunt long enough to remark to a friend, about said leak having no juice. Then he springs the old one about "Why do you do it, charge it with Tungar." Yours to a cinder. MIKE ROFARADS.

Wot the Hoot?

Dear Mr. Gest: May I call your attention to the announcement in the advance program for Station WWJ, Detroit News, that following the Town Crier, Mr. C. L. Hoot, bass, would sing? POLLY W.

Here rests Tommie
DeLacey McKinner.
A bolt of lightning
Struck his antinner.

HELP! HELP!

I have a little tube set
Which likes me not, I fear;
I turn one of its dials
And it shrieks into my ear.

It whistles, moans and gurgles—
Though I've sat with it all night
It howls and screeches eerily,
Which seems most impolite.

I'm sure I should be satisfied
Would it obey my hand
And say just one small thing to me
That I could understand!

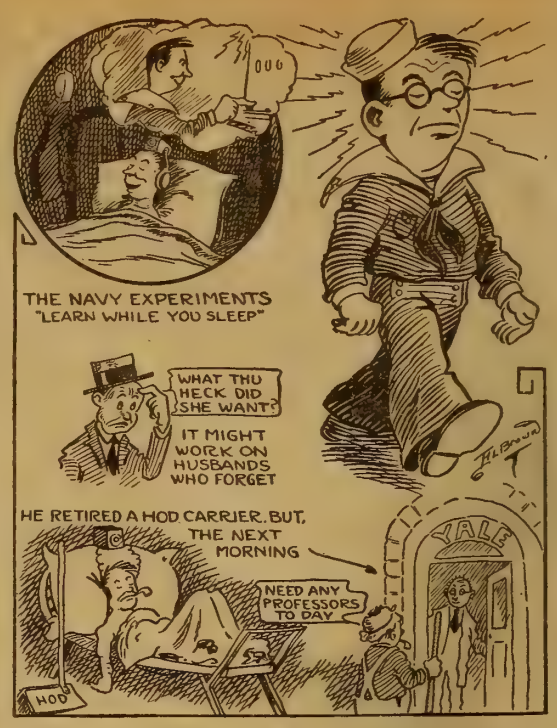
LE MOQUER

INDI-GEST KINKS?
SEND A DOLLAR—

THERE are many little Indi-Gest kinks worked out in the home that would hamper your fellow Radio-knut and cause him much worry. Indi-Gest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.

INDI-GEST KINKS DEPARTMENT

E. Sa. P. hastens to submit a kink for the well-known Indi-Gest Kinks Department for the benefit of fellow Knuts troubled with too much interference. He claims that this trouble may be definitely and assuredly stopped by the simple procedure of removing from their sockets one's vacuum tubes. He adds that this also is sure of eliminating all tube noises. Odds are 3 to 1 that E. Sa. P. is a surgeon specializing in appendicitis.



Condensed

By DIELECTRIC

It is quite an easy matter, and more or less popular, to lay to modern discoveries the seeming tendency away from clear thinking and concentrated study producing a "scatter-brained race" (in the words of James M. Beck). Long before the day of broadcasting lectures, presidential speeches and Will Rogers' paraphrases, we had many evidences of the condition he claims is concurrent with Radio, movies, etc. The fact is that Radio broadcasting has provoked thinking, rather than the reverse, and has brought knowledge to men who otherwise would never have acquired it.

The day of Radioed movies is close at hand, if we may believe the assertion of Mr. Jenkins, whose ability to transmit still pictures via Radio is well known. At a test in his laboratory he showed upon a screen in an adjoining room movements of various objects held in front of the apparatus. Someone will produce and provide for the use of broadcasting stations, movies for home enjoyment. The motto "there is no place like home" is coming true.

Radio is rapidly extending its usefulness into the field of law enforcement. The police department of Los Angeles has been testing Radio equipment as a means of quickly cornering criminals. With officers' cars equipped with receiving sets, details of a crime and the direction followed by the criminal may be broadcast all over a city or section of country and result in lessening the chance of escape. Where practical objects are to be served Radiophony is just as much valued as by those who seek its entertainment.

Prizes are still being offered to listeners in which adds to the zest of getting and holding distant stations. One such DX listener was aboard the steamship Belgian when Station WNAC was broadcasting a concert by the Copley-Plaza orchestra. Songs of ancient vintage were broadcast and to the one correctly naming the largest number of them a five-pound box of candy was awarded. It is sweet indeed to hear some of the old songs; sweeter yet in this case.

The comparatively new station, WJAZ, in Chicago, was used by the Commandant of the Illinois Naval Reserve to broadcast a number of talks to his fellow citizens, hoping to gain recruits thereby. From reports gathered since, it is quite evident that many who heard him on these occasions were induced to enlist in the service. It might seem useless to urge such action upon a man when he is comfortably seated at his set, but there are the facts. Radio did it!

Instances have been cited intending to prove the nuisance of receiving sets with loud speakers when placed near an open window or projected from a store. Talking machines have played an important part in disturbing the general tranquillity of a neighborhood in exactly the same manner. It is undeniable that either of these may cause neighbors to complain when foisted upon them uninvited. It is best to keep the loud speaker indoors in crowded sections and thereby avoid providing fuel for anti-Radio fanatics.

Comparable to the recent situation developed here because of the action of certain music publishers, the British Broadcasting Company is intending to meet the banning of broadcasting of plays by the Theatrical Managers' Association of London by building a studio-theater at Savoy Hill and organizing their own theatrical companies. This is a sensible way to overcome such difficulties, especially in view of the different technique required for producing realism when broadcasting plays from a studio.

First Steps for Beginners in Radio

Chapter X—Audio Frequency Amplifiers

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XI—How Super Regeneration Is Accomplished.

Chapter XII—Reflex Circuit Operation.

Chapter XIII—About Headsets and Loud Speakers.

Chapter XIV—Batteries Used in Radiophony.

AUDIO frequency amplifiers serve to increase the volume of sound obtained from the receivers or loud talker connected to the Radio set. Where the Radio frequency amplifiers act to increase the range of a set by taking the very weak impulses and amplifying them till they will operate the detector efficiently, audio frequency amplification takes the audible signals and amplifies them till they can be heard for quite a distance or all over a large room. In deciding how to use a certain number of tubes it is well to keep the above in mind. Thus if one desires maximum range and is willing to sacrifice signal strength one or two stages of Radio frequency amplification should be employed and fewer audio stages. Where volume of sound is desired regardless of range then two stages of audio amplification should be used.

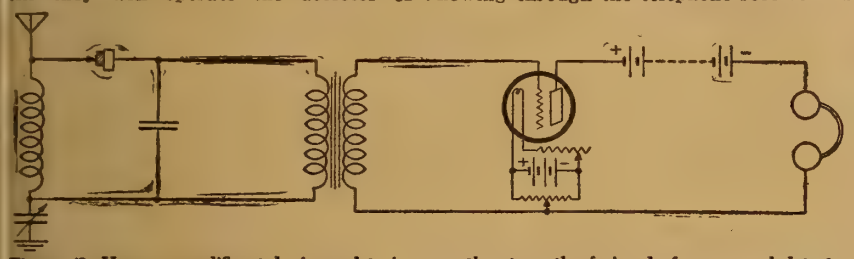


Figure 43—How an amplifier tube is used to increase the strength of signals from crystal detector

Tubes Connected in Cascade

The problem of connecting tubes in cascade for audio amplifiers is somewhat simpler than in the case of Radio amplifiers. When the Radio currents have been converted to audio currents the frequency has been reduced and capacity losses in the tube and circuits are greatly reduced. On the other hand we have currents that vary greatly in frequency and the transformers used must work efficiently over a comparatively wide band of frequencies.

To accomplish this the transformers are designed with what is termed a flat wave characteristic which simply means that the transformer has no sharp point of resonance or is not tuned to a particular frequency. The transformer will then handle currents varying widely in frequency with maximum efficiency.

Operation With Three-Element Tubes

The operation of a three-element tube as an audio frequency amplifier is very similar to its action as a Radio frequency amplifier. Its operation may best be understood when considering its action when amplifying the signals from a crystal detector as shown in Figure 43. Here we have a standard crystal detector circuit with the exception that an audio frequency transformer has its primary winding connected in place of the telephone receivers. The secondary of the transformer is connected to the grid and filament of a hard tube having 45 to 90 volts on the plate.

A potentiometer is shown to control the potential of the grid. The grid potential is adjusted to such a value that the plate current is halfway down the curve as mentioned in connection with the Radio frequency amplifiers.

When signals are being received the current that would normally flow in the telephone receivers now flows in the primary of the transformer. These currents induce a current in the secondary of the transformer that acts to vary the grid potential. In this manner the current flowing through the telephone receivers is varied to reproduce the music or speech in much greater volume.

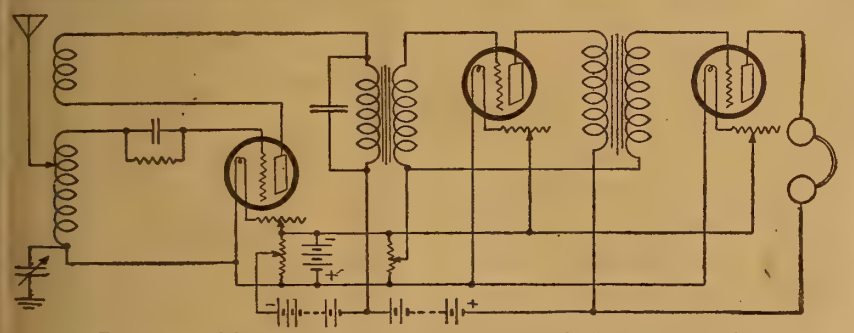


Figure 44—A fully developed circuit for two stage audio frequency amplifier

Step Up Ratio Transformer

The higher the voltage used on the plate the louder will be the resulting signals, and, as we have learned previously, the greater the change in grid potential the louder the signals received. To this end, use is made of transformer with a step up ratio. Thus we see transformers advertised with ratios of 2 to 1 or 5 to 1, which means that the voltage of the secondary is twice or five times as great as that applied to the primary. This step up in voltage increases the variations in grid voltage but we must be careful not to overdo this increasing of voltage.

The curve shown in connection with tube detectors flattens out at both ends. That is, after a certain voltage is applied to the grid an increase of voltage will no longer cause a change in plate current and the tube is said to be at its saturation point. Now were we to use a high ratio transformer that would increase the voltage applied to the grid of the tube so as to pass the saturation point, signals would be distorted, for part of the wave on the grid would be clipped off because the plate current could not respond.

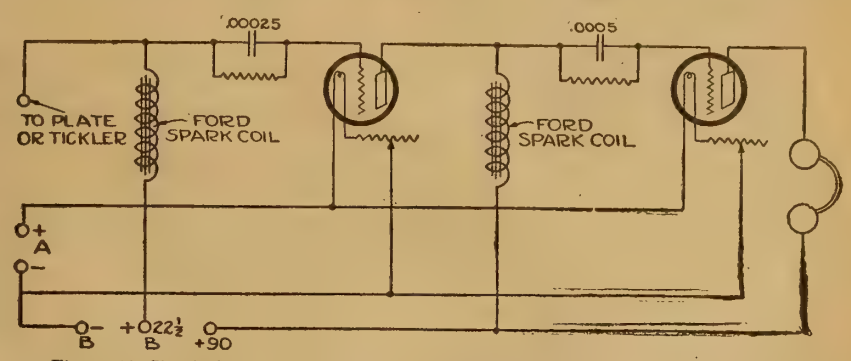


Figure 45—Circuit for a two stage impedance coupled amplifier using Ford spark coils

Transformers and Filament Control

For that reason the transformer ratios may be larger in the first stages and smaller in the second stage. This is due to the voltage in the first stage being low but after being amplified by the first tube the voltage is increased and a high ratio transformer may push it too high. Increasing the voltage on the plate increases the length of the plate current curve and when distortion results from too high a ratio in the transformers it may be eliminated by increasing the plate voltage.

Increasing the filament brilliancy has the same effect but should only be done with caution for pushing the filament shortens its life and may make the proceeding rather expensive.

Regenerative Circuit

A fully developed circuit using a regenerative tuner with tickler feedback and two stages of audio frequency amplification is shown in Figure 44. It will be noted that two potentiometers are used. One acts to vary the voltage on the plate of the detector to obtain the best point of operation. The second is for the purpose of controlling the grid potential of the amplifying tubes. Many persons operate amplifying tubes without a potentiometer but maximum results are seldom obtained without some means of bringing the tubes to the point of best response.

The circuit shown employs no jacks and it is the writer's opinion that it is preferable to eliminate the jacks. They are often a source of noise that is difficult to locate, needlessly complicate the circuit,

(Continued on page 14)

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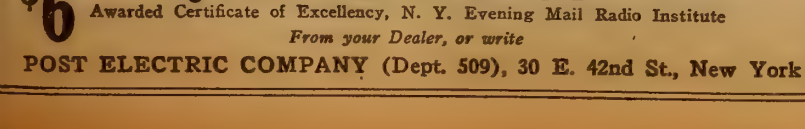

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Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
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50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.80	.40
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1 Remler Bakelite Socket	1.00	.45
Howard Vernier Rheostat	1.50	1.35
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Complete Parts for Ultra Audion Circuit, $11.90
(Known as the Wonder Circuit)

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23 Plate Condenser	3.30	1.45
Bakelite Socket (Remler)	1.00	.45
Special Ultra Audion Coil, plain or bank wound with tape	3.00	1.95
Howard Vernier Rheostat	1.50	1.35
CRL Grid Leak	1.50	.95
.0005 Micon Condenser.	.35	.25
2 Switch Levers	.70	.50
18 Switch Points	.50	.30
2 Switch Stops	.10	.05
8 Binding Posts	.80	.40
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25 ft. Hookup Wire	.20	.10
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Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in schematic form but are drawn so that any one without any technical knowledge can follow with ease. Our Price $11.90

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Cunningham C301-A Tube	9.00	5.95
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How to Make a Storage B Battery

Use Old A Battery Parts in Construction

The following B storage battery was entirely made out of the parts of an old storage or automobile lighting and starting batter. There are enough parts in one 6-volt battery to make three very neat and serviceable 20-volt storage B batteries.

Each jar of the B battery is made from a jar of the A battery. The jar is cut off 3½ inches from the bottom. The rubber should be warm when working it. If possible leave it in the sun for two or more hours and then it may be cut by drawing a sharp knife across the surface point downward. This will not cut the rubber through but it may be turned over and the cut repeated on the other side and then the rubber will break where the cut was made by bending it back. When cuting the jar off it is best not to have it too warm, and to use a hack saw instead of a knife. If the rubber is cut while cold there is great danger of breaking it and damaging the whole jar.

Out of the remaining upper half of the jar cut nine strips as wide as the inside of the jar and as high as the inside height of the jar. These are for the partitions to separate the cells of the battery and should fit as snug as possible when they are in place as shown.

Making Partitions

Heat some battery compound until it becomes liquid. Stand a partition in place and pour the heated battery compound in the first cell. Turn the jar sideways so as to let the compound run in and seal the strip to both walls and the bottom. Use as little compound as possible. This may be done best by having the compound very hot and pouring plenty in the cell then pouring out the surplus. If just a little has been poured in it cools too quickly and cannot be made to fill the crevices. Let this cell stand for a minute and then proceed with the next cell in the same manner.

After the cells have all been sealed they should be tested by pouring water into every other one and let them stand for a while. If one of the strips is not properly sealed it will show up in the adjoining cell, filling it with water.

Ten positive and ten negative plates are cut out of the positive and negative lead plates, respectively, from the old A battery. The plates should be cut about ½ inch narrower than the inside of the jar and about ¾ inch shorter. The plates may be cut with a hack saw, or, by cutting a groove in both sides of the plate with a knife and breaking it on the cut. The separators should be about ¼ inch larger than the plates. The former are cut from the old separators in the A battery.

Assembly and Charging

One positive and one negative plate and a separator is used to make up the elements of one cell, the negative of one cell being soldered to the positive of the next cell.

If you are not sure that the old battery torn down for making this battery was in a charged condition (which they seldom are), it is a good plan to fill the old battery with distilled water and then charge it for a few hours. This will bring the old acid out of the plates and into the distilled water. Then it is poured off.

After the battery has been charged with the distilled water in it and the water taken out, fill the battery with a sulphuric acid solution until it tests to 1250 on the hydrometer, and charge it at a ½ ampere charging rate. When the battery has been fully charged it will gas or bubble, a condition that will be readily recognized. Then it is ready for service. This initial charge may take some time, depending on the condition of the plates. The battery should be placed on charge as soon as possible after the acid has been placed in it. When fully charged the battery should give about 22½ volts, but as the charge runs down it will drop to about 20 volts.

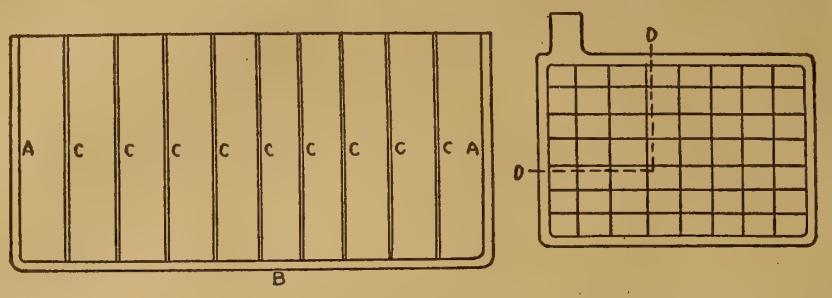
Care and Treatment

Such a battery should stand up for several weeks when used only on a single tube. If used on more tubes the life, of course, will be accordingly shorter. One of these batteries made up like this has been used on a five tube set in series with a manufactured B storage battery and it has compared splendidly.

When the voltage drops to about 20 it is time to recharge it. This can be done much quicker than the original charge. When fully charged the acid specific gravity should test to about 1250. If, however, the battery was not previously charged with distilled water as directed, the gravity may run higher than this figure on account of the acid that was in the plates before the new acid was poured in, thus raising the amount of acid in the battery.

The specific gravity method of testing is not to be relied upon entirely in such small batteries, as the amount of acid required to neutralize the plates may be so small as not to affect the solution.

CUTTING THE CELL AND PLATES



This holds true more especially where small plates are used in a comparatively large container or jar.

When charging the battery the best way is to charge it each time until it gases. When a battery gases it is a sure indication that there is no acid left in the positive plates and the battery is therefore fully charged.

The battery should never be shorted to tests its condition, and it should never be left standing long discharged.—E. A. Johnstone, Pocatello, Idaho.

Protection for Filaments

The Radiophan is apt to experience disappointment when he finds that the high voltage leads from the B battery have been accidentally connected across the filament posts of his receiver and one or more tubes are burned out. Although the normal life of the average filament is considerably more than 1,000 hours, it requires but an instant to destroy this delicate filament when excessive voltages are applied to its terminals.

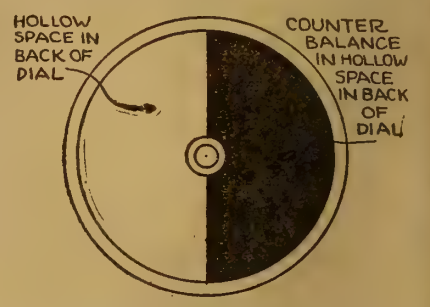
When filaments are shorted across a 20, 40 or 60-volt battery in new condition, the burnout requires but a fraction of a second, and unless the user happens to be inspecting the tube at the instant of the flash, the damage would not be discovered until the set was used again. It is a very easy matter to protect tube filaments by either of the following means:

Insert a 100-ohm (noninductive) resistance for each 22-volt block or B battery in the circuit next to the positive terminal of the B battery. This resistance may be left permanently in the circuit without any effects whatsoever in the normal life of the receiving set.

Probably the most convenient form of resistance is a 25-watt, 100-volt tungsten lamp which will provide sufficient protection for plate voltages up to and including 100 volts. This resistance automatically increases with the current so as to act, in effect, as a protective ballast lamp.

Counterbalance for the Condenser Put in Dial

Most Radiophans like an easy and smooth turning condenser, but if there is no counterbalance (and most condensers have not) they will often sag when subjected to even only a small amount of vibration, with the result of fading signals or sometimes causing the set to oscillate. An easy way to avoid this is to place a counterbalance on the back of the dial. As practically all beveled dials have a hollow space in the back, it is a comparatively simple matter to add an effective counterweight, as shown in the illustration. It can be cemented or glued in place, or, if desired, the dial can be drilled and tapped for small machine screws.—Albert J. Madison, Portland, Oregon.



Distortion of Broadcast Waves

At the present time, broadcast waves can not be produced without some distortion. This is caused by the microphone diaphram being more sensitive to the effect of some sound waves than to others.

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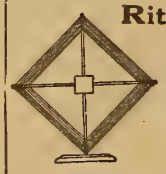

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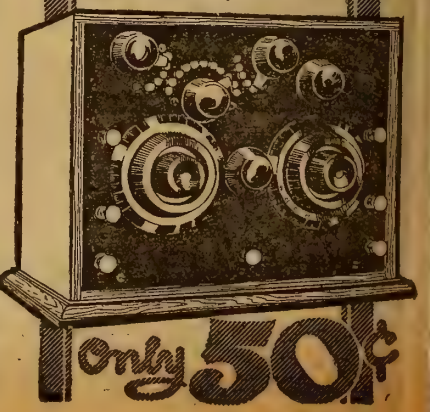


Only 50¢

Another Simple Single Tube Reflex Circuit

Operation and Characteristics of the Northern Electric 215A Tube

By H. J. Marx

EVER since the details of the smallest regenerative set appeared in the June 23rd number of Radio Digest, the fans have been requesting more information about this new miniature peanut tube. Where does it come from, who makes it, what are its features and a multitude of other questions have been asked.

This tube is put out by the Canadian Northern Electric Co. and known as type 215A. When imported in this country a duty must be paid, making it a little more high priced than the local dry cell tubes. Its distribution has not become very national as yet so many fans will still have trouble getting them.

Filament Voltage

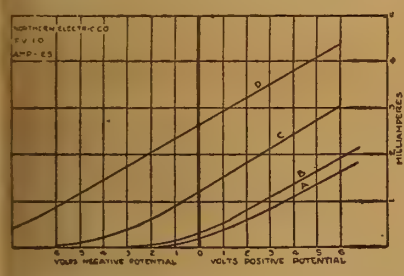
The filament voltage is 1.0 and the current consumed is 0.25 ampere. One dry cell will operate it but it is best to connect two in parallel so as to increase the ampere hour capacity. Dry cells are designed for intermittent service—lighting tube filaments is a steady drain that causes polarization of the battery. By increasing the number of cells and connecting them in parallel the proportionate drain on each cell is reduced and the batteries will give much better service.

This tube has a special socket, and requires an adapter when used with standard sockets. The usual six ohm rheostat can be used, no vernier adjustment being required.

The Plate Voltage

The plate voltage as recommended by the manufacturer is 15 to 90 volts. The curves A, B, C and D are taken with the plate potentials at 16, 22½, 45 and 87 volts respectively.

This tube makes a very good detector but it will be found that when used as an amplifier the average audio frequency transformer will not permit good coupling because of its impedance value being different. Undoubtedly transformers will be placed on the market to work with this tube. Details of the construction of



a home-made transformer for this tube will be given in an early issue.

Adapted to Small Sets

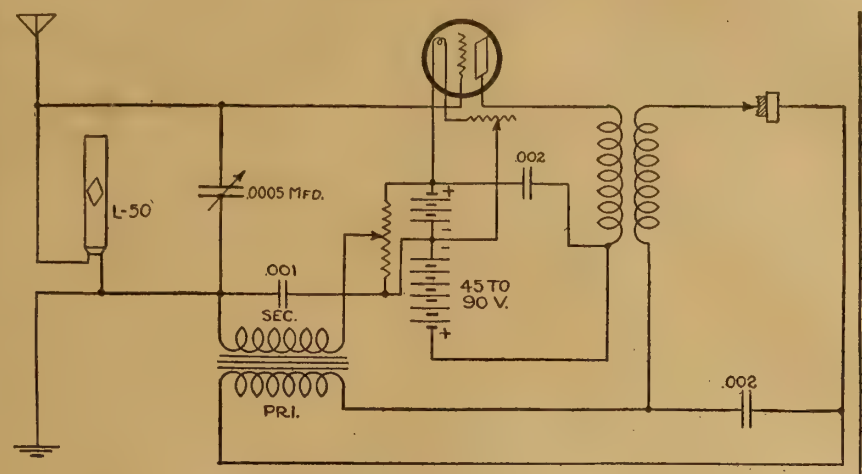
Because of its small size it is especially adapted for use with very small compactly constructed sets. Another circuit which can be compactly constructed is the single tube reflex. In a circuit of this type, if it is not desired to use a loop aerial, a 50 turn honeycomb coil with a 23 plate variable condenser shunted across it makes a good simple tuning unit. A circuit of this type is shown in Figure two.

Single Tube Reflex

The inductance can be any of the three following types, a fifty turn honeycomb coil, a fifty turn spiderweb coil, or fifty turns of No. 22 single cotton covered wire wound in a single layer on a tube 2½ inches in diameter. The tuning condenser should have a capacity of .0005 microfarads with a vernier control for close and accurate tuning.

Three by-pass condensers are necessary, one of .001 mfd capacity and two of .002 mfd. The potentiometer can be of any resistance between 200 to 400 ohms. The filament voltage depends on the type of tube used. The circuit is by no means limited to the 215-A tube. Any hard or amplifier tube can be used. The rheostat resistance depends also on the tube used. The series of articles on tube characteristics mentions the type of rheostat advisable to use with each tube.

The plate voltage is best determined by the operation of the set. When the loudest



and clearest tones are heard, keep the voltage at that point. Some tubes require more than others.

Three Controls in Circuit

The circuit has only three controls, one of which is the filament rheostat, so no instructions are necessary for tuning. It is the kind of circuit that anybody in the family can get hold of to listen in without a long list of instructions. Further refinements such as filament control jacks, battery switches, etc., can be added if desired. As it stands, the circuit is simple, inexpensive and presents opportunity for compactness and portability.

SYMPHONY RECEIVER

(Continued from page 6)

An improvement over this type of feedback is the connection of a variometer between the aerial and plate circuit. This not only helps build up the volume but increases the selective tuning.

The upper illustration shows the front view of the set in its cabinet. The only connection made there is the plugging in of the loud speaker or head set in the jack of the particular stage desired.

The large dial on the left is the regenerative coupling dial and therefore controls the feedback to the plate circuit.

The tapped switch between the first and second dials is the control for the inductance adjustment for approximate wavelength value. The second dial from the left is the variable condenser which gives the fine adjustment for wavelength. If regeneration is not very pronounced, the inductance should be increased by advancing the tapped switch and decreasing the condenser capacity.

Variometer Control

The third dial is the variometer control between the plate and antenna circuits. This will have a balancing action that will help clear up signals and bring out maximum volume.

The four small knobs are the rheostat controls for the tubes.

Rear Connections

The lower view in the photo diagram shows the rear view of the panel and instruments when removed from the cabinet. There are eight binding posts for battery connections, the antenna and ground. Starting from the right they are connected in order, aerial, ground, A—, A+, B—, B+18-22½, B+60-90, and B+90-135. The last stage uses a high plate voltage and is designed for use where maximum amplification is desired.

Tuning Instructions

The headset is plugged in at the first stage, and the first two knobs are turned up until the filament burns so that a soft purring is heard in the receivers. The tapped switch is set at the center or top contact point. The regeneration dial is adjusted to about 100 dial graduation and the variometer dial to about 100. The condenser dial is then turned until the familiar carrier wave whistle is heard. The vernier on the condenser can then be used for accurate setting.

Regeneration can then be increased up to the point just ahead of where distortion and howling starts. The variometer is then slowly rotated until volume is at its maximum. It may be necessary to try over at different tap settings for best results as this is dependent upon the antenna and ground system. Different tubes will necessitate different regenerative dial settings.

These variations dependent on apparatus and local conditions will alter preliminary tuning adjustments slightly and it is usually necessary for the operator to discover by experiment at what settings his set operates on.

Range of the Transmitter

The necessity for long wave lengths, where great distances are to be covered, such as in transoceanic communication, is due to the fact that absorption of energy is much less on long wave lengths than on short wave lengths. The nature of the intervening country between transmitting and receiving stations is an important factor with relation to the strength of the signal and the distance it can be received, the greatest distance for a given amount of power being obtained over water. Lofty buildings with steel frameworks, or a section of country containing ore deposits absorb a considerable amount of the signal strength and consequently restrict the range of the transmitter. Communication during the winter months may be carried on with less power and greater reliability, due to the absence of serious electrical atmospheric disturbances.

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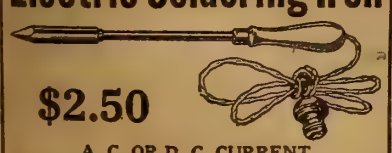
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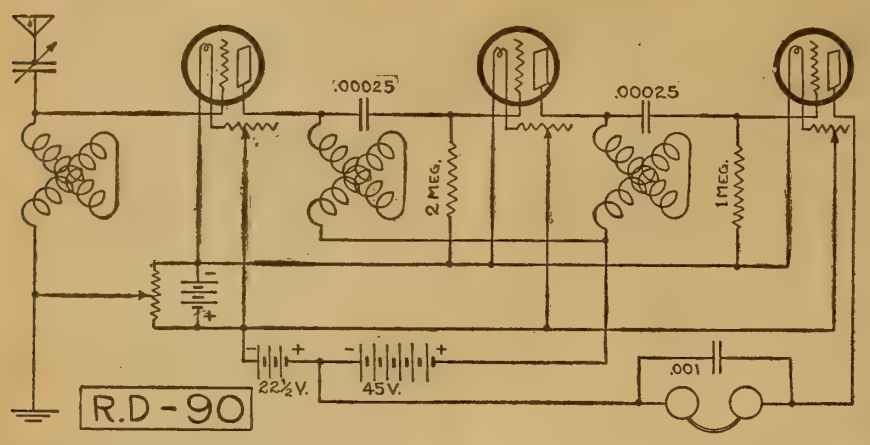
LONG DISTANCE HOOK-UP R.D.-90



A TYPE of amplification little used, but giving very efficient results, is shown in the illustration as R.D.-90. The use of transformers in coupling is eliminated.

The necessary apparatus is limited and will permit construction at a very reasonable outlay of money.

Hard tubes are employed in the first two stages. The three variometers are of the lattice winding type, with minimum internal capacity. The wooden frame type are not recommended. The tuning unit consists of a variable condenser and variometer in series. A 200-ohm potentiometer is used for controlling the grid potential of the first tube. The remaining two variometers control the plate circuits of the first two tubes. The addition of the grid leaks keeps the grid at the proper potential by drawing off any accumulated charge. One rheostat can be used for controlling the first two tubes if desired.

Audio frequency can be added by hooking the primary of the A. F. transformer in place of the phone receiver. The circuit is well adapted for long distance reception. The simplicity of controls will help the amateur in rapidly acquiring the tuning knowledge.

FIRST STEPS IN RADIO

(Continued from page 11)

and in many cases are not used at all. When the volume of sound is too great it is only necessary to slightly reduce the filament brilliancy to control the intensity of the signals.

Limit of Amplification

It is not practical to carry the amplification beyond two stages with apparatus as usually purchased for by the very nature of the amplifier it will increase the intensity of audible sounds that interfere with the signals being received. These sounds originate in many different ways and are often extremely difficult to locate.

A poor contact in any part of the circuit will give rise to disturbances and can only be guarded against by soldering all connections. Tubes loose in the socket, corroded prongs on the tubes, low B batteries, irregular emission of electrons by the tube filaments and even vibration of the tube elements give rise to interfering sounds that are greatly amplified and cause much annoyance. These various items should all be checked up when a set proves very noisy.

Squealing and Howling

Another source of great annoyance with audio frequency amplifiers is squealing and howling. This is due to the plate circuits feeding back into the grid circuits giving a regenerative action at audible frequencies. This can only be prevented by proper wiring and location of the instruments.

The transformers should be separated as far as practical and placed at right angles to each other. The wiring must be kept well spaced and not run parallel to any point and should always cross at right angles. Squealing in a set can often be prevented by reversing the leads to the transformer terminals, trying different arrangements till the trouble is eliminated. Jacks are a frequent cause of squealing and their removal will often cure a chronic case.

Other Methods of Coupling

So far we have considered only transformer coupling between tubes. Another method of coupling audio frequency amplifiers that deserves attention is impedance or choke coil coupling. This method of coupling was the first to be experimented with and work on it was stopped by the amateurs during the war but the army carried on the work and an efficient choke coil amplifier is possible of construction at a cost lower than with transformers. This should appeal to the Radiophan who must watch expenses closely and strange to say this amplifier will give just as good results as transformer coupling and with a little experimenting can be made even more efficient. A circuit employing this type of coupling is shown in Figure 45.

A fixed impedance is connected into the circuit in place of the transformer and a small fixed condenser inserted to prevent the positive B potential reaching the grids of the amplifier tubes. The grid condenser is shunted by a small grid leak to control the potential of the grids.

The action of this form of coupling is similar to the tuned or impedance coupled Radio frequency amplifier depending for its operation on the change in drop of potential across the impedance which is transferred to the grid of the next tube through the small fixed condenser.

Homemade Impedances

For the benefit of those who may care to experiment with this circuit some construction data might not be out of place. The impedances are made from Ford spark coils. Simply remove the vibrator and make connections to the secondary winding and the impedances are ready for use. It is not even necessary to remove the primary winding. The coils when mounted in the cabinet should be placed at right angles to each other and at opposite ends of the box. The values of the fixed condensers are given in the illustration but these values must not be taken as final. It is well to experiment a little, trying different capacities till the loudest signals are obtained.

The grid leaks may be homemade and of the simplest construction. The adjustment of the leaks is rather critical and should be carefully done while the set is operating. The important part in making up this amplifier is to make all leads as short as possible, particularly the leads to the grids of the tubes and for that reason do not attempt to use jacks in the circuit. The posts on the left of the circuit are to be connected to the phone terminals of the detector circuit, the condenser across them serving as a bypass for the Radio frequency currents when a regenerative receiver is used.

This type of audio amplifier when properly adjusted will be very efficient and not only give louder signals but be freer from stray noises. It takes a little patience but is well worth the trouble and will be found much cheaper than transformer coupled amplifiers.

(TO BE CONTINUED)

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Practical Amateur Wireless Stations. Contains the best suggestions of thirty-three experimenters on building, installing and operating experimental stations for Radio communication. 136 pages illustrated. Price 75 cents.

Prepared Radio Measurements. It is not necessary to apply the "cut and try" method when you have this book at hand. The charts included in this book represent formulae that are apt to occur in ordinary Radio computations. Price $2.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desired to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

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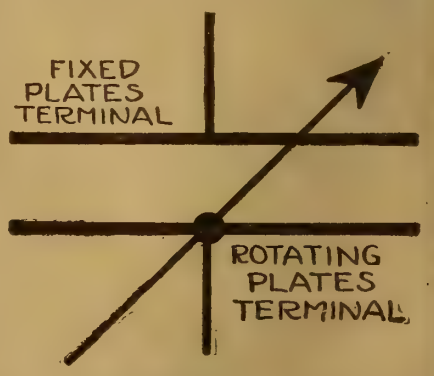
New Condenser Symbol Showing Connections

The element of body capacity effect is an important part in tuning for the new fan. Inadvertently, he makes connections that increase his troubles. It is an important point to see that the rotating plates in a variable condenser are connected to the proper side of the circuit. For example, when the rotating plates are connected to the grid side of the secondary circuit, every time the hand touches the condenser dial it affects the grid action of the tube. The set may howl every time the hand is brought near the dial or after the station is tuned in and the hand removed from the dial the reception fades away or decreases in volume.

The ordinary variable condenser symbol does not indicate which side is the rotating plate's terminal. In order to correct this omission and to help make the fans get the proper connection, the symbol shown in the illustration will be used exclusively. The location of the heavy dot at the crossing of the arrow on the plate line indicates that this is the rotating plate side. The fixed plate side has no dot, and the arrow does not cross at the intersection of the lead line. Watch for this in future circuit diagrams, and see that your condensers are connected correctly.



Locating Trouble

The trouble in many a homemade Radio set is often poorly constructed tinfoil condensers, pencil line leakage across the panel, poorly soldered joints or slight mistakes in wiring. It pays to use the best type of parts and to be very careful about leakage and soldering.

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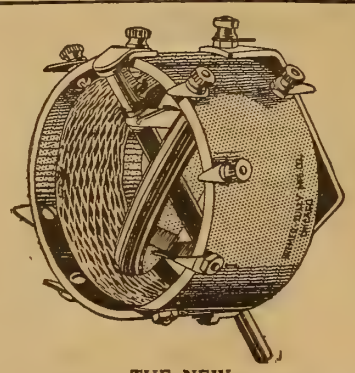

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Price, without tubes or battery, F. O. B. Grand Rapids, $27.00.

Ask your dealer. If he cannot supply you, remit to us and send his name and address.

Send for list of Michigan Quality Radio Receivers and Parts; variometers, variocouplers, all-range couplers, special rheostats—50c, potentiometers—200 ohm and 400 ohm—60c, etc.

Dealers, the set you have been waiting for to make complete package "over the counter sales."

MICHIGAN RADIO CORPORATION
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Questions and Answers

Rectifier Details

(2839) EHT, Concord, N. H.

Kindly give winding directions for a transformer as follows: Kind of core, primary winding for 110 volts, size of primary wire, number of turns, secondary winding number of turns and size of wire?

Are the windings wound over one another as in an auto transformer? Is it possible to use soft iron wire to about 1 inch in diameter as a core?

Can this be used in the place of B battery on the regular super set and also on the amplifier by using UV-202 5-watt tubes to stand up to 350 plate voltage or will I have to use some other source for the super and this transformer rectifier for the amplifier alone?

A.—The usual silicon iron laminated core is used for the transformer. Primary consists of 440 turns of No. 18 D.C.C. wire and secondary of 880 turns of No. 22 D.C.C. Advise winding on standard closed core frame.

You should be able to use this in place of B battery with UV-202 or 5-watt tubes, as suggested.

Crystal Detector Circuit

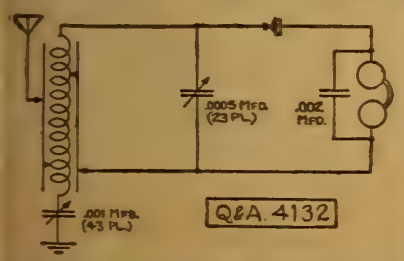
(4132) IN, San Francisco, Cal.

I have bought parts to make a small crystal set and I have put them together, but I do not get a sound of music; sometimes static. Enclosed you will find a diagram of my parts and hook-up (diagram given). If you will help me out I will be much obliged to you.

Do you think the matter lies in the variable condensers? Are the number of plates correct?

Could I discard the tuning coil and use a variocoupler or a molded coupler?

A.—Noting diagram submitted we are advising that it is correct in detail. It is possible that your limitations are due to an ineffective antenna system. This should



consist of a single wire accomplishing 150 feet, including lead-in, with an adequate ground. It might be due also to an unsensitive crystak. A phone condenser is not indicated in crystal detector circuit necessarily. Possibly these suggestions are all that are necessary to follow to accomplish satisfactory reception.

Body Capacity

(2379) HDH, St. Paul, Minn.

I have constructed the regenerative tuner and detector panel as described in Radio Digest issue of Dec. 16, 1922, page 11, by A. C. Tabbot.

With this set I have heard Chicago, Schenectady, Atlantic City, St. Louis, Davenport and others, but still I am having my troubles, and therefore I am writing this for help. I am using a 1½ volt WD-11 tube with a 22½ volt variable B battery and no condenser across tickler. I use a variable Freshman grid leak and all is mounted on a wooden panel well shielded and grounded. My trouble is noises of which there is every description imaginable when tuning for long distance. On local reception the set works fine, but I cannot tune out the noises on long distance. Immediately upon approaching or leaving the panel it howls. I have found that by clasping the receiver cords tightly in my hands I get clear reception for a while and then all at once it sounds as if a lot of coal is rolling down a chute and my station is lost. My aerial is two wire 40 feet long and 30 feet high, which I am going to change to a single wire, and have wondered about the wooden panel, but have been told that this should have no effect.

Is the three plate condenser across the tickler necessary to stop the noises and should I use a vernier rheostat? What transformer and what ratio is best for WD-11 tube, as I intend to use two stages if I can get my set to operate properly. I would be one happy amateur if you could lead me out of my predicament, and I think you can.

A.—Noting your specifications and difficulties encountered will advise that it is indicated that your trouble is due to body capacity effect. The wooden panel does not in any way prevent the reception of signals. Body capacity effect is materially reduced by shielding panel and grounding shield, as you have done, also by grounding minus A battery as well. There is no other known method for eliminating body capacity.

A twenty-three plate vernier across the secondary of your coupler will be more effective than in any other position in set. It is doubtful if a vernier rheostat will have any material value.

For amplifying transformer use a ten to one ratio on first and three or four to one ratio on second stage of audio frequency amplification.

Referring again to body capacity effect, it is one of the bugbears of reception and is peculiar to regenerative sets. Shielding in itself considerably reduces efficiency so that it is resolved to a question of enduring of two evils the lesser.

Reflex Circuit

(3030) FCW, Austin, Minn.

Will you be so kind as to give me a little additional information in regard to reflex circuit hook-up given in Figure 1, published in Radio Digest of January 20, 1923?

The diagram shows a variable condenser of .0005 mfd. capacity for tuning, while the text calls for one of .001 mfd. Which is correct?

I take it that the diagram, as drawn, contemplates the use of a loop only. If aerial and ground are used, what additional pieces of apparatus are necessary, the proper constants for them and their location in the circuit?

Would like to know what you have to say regarding the effective range of this set on a loop and also with aerial and ground?

We have a rather peculiar condition to contend with here. Our municipal lighting system is in a bad way, insulation in many instances hanging from the outside wires in streamers, transformers often overloaded, frequent "shorts" and "grounds." Of course all of this is reflected in our sets using only A. F. amplification. We often have to quit entirely, as a steady buzz of considerable volume drowns out our signals.

What many of the local fans wish to know is, whether or not R. F. amplification would cut out some or most of this interference, and whether or not the reflex circuits are practical. Of course we know that the directional qualities of a loop would help to cut out interference from any certain direction, but most of the fans want a set with which they can cover the longer distances, and would still like to use the outside aerial.

A.—It is not our opinion that either this circuit or the employment of Radio frequency amplification will serve to cut out any of the interference cited, neither will they tend to reduce it. The only effective plan that suggests itself to mind is that of attacking the annoyance at its source.

Under normal conditions the reflex circuit should serve you effectively. Its range with outdoor antenna and ground approximate one thousand miles. This arrangement is altogether desirable for best results. Range with loop antenna is more or less conjectural. However, we are directing your attention to the diagram appearing in January 27 issue of Radio Digest as preferable to the one you have cited.

Either a .0005 mfd. or .001 mfd. variable condenser will serve. .0005 capacity is preferable.

A variocoupler as connected in the second part of diagram one is used for outside antenna and ground, as indicated.

Antenna Circuit.

(3055) FEM, Chicago, Ill.

Living in an apartment building I am compelled to use a lead-in from my antenna, which comes down an inside air shaft, and the length of the lead in is about 75 feet. What length of antenna to use on the roof? I have tried one 125 feet long and get local reception loud, but cannot tune it out. I also have tried two 40-foot wires, but do not get the same volume. I have two variometers and a coupler, and use a 43-plate condenser on the ground. Should this be shunted between the ground and the antenna?

A.—Noting your specifications and difficulties experienced we are advising a seventy-five foot antenna, a single wire on roof, lead-in to be taken off the end nearest the set, not from the center.

Antenna condenser is placed properly as you now have it.

The set you have is efficient and selective. You should have no difficulties in the matter of interference, generally speaking.

The Massachusetts Federation of Women's Clubs broadcasts, through station WGI, talks and instructions in housekeeping, cooking, marketing and domestic science.

The Question and Answer department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard, therefore when asking questions please make out your query on a separate piece of paper and written on one side only. Do not mix your questions with other material, write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered.

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WD-11, WD-12, UV-199, UV-201-A, C-301-A ..... $3.50 each
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UV-202 ..... 4.00 each
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Radio Illustrated

Daphne Pollard, English Actress, and her infant son listening to a Radiophone concert in her dressing room at the London Theater, London, England. © London Mail

This tiny crystal receiving set is so small that it will fit in the palm of a hand. Its range is 25 miles. © K. & H.

The 700-year old turtle in the Bronx Zoological Park, New York, seems to be pleased with the Radio music. Dr. Raymond Ditmars, and the head keeper, John Toomey, observed the actions. © K. & H.

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Graduating a V.C.; Benson on Super Circuits

Radio Digest

EVERY WEEK Illustrated TEN CENTS

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Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, JULY 28, 1923 | No. 3

PROMISE "SILENT" CODE

FAMOUS PEGGY HOPKINS JOYCE AND "VANITIES OF 1923" ON AIR

Station WOR, Newark, Broadcasts Earl Carroll's Production—Joe Cook Invents "Visual" Radio

NEWARK, N. J.—A special Radio matinee was given by the internationally famous Peggy Hopkins Joyce and the others stars of her latest and greatest success, Earl Carroll's "Vanities of 1923," at Station WOR, L. Bamberger & Co, here recently. The performance ran a full hour and a half.

The program was made up of selections from the sensational revue and several "surprise numbers," especially written for the occasion.

Joe Cook, principal comedian, who admitted that he is "The World's Greatest Inventor," told how he happened to perfect the Radiophone and introduced his very latest Radio device by which he enables the listeners in to "see" the show. He was especially anixous to give the Radiophans a view of "Pretty Peggy," her $20,000 Chinchilla gown and Mr. Carroll's much talked of beauty chorus.

AUSTRALIA HEARS AMERICAN "BUGS"

SIGNALS, CLEAR AND SHARP, CROSS PACIFIC

News of Receipt Causes Flurry Among Operators on West Coast

SAN FRANCISCO.—The first successful spanning of the Pacific Ocean on schedule has been demonstrated according to reports that American amateur Radio signals have been heard in Australia.

This news in the form of a cablegram from H. K. Love of the Wireless Institute of Australia caused a flurry of excitement among operators in California and other western states many of whom made enviable records in the transatlantic tests of last year.

Reception of amateur signals have been reported from time to time by operators on ships off the coast of Australia and China, one of these vessels having been at anchor in a Chinese port. Never until recently has there been any organized effort to transmit signals across the Pacific Ocean on a definitely arranged schedule.

Australians Suggest Test

The tests were made at the suggestion of Australian amateurs, who, hearing of American DX records, desired to demonstrate that they were able to receive signals from western members of the American Radio Relay League. America was to send, Australia to listen.

Although no long distance records were broken, it is significant that American signals were heard clearly and consistently and complete information from the receiving end may show that some amateurs east of the Rockies may have got their signals over unawares.

U. S. ARMY DEVELOPING EQUIPMENT

Frees Air for Broadcasts

Squier's Sine Wave Alphabet and Bruce Relay to Be Used

By Evans E. Plummer

CHICAGO.—Interference to broadcasting by code stations may soon be eliminated by the development of "silent" Radio telegraphy, Major Joseph O. Mauborgne, signal officer of the Sixth Army Corps area with headquarters here, announced in an interview before his departure to Washington, D. C. The silent telegraphy development is the occasion of the Major's call to Washington, where he has been placed in charge of the U. S. Army Radio laboratory of the Bureau of Standards.

Ear Can't Hear Code

The principle behind the "silent" system is that of sending the code signals on a wave frequency below that of sounds audible to the human ear. Thus it will be possible for as many code stations as desire to send at the same time as broadcasting is being done, without the code being heard by the broadcast listeners in. In fact no one will be able to hear the code signals, as these will be sent at a frequency below that possible for the human ear to hear, and it is planned to make use of special relays and tape or page printers in the reception of messages under the new system. The human ear mechanism at its best cannot register sounds with vibration

(Turn to page 2)

Carol Dempster (left above), well-known star of the silver sheet, has had her innings of broadcasting as well. Picture below (not Miss Dempster) was snapped to illustrate a new beach alibi for keeping the bathing suit dry
Lower Photo © U. & U.

INTEREST IN PARTS OFFER STILL RISES

NUMBER OF INQUIRIES CONTINUES TO GROW

New List of Accessories Printed Here Shows Why Radio Fans Are Attracted

SPECIAL REWARD OFFER
Coupon Number 9

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Interest continues to grow in the Radio Digest's special offer. The number of series submitted by readers desiring parts for the construction of sets, constantly increases.

There is no limit to the number of series you many send to this office but be sure that your coupon numbers run in order. They need not begin with number one but they must be consecutive.

You may send as many coupons as you want. Choose the parts you want and send the list with the coupons and the money.

The parts will be sent to you as soon as we receive your letter.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutitvely numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 691 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .0006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser.

Synchronizes Airs from Two Stations

Fan Tunes in Same Piece at Same Time from Two Plants

SCHENECTADY, N. Y.—With nearly 600 broadcasting stations in the air, many of them at the same time, it is not unusual for an operator to pick up two or three stations at the same time. Then begins the delicate task of tuning out all but the desired station, a task frequently impossible and always trying to the temper.

It is most unusual, however, for a fan to secure dual reception and discover that both stations are playing the same tune in the same key and tempo.

This occurred recently. A Providence, R. I., Radiophan recently wrote WGY, local station of the General Electric Company that he had heard the Radio Four sing "Dixie" from WGY at the same time that WEAN, station of the Shepard Company in Providence, was sending out a phonograph record of "Dixie," a banjo solo with piano accompaniment.

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Looking Ahead

How to Make a Good Single Tube Super—will take up most of Part II of Thomas W. Benson's Chapter next week, concluding his discussion on super-regeneration. He will also analyze the principles of the Flewelling circuit.

A Discussion of the Mutual Conductance, Amplification Constants and Output Impedance Values of Vacuum Tubes—and their effects on efficiency of tube operation, is the topic to be handled by H. J. Marx in the issue of August 4. A simplification of the technical terms and formulas will be made for the benefit of fans anxious to learn the theory of tube operation in Radio circuits.

Away up North with Capt. McMillan—Next issue of the Digest will contain cooling pictures of the Captain and his Radio-equipped ship, the Bowdoin. The famous explorer will endeavor to find out all about static while hovering on the roof of the earth.

R. D. Diagram 91—a Different Development of the Ultra Reinartz—will appear next week. The hook-up uses the same tuning unit as was described several months past in the Ultra Reinartz series.

Conclusion of John B. Brady's Patent Survey—Part IV, the end of Mr. Brady's interesting survey of the Radio patent tangle, will be contained in the issue of August 4.

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PROMISES "SILENT" CODE

(Continued from page 1)

frequencies of sixteen or less per second. With this fact as a basis of the plan, the telegraphy will be done on these low frequencies, which will in turn be impressed on a carrier wave of any Radio frequency. The first experiments will in all likelihood, according to Major Mauborgne, be done using carrier waves with frequencies of from 600 to 857 kilocycles per second (500 to 350 meters wave length).

Using one carrier wave it will also be possible to modulate this by several different "silent" code bearing frequencies. Thus one station's equipment could be used to handle a number of different messages simultaneously. This system is known as the "multiplex" and sending several messages at once by multiplex is known as multiplexing.

Will Help Crowded Ether

The successful establishment of the system of multiplex silent telegraphy will mean the opening for Radiophone broadcasting use of every practical wave band now set aside for the use of Radio telegraphy only. Conversely, it will also mean that wave lengths now reserved and used for broadcasting only, will be open to use by Radio telegraph stations.

The latter significance is of much more importance inasmuch as thousands of telegraph stations are crowding one another in the limited range of useful wave frequency bands. This added advantage of the silent system will undoubtedly cause it to be very popular and applied to use quickly, once developed and proven, at the commercial stations.

To Use Squier Sine Wave Alphabet

The new code signal system invented and recently introduced by Major General George O. Squier, chief signal officer of the U. S. Army, known as the sine wave alphabet, and by means of which it is possible to send at a terrific rate of speed, will be applied to the silent system Major Mauborgne will develop. The sine wave system has already been successfully applied to cable work, permitting an increase in cable speed of 150 per cent.

The Squier sine wave alphabet, explained previously in Radio Digest, is based on the height or amplitude of the sine wave transmitting the signal. For dots the amplitude of the emitted sine wave is less than for dashes. Word and letter spaces, ordinarily consuming much valuable time, can be done away with by Major General Squier's sine system.

Employ Automatic Receiving Printer

As was explained above, the silent telegraphy will also be silent so far as an operator with a headset is concerned, so that it will be necessary to use an automatic receiver and printer. Relays and printers for this work can receive at from five to ten times as fast as it is possible for an operator to "read." There is also a great decrease in the number of errors with the elimination of the human element.

William B. Bruce, Jr., Springfield, Ohio, well known for his inventions in the submarine cable field, is responsible for the invention of an alternating current operated relay which, Major Mauborgne says, will very likely be employed to operate the printer of the automatic receiver. The Bruce relay will take the sine wave alphabet and is really a very remarkable application of the use of the triode tube, so familiar to Radiophans for its rectifying and amplifying powers in the Radio receiving set. Mr. Bruce will have charge of the experimental work in developing the relay purely as a relay. Its application to the silent sine wave telegraphy will be developed in Major Mauborgne's laboratory.

Perfecting Static Eliminated

Associated with Major Mauborgne at Washington will be Dr. Louis Cohen, civilian consulting engineer of the U. S. Signal Corps. The two have done much Radio research together, one of their inventions being the static eliminating device already described twice previously in Radio Digst. The experimental work on the static eliminator will be continued at Washington. Although proven to be practical and a desirable addition to receiving sets where atmospherics are especially bothersome, the device is still undergoing refinements and simplification so that the novice can handle it without difficulty.

Plans for marketing the static eliminator, Major Mauborgne says, are not yet definitely completed.

Lieutenant Colonel Alfred T. Clifton, formerly signal officer of the Second Army Corps area, headquarters at Boston, will succeed Major Mauborgne as signal officer of the Sixth Army Corps area, headquarters Chicago.

Two Broadcasting Stations Recently Opened in Chile

WASHINGTON, D. C.—Reports recently received from Chili state that two new broadcasting stations have been opened in this South American country. One station is located at Santiago de Chile and more recently one was installed in Vina del Mar by an ambitious amateur who sends out regular programs.

Both of these stations do not start until the Buenos Aires stations have closed down for the night, there being a difference of one hour in time between the coast and the interior.

Ex-President Wilson has a supersensitive Radio receiving set installed in his home in Washington, D. C.

RADIO DEVICE AIDS DEAF, TESTS SHOW

MICROPHONE AND VACUUM TUBES HELP EAR DRUM

Chicago Experimenter Reports Success in Treating Latent Muscles with Speech Amplifier

CHICAGO.—Great success in applying Radio to teaching the deaf to use their vocal chords and even in the reduction of deafness has rewarded the work of B. K. Ford, 8 South Austin Boulevard, this city. The apparatus used in the experiments consists of a microphone connected to a vacuum tube speech amplifier, the output of which is run into an ordinary Radio headset. A milliammeter in the plate circuit of the last tube of the speech amplifier tells how much current is used to make a deaf subject hear.

Once the correct amplification for the subject is established the problem becomes simple. Some deaf persons require great amplification while others require very little. The milliammeter therefore allows grading of the subjects so that classes of the same degree of deafness can be taught by the same apparatus at one time.

No Lip Reading Allowed

No lip expressions are used by this method in teaching the deaf to speak. The back of the instructor is even turned to the patient so that he cannot be led to read the former's lips. Much patience and care are necessary to induce the deaf patient to learn the sounds that make words.

Henry Heinz, 2027 Bingham street, twenty-one years old, Chicago, was deafened by scarlet fever at the age of six. Four hours of constantly increased amplification were necessary before Mr. Heinz evinced reaction to sound. He is now able to distinguish piano, vocal and violin tones and is being taught to use his voice.

Harry Allen, 2132 Milwaukee avenue, Chicago, fifteen years old, after four hours' work was taught to say, "Hello," "Yes" and "No," and to count from one to ten. The counting was not consecutive; the boy learned the numerals and their value not merely their order.

Decreased Power Strengthens Hearing

By gradually decreasing the power of the amplifier the deaf subjects soon are enable to hear much better. The process really is based on the strengthening of the latent muscles of the delicate ear mechanism. The experiments are a revelation in the teaching of the deaf. Normal hearing may be restored in rare cases. Practically every subject treated thus far has shown improvement.

Mr. Ford does not declare that the procedure is a panacea for the deaf nor does he assure improvement in every instance. There are deaf persons whose aural mechanism is hopelessly underdeveloped or crippled.

The value of the method in teaching the deaf to speak and in further educating them is attracting the attention of many.

BELLEVILLE, ONT.—A deaf and dumb boy first heard sound over a Radio set recently during an experiment at the convention of American instructors of the deaf in session at the Ontario school. The lad, using sign language, told delegates he heard voices of singers at a broadcasting station.

NASHVILLE, TENN.—Piano music over a receiving set brought a revelation of hearing facilities recently to Berinth Hudgins, life-long deaf mute, of Trezevant, Tenn., near here, when he applied a receiver to his ear and listened in on a concert. A smile brought the first indication from Hudgins that he could hear.

Weekly Bible Class Increasing

FORT WORTH, Texas.—The Saturday evening WBAP Bible Class, conducted by Mrs. W. F. Barnum, leader of the Barnum Bible Class of First Methodist Church, is increasing weekly. The enrollment is now over 1,000, the largest Sunday school in the Southwest.

"HAVE ONE ON ME"— RADIO TREAT AT SEA

NEW YORK.—The first box of cigars ever delivered by means of Radio was sent recently by L. M. Boomer to General T. Coleman du Pont, a passenger on board the Leviathan at sea. It inaugurated the Radio smokers' service instituted by the firm operating the cigar department on board the new vessel.

PLANE BREMEN-BOUND MAKES PHONE RECORD

LONDON.—A Daimler air express, flying from here to Berlin, recently, conversed with the London air station while approaching Bremen, more than 400 miles distant. The distance is a new record for plane-to-ground phone transmission. The plane used a 400-watt transmitter and was piloted by Captain W. R. Hinchcliffe.

"OGN" OF WJZ EXPLAINS "BOTTLE"

"OGN" of Station WJZ, New York City, explains to Miss Rose Bower, WJZ listener in, how a five-kilowatt transmitting vacuum tube or "bottle" works. From the expression on her face one can tell that Miss Bower knows less about it now since "OGN" has explained. "OGN" is no other than Raymond F. Guy, well-known announcer at the big metropolitan station © K. & H.

SING TABOO SONGS IN FIREMEN'S CONCERT

Program Attracts Wives, Sweeties to Laddies' Stations

BOSTON.—A surprise program broadcast recently from Station WNAC here direct from the Mason street fire headquarters, proved a treat for listening in firemen and other Radiophans all over New England. An all-star program of theatrical talent from the various theaters sang a large number of popular songs that have been tabooed by Radio lately. Special permission had been secured from the American Society of Composers, Authors and Publishers for this occasion. There were also short talks by Fire Commissioner Glynn and Chief Taber.

At several fire stations in surrounding towns, where the Radio sets have loud speaker equipment, there was quite a gathering of wives and sweethearts of the fire laddies to hear the concert.

14 MORE WEEKS OF STANDARD WAVES

WASHINGTON HEEDS CALL FOR SERIES OF SIGNALS

Bureau of Standards to Broadcast Adjustment During August, September and October

WASHINGTON, D. C.—The popularity of the standard wave frequency signals transmitted by the Bureau of Standards station, WWV, during the last six months is such that the series will be continued in August, September, and October, it has been announced here. The accuracy of the waves is more than three-tenths of one per cent. They are thus ideal for checking wavemeters and adjusting transmitting and receiving apparatus.

The power of the transmitter at WWV enables the station to be heard anywhere east of the Mississippi River, provided sensitive receiving apparatus is used. The schedule follows:

Schedule of Transmissions

The time used is Eastern Standard. The hours for transmissions August 15, September 13, and September 28 are similar. Different time periods are used, however, in the October 7 transmissions—

10:55 to 11:11 p. m., Aug. 15 and Sept. 13, 705 meters; Sept. 28, 600 meters. 11:15 to 11:26 p. m., Aug. 15 and Sept. 13, 600 meters; Sept. 28, 428 meters. 11:30 to 11:41 p. m.; Aug. 15 and Sept. 13, 450 meters; Sept. 28, 333 meters. 11:45 to 11:56 p. m.; Aug. 15 and Sept. 13, 352 meters; Sept. 28, 273 meters. 12 to 12:11 a. m.; Aug. 16 and Sept. 14, 300 meters; Sept. 29, 231 meters. 12:15 to 12:28 a. m.; Aug. 16 and Sept. 14, 240 meters; Sept. 29, 200 meters. 12:30 to 12:41 a. m.; Aug. 16 and Sept. 14, 200 meters; Sept. 29, 176 meters.

On October 7, the schedule is: 1:55 to 2:11 a. m., 222 meters; 2:15 to 2:26 a. m., 200 meters; 2:30 to 2:41 a. m., 187 meters; 2:45 to 2:56 a. m., 176 meters; 3 to 3:11 a. m., 167 meters; 3:15 to 3:26 a. m., 158 meters; 3:30 to 3:41 a. m., 150 meters.

Details of System

For each transmission of a standard wave frequency a general call is given by voice first then it is repeated in code. Next the standard frequency signals are given. These consist of the station's call, WWV (.-- .-- ...-), repeated with very long dashes intervening and are transmitted by undamped continuous waves. After the standard signals, special announcements are made.

The general call and the announcements are made with the same frequency as the standard signals between but it is recommended that only the standard signals be used for measurement purposes by those listening in.

U. S. OFFERS CRYSTAL DETECTOR TEST DATA

Bureau of Standards Information Aid to Manufacturers

WASHINGTON, D. C.—The results of tests of Radio receiving sets by the Bureau of Standards are given in a series of letter circulars of which the first (No. 90) was issued some time ago. This paper dealt with tests of electron tube sets. The second circular of this series (No. 93), ready for distribution, gives the results of tests on crystal detector sets.

It is believed that the methods followed and the examples given in these reports will be of assistance to manufacturers in the development of methods of testing, besides aiding them to describe properly and to improve their products.

The receiving sets are referred to by arbitrary reference numbers rather than by manufacturer's name, type and model numbers. These circulars are available only in mimeographed form and the supply is limited but copies may be obtained by those directly concerned with the testing of receiving sets by addressing the United States Bureau of Standards.

THE ANTENNA BROTHERS — Spir L. and Lew P. — A Word to the Wise, Etc.

SURVEYS INDUSTRY'S TANGLE OF PATENTS

"Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

By John B. Brady

(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation started July 14 issue.)

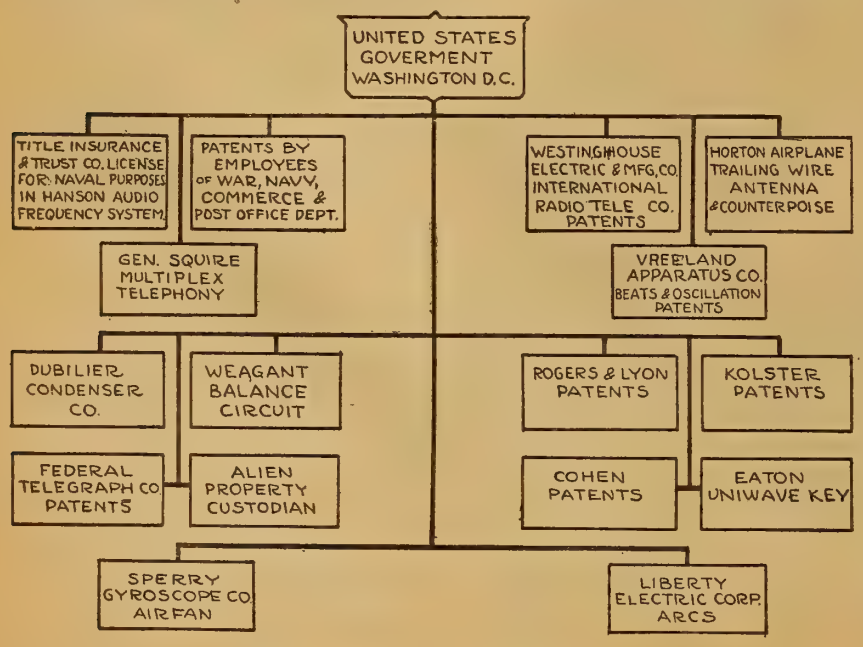
PART III

ON THE signing of the Armistice, however, this condition no longer continued and the patent monopoly heretofore existing returned with all of its legal aspect and effect. The circumstances were such that no one of the companies working in the art were in a position to sell Radio apparatus without infringing some patents controlled by a competitor. The Westinghouse Electric and Manufacturing Company in gaining a foothold in the commercial Radio field, secured rights under the patents of the International Radio Telegraph Company, including the Fessenden patents, and then under the inventions of Pupin and Armstrong, including the famous Armstrong regenerative circuit.

They had secured certain rights under Hutin and LeBlanc multiplex wire telephony patents, also certain rights by negotiation with the government under the patents of the Federal Telegraph Company, The Atlantic Communication Company, and the invention of Lieutenant Eaton, U. S. N., covering the uniwave arc signaling key.

Form Radio Corporation

The Radio Corporation was formed, including the patent holdings of the General Electric Company, the Marconi Company, the American Telephone & Telegraph Co., and Western Electric Company, with certain reciprocal license rights designating the fields of operation for each of the several companies, and the heretofore deadlocked patent situation then somewhat relieved. Continuous wave reception was not practical and convenient for the Radio Corporation without the infringement of the heterodyne patents and the Armstrong patent of the Westinghouse Electric & Manufacturing Co., while on the other hand the Radio Corporation's combine of patents offered serious difficulties in the way of tube patents for the commercial operations of the Westinghouse Company, and with this problem existing the great combine of patents became established, including the Westinghouse Electric & Manufacturing Co. as a part of the Radio Corporation as represented by the chart given last week.



Radio Patent Organization Chart

To Decide if Combine Is Legal

Whether such a combine of patents is in violation of the Sherman Anti-Trust Law, in unlawful and unfair restring of trade, was the subject matter of a bill for investigation introduced in the House of Representatives by Congressman Fred A. Britten of Illinois. This question is being investigated by the Federal Trade Commission at Washington under a resolution offered by Congressman White of Maine just before Congress adjourned its last session.

The Wireless Specialty Apparatus Company during the war had manufactured for the government certain constructions of mica condensers alleged by the Dubilier Condenser Company to be infringements of their patents. Suit was initiated by the Dubilier Company but settlement arrived upon early in the proceedings, wherein the Wireless Specialty Apparatus Company secured certain rights under the patents of the Dubilier Condenser Company.

Wireless Specialty Invited in

Professor Pickard, associated with the Wireless Specialty Apparatus Company, had been an early and creditable worker in the Radio art and had secured many patents upon the crystal detector. A mutual agreement was reached between the Wireless Specialty Apparatus Company with its associated company, the Tropical Wireless Company, suppliers of Radio apparatus for steamers of the United Fruit Company, and the Radio Corporation, designating the fields of operation of the several companies wherein the Specialty Company became substantially a part of the Radio Corporation. The Radio Corporation finally purchased the Vreeland oscillator patents containing claims which appeared to offer difficulties in operation of thermionic tube oscillators.

(TO BE CONCLUDED)

PRIZES TO TEMPT RADARIO WRITERS

Cincinnati Publisher Offers $100 for Three Best Air-Borne Plots

CINCINNATI, O.—A Cincinnati magazine published in the interests of writers, "The Writer's Digest," announces a prize contest in which $100 will be given for the three best Radarios. The prizes are: First, $50; second, $30, and third, $20.

The three winning Radarios will be broadcast from Station WLW, Crosley Radio Manufacturing company, here. The contest, open to all, will close September 15, 1923.

Judges in the contest are James Knapp Reeve, writer; Howard T. Dimick, author of several books on photoplay writing, and Fred Smith, studio director of Station WLW.

The Radario, a new dramatic form, offers an interesting field to writers. The contest is intended to impress on them the significance of the new form and to familiarize them with its technique.

Will Broadcast Lectures Along Educational Lines

DAYTON, O.—Listeners in within a radius of 300 miles of Dayton were able to hear the first program broadcast recently from the new $3,000 station, WABD, located at Parker high school, this city.

According to G. A. Morris, principal of the school, programs to be broadcast from the station will be along educational lines.

Reviews of Books

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blue print. Price, 75 cents.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, $1.

Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

Radio Telephony. By Alfred N. Goldsmith, Ph. D. This book is intended for Radio engineers, operators and experimenters. Students and other who desire to be clearly informed concerning Radio need this book. It is written in a clear style, fully illustrated with wiring diagrams and photographs of Radio apparatus. Price, $2.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Alabama Hams Quizzed

BIRMINGHAM, ALA.—Theodore G. Deller, superintendent of Radio for the fifth district was recently in Birmingham and inspecting all Radio stations in Birmingham and vicinity.

While here Mr. Deller addressed the Birmingham Wireless Association, concerning both broadcast listeners and amateur operators, explaining the position of the government in its relation to amateurs and broadcasting stations.

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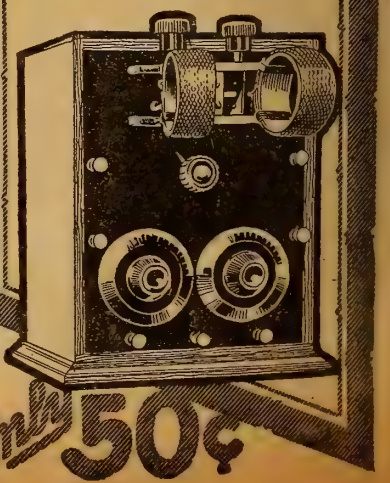

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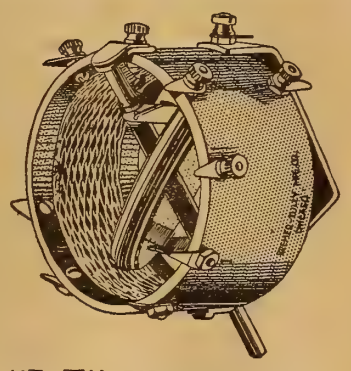

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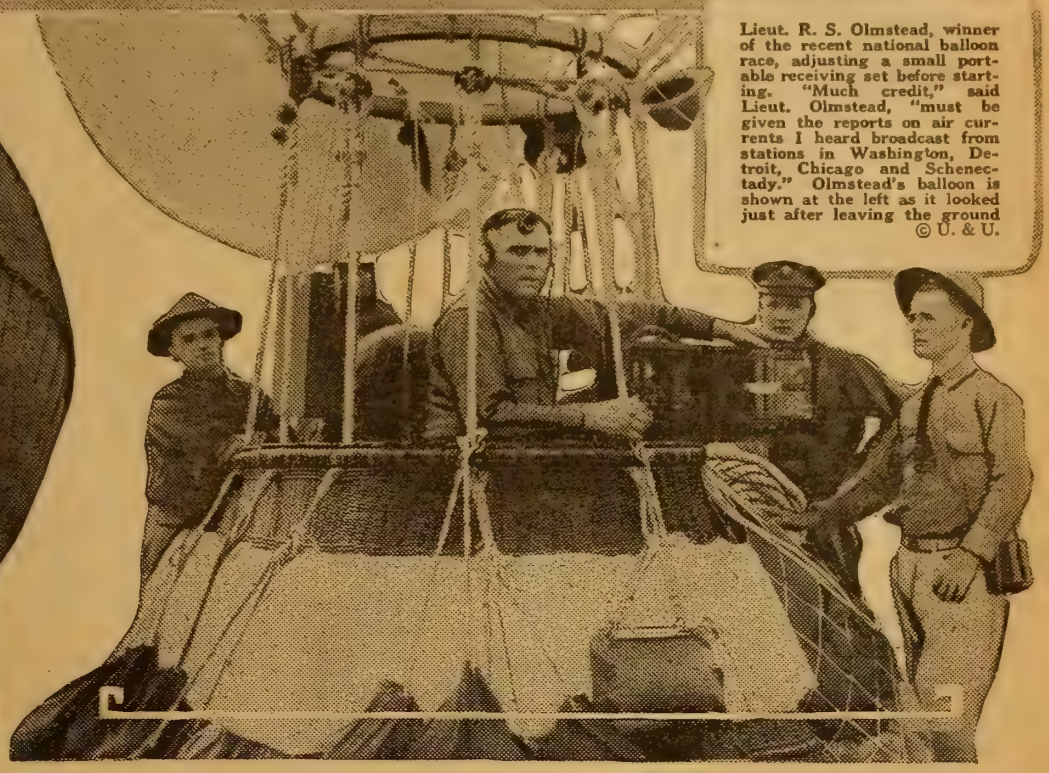
BALLOONIST WITH RADIO WINS RACE



Lieut. R. S. Olmstead, winner of the recent national balloon race, adjusting a small portable receiving set before starting. "Much credit," said Lieut. Olmstead, "must be given the reports on air currents I heard broadcast from stations in Washington, Detroit, Chicago and Schenectady." Olmstead's balloon is shown at the left as it looked just after leaving the ground
© U. & U.

Five of the fourteen entrants in the recent national balloon race were equipped with lightweight, two tube, portable receiving sets for the purpose of receiving special weather reports giving the air currents at the various altitudes. These were broadcast by stations in Chicago, Detroit, Schenectady and Washington under the supervision of Prof. C. F. Marvin, chief of the U. S. weather bureau. Given above is the statement of Lieut. Olmstead, winner whose balloon was Radio-equipped, endorsing the value of the Radio reports. Last year Major Oscar Westover, winner of the National Balloon Derby, carried a set in his balloon and also gave particular credit to Radio in helping him to win. Another interesting sidelight on balloon Radio is the report of Ralph Upson, pilot of a second balloon equipped with a set. "One of the outstanding happenings in the use of Radio in the balloon race," said Upson, "was that at altitudes of 3,000 feet and above we observed absolutely no static whatever, although we could see lightning at various points on the horizon." Upson is no Radio newcomer, having experimented considerably with the popular pastime, and is thoroughly competent to judge the presence or absence of static noises

TALKS TO WIFE WHILE DELIVERING LECTURE

Spouse, Listening In, Gets Personal Remarks in Sermon

BIRMINGHAM, ALA.—By the aid of Radio Rev. Alfred J. Dickinson, Jr., recently delivered a sermon here especially intended for his wife, which the wife heard without the invisible audience being wise. The audience didn't know the wife was listening in several hundred miles away at Tupelo, Miss.

Rev. J. R. Hobbs, pastor of the First Baptist church here, is in Europe, and Rev. Dickinson is filling the pulpit temporarily. When informed that a sermon of his would be broadcast by Station WSY, the Alabama Power Company here, the minister wired his wife to listen in. Mrs. Dickinson wrote her husband she heard every word spoken during the services.

After delivering the sermon the Rev. Dickinson admitted that all through the sermon he talked to his wife at their Tupelo home, but so carefully were his personal remarks to his wife interwoven with the words of his sermon that his congregation did not detect it, and his sermon was pronounced one of the strongest and most forceful ever delivered from a pulpit in Birmingham. "I had an inspiration while speaking, from my wife at our Mississippi home," the minister said.

Roller Skaters Roll 'Round Rink to Radio

"Aerial Hats" Pick Up Cincinnati Broadcast Music

CINCINNATI, O.—The engineers of Station WLW, Crosley Manufacturing Company here, recently took a receiving set and an amplifying horn to the Hill Top Rink and installed it to test out the possibilities of using broadcast music to roller skate. This is probably the first time roller skating has been done to Radio music.

One of the novelties of this skating and dancing carnival, was the Radio hats which the principal skaters used. They were equipped with a little aerial, and apparatus of the crystal variety was used to pick up the broadcast concert from WLW while the skaters were enabled to keep perfect roller time to the music.

The experiment was so successful that it will be used by the ice skaters at the Cincinnati Zoo, where a carnival is given twice a day.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	6:30- 8:00	.....	.....	.....	6:30- 8:00	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	6:00- 9:00	.....	.....	.....	6:00- 9:00	.....	.....
WOR, Newark, N. J.	405	7:00-10:00	5:15- 6:30	7:00-10:00	5:15- 6:30	5.15- 6:30	7:00-10:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	10:45-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

WMAK, Lockport, N.Y. Cuts Program During Remodeling

LOCKPORT, N. Y.—Station WMAK of this city has discontinued broadcasting during July and August excepting weather and crop reports, which will be given at 11 a. m. Eastern Standard time. The station will be remodeled and the transmitter will be altered. It is planned to operate as a Class B Station in September.

Bagpipes Give Scotch Treat

TACOMA, WASH.—An atmosphere of heather hills and bonnie lassies was broadcast from KGB recently when a trio from Tacoma Bagpipe Band played for Ledger Radiophans. Only three members of the originally announced sextette were able to play. Their numbers were "The Gordon Highlanders' March," "Sterlingshire Militia" and "The March Past of the Cameron Highlanders."

Daily "Time Ticks" Set Watches Right

New WBAP Service Proves Popular with Fans

FORT WORTH, Texas.—Time ticks sent out each morning, except Sunday, by WBAP, Star-Telegram, are proving very popular with Radiophans of the Southwest. The ticks are absolutely correct, being transmitted direct from Washington by wire to WBAP. Many jewelers use the time ticks to set their standard clocks.

The first tick begins at 10:55 (Central time) and continues for five minutes. Each tick is transmitted as a dot, omitting the twenty-ninth second of each minute, and the last five seconds of the first four minutes.

The last ten seconds of the last minute before 11 o'clock are omitted and then a dash is sent at exactly 11 o'clock when the time ball falls in the National Observatory at Washington.

RADIO TAKES PLACE IN "WELCOME HOME"

Auto Set Greets Los Angeles Chief on Return to City

LOS ANGELES.—Radio has taken its place as part of the local reception committee to welcome new arrivals, guests and visitors, when recently it was given an important part in welcoming Louis D. Oaks, chief of police, upon his return to this city.

The Radio reception was extended over Station KHJ, the Los Angeles Times. Through arrangements and the courtesy of Major Frank Creswell, of the Western Radio Research Laboratories of this city, which placed a Radio-equipped automobile at the station entrance as Chief Oaks came through the station, he was greeted by Captain of Detectives George K. Home, who broadcast his welcome from The Times Building.

While awaiting the arrival of the train at the station the friends, citizens and representatives of the city, organizations and associations which made up the welcome, were entertained with concert selections, news events of the day and other features from the broadcasting plant.

Hawaii Hears Michigan "Bugs"

DETROIT.—Three men in Port Huron, Mich., have installed an amateur Radio broadcasting station which has been heard in Hawaii. Its call signal is 8AB.

WANT TO LISTEN TO EUROPE STATIONS?

OLD WORLD BECKONS WITH ELEVEN PLANTS

Six British Phone Broadcasters, Three French, One Belgian and One Dutch Operate Daily

Do you think your set will reach to Europe? If so the following information will be of use to you. At present there are eleven phone broadcasters on the continent and the British isles, ranging in wave length transmitted from 353 to 3,100 meters. Better buy some big duo-lateral coils before you start on the European DX hunt but, then, the hunt will be worth it!

Let's take them in turn.

Now there's Great Britain for example. Six stations fill the air every evening. If we assume the evening hour to be 7:30 p. m. over there, the time expressed as Eastern Standard would be 2:30 in the afternoon or in Mountain time, 12:30 p. m.

The plants and the wave lengths used in Great Britain are: 2L, London, 369 meters; 5IT, Birmingham, 420 meters; 2ZY, Manchester, 385 meters; 5NO, Newcastle, 400 meters; 5WA, Cardiff, 353 meters; 5SC, Glasgow, 415 meters.

Across the Channel

How about crossing the channel and tuning in France? Well there's FL, the Eiffel Tower, Paris, on 2,600 meters. If you use Eastern Standard time, you can hear him on the following schedule:

7:06 a. m., weather reports, ten minutes; 2:11 p. m., weather reports and concert, thirty minutes; 6:01 p. m., weather reports, ten minutes.

Then down on 1,780 meters there are the Radiola concerts in Paris every day, the schedule is: 1:00 p. m. (Eastern Standard time) news; 1:06 to 1:51 p. m., concert; 4:36 p. m., news; 4:51 to 5:51 p. m., concert.

Then still in Paris the station of L'Ecole Superieure des Postes, Telegraphes et Telephones can be heard Tuesdays and Thursdays from 3:36 to 5:51 p. m., Eastern Standard time. The plant is also on the air Saturdays, 12:21 to 3:21 p. m.

Lyons, France, puts 1,500 good watts and phonograph records on the air daily except Sunday from 6:36 to 7:06 a. m. The wave length of Lyons, 3,100 meters, is the highest of any phone broadcaster in Europe.

Holland and Belgium at It Too

The little country you heard so much about in the world war, Belgium, also does its bit. Brussels, BAV, 1,300 meters, has 1,000 watts in its antenna. Its operating schedule is Tuesday and Thursday, 12:43 p. m., Eastern Standard time.

Then Belgium's equally famous neighbor, Holland, has a station at the Hague. The wave length is 1,050 meters. If you can reach the Hague, Station PCGG, you will hear him as follows: Sunday, 10:40 a. m. to 1:20 p. m. (Eastern Standard time), concert; Monday and Thursday, 4:20 to 5:20 p. m., concert. The Monday concerts are sometimes given on 1,300 meters, notice being given the previous Sunday (so you'll have to hear him both times.)

The time difference makes quite a peculiar situation. Concerts broadcast there in the evening are heard here in the early afternoon, while early morning European broadcasts (if there were any) would be heard here the evening before. But don't let the difference in time worry you. Just listen in regularly at the hours given above. Europe hears our big stations but the European broadcasting plants have been heard very few times in this country. Let's put them on our string of DX scalps.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

(Submitted by G. H. D., Ontario, Canada.)

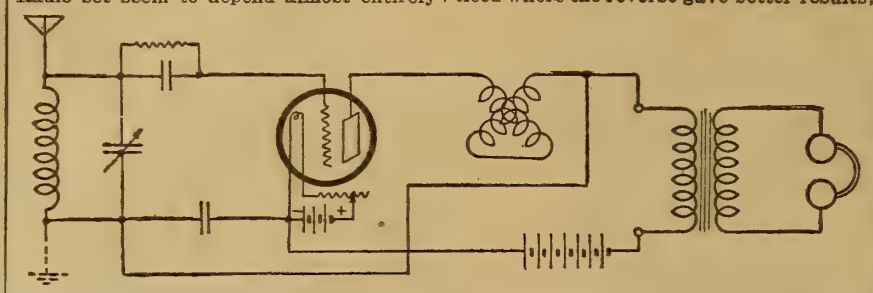
Getting Rid of Body Capacity

Question. I am able to report very successful results with the Flewelling circuit so far as reception is concerned but find that hand capacity effects are terrific. Is there no way by which this trouble may be overcome?

Answer. Hand capacity effects with any Radio set seem to depend almost entirely on the design of the apparatus used. It is the writer's opinion that the time has come when some manufacturers will awaken to the fact that we are still using approximately the designs and ideas in our Radio apparatus of today that were prevalent 15 to 20 years ago. One of the greatest offenders from most any angle is the interleaving plate condenser which is in such common use. One may say that this type of condenser is responsible for ninety per cent of our Radio sets failing to give us maximum results. This is because of hand capacity troubles and poor electrical efficiency. It is a great puzzle to the writer why so many of these condensers are in use when it is so easy to purchase a condenser of a type that will practically spell the elimination of hand capacity effects. One answer to this may be that the public finds it difficult to obtain a condenser of this type—one built mechanically good. Were our apparatus properly designed we would not be bothered in any way by hand capacity effects. This means that there would be no need to shield our sets, with the accompanying bother and trouble that this work entails. However, radio is traveling very fast indeed; it will be only a short time before very radical improvements will be offered by the manufacturers of sets and parts.

However, if we must use the interleaving plate condenser we are still able to eliminate hand capacity effects from the Flewelling circuit. Incidentally, it may be well to bear in mind that the more sensitive a Radio set the greater will be the hand capacity effects, dependent of course to an extent on the layout and design of the apparatus and set. If you will take any type of Flewelling set in working condition, remove the phones and in their place connect the primary of any audio frequency transformer and connect the phones with the secondary posts of the transformer you will find that, with no other change, the capacity effects have been eliminated for all practical purposes. This helps to overcome even the trouble which is caused by the interleaving plate condensers.

I say connect the primary in place of the phones and the phones with the secondary of the audio transformer. Please remember that conditions have been noticed where the reverse gave better results; that is, the secondary of the transformer was connected in the circuit and the phones were connected with the primary of the transformer. Note also that the use of a .001 mfd. stopping condenser may be used here in the usual manner depending on your own set. Sometimes it is better to leave it out. The transformer connection is shown in the accompanying diagram. It is often very handy but the writer prefers to use on his own set such apparatus by means of which the hand capacity effects are eliminated without the use of the audio transformer and the incidental expense, space in the set, and the like that its use means.



Rural Sections Look to WSY for Sunday Sermons

BIRMINGHAM, Ala.—One of the popular features of Station WSY, the Alabama Power Company, is the broadcasting of sermons and special church music. Small towns and rural sections, as well as the cities of Alabama, look for these sermons and musical programs with much regularity, from Birmingham's well known ministers of the various denominations.

Tells Kiddies by Air How to Swim

'Y' Instructor's Directions Broadcast to Pool

CINCINNATI, O.—Stanley Brauninger recently completed his series of swimming lessons from Station WLW, Crosley Manufacturing Company here, by giving a practical demonstration of the use of Radio in teaching children how to enjoy the natatorial art. The children were in the pool at the workhouse and Mr. Brauninger, swimming director of the Y.M.C.A., got the children to line up in the pool. By means of a Radio receiving set and an amplifying horn, he told them from WLW studio just what to do. This is the first time on record that swimming lessons have been given by Radio. The test was successful in every way.

All Lightships to Have Sets

DETROIT.—George H. Putman, local commissioner for lighthouses, states that all lightships and lighthouses in the near future will be equipped with apparatus. He has been particularly interested in the effort of WWJ, the Detroit News, along these lines.

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N. & K., 6000 Ohms	16.00	6.50
Rico, 3000 Ohms	6.50	3.95
Dictagraph, 3000 Ohms	8.00	6.50
Ambassador, 3000 Ohms	....	3.98
Nathaniel Baldwin, Original	12.00	8.75
Nathaniel Baldwin, Single, with Cord	6.00	4.45
Brandes Genuine	8.00	6.75
VARIOCOUPLERS & VARIOMETERS		
Queens	5.00	1.95
Fisher	5.00	1.95
Raven	5.00	1.95
Tuska with Dial	6.00	2.95
Pathe	6.00	2.95
Columbia	6.50	3.95
Workrite	6.00	2.95
Eagle Bakelite	8.50	4.95
Fisher, Large	6.50	2.95
Pearloo Bakelite	6.50	4.45
VARIABLE CONDENSERS (*Moulded Ends*)		
3 Plate	2.00	1.25
11 Plate	3.50	1.75
17 Plate	4.00	1.95
23 Plate	4.00	1.95
43 Plate	5.00	2.25
11 Plate Vernier	6.00	3.25
17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
43 Plate Vernier	7.50	3.95
TRANSFORMERS		
All American	....	3.95
Earla Reflex	....	4.50
Thordarson	....	2.95
Marle	4.00	2.95
Acme Audio or Radio	....	3.75
Tri-Coil Radio	....	1.50

	List Price	Our Price
MISCELLANEOUS		
Tungar 5 Amp	$28.00	$22.50
Tungar 2 Amp	18.00	14.95
Mica Diaphragms	2.00	1.25
RHEOSTATS		
Cutler Hammer	1.00	.85
With Vernier	1.50	1.25
C. H. Potentiometer	1.50	1.25
Klosner Vernier	1.50	1.20
SETS		
Aeriola Jr. (Westinghouse)	18.00	5.95
Cutting & Washington 3-Tube Type II	125.00	55.00
Tuska Regenerative	35.00	22.50
Crosley Regenerative	....	19.00
Crosley 2-Step Amplifier	....	17.00
2-Step Amplifier, Assembled	....	11.95
General Radio 1-Step Amplifier	8.00	6.95
LOUD SPEAKERS		
Magnavox Type R3	35.00	24.95
Atlas	25.00	17.50
Western Electric	55.00	Special
Music Master	30.00	24.95
Wooden Horn	8.50	5.75
Aluminum Horn	10.00	4.95
TUBES		
UV-199, UV-201-A, WD-12, WD-11, All Genuine	....	5.75
VT-2 Western Electric	....	7.95
De Forest DV-6	....	3.75
UV-200	....	4.50
De Forest DV-6A	....	4.75
COMPLETE PARTS FOR		
Flewelling Circuit	....	13.95
Reinartz Circuit	....	11.95
Neutrodyne Circuit	....	35.00
Cockaday	....	13.95
2-Step Amplifier	....	9.95
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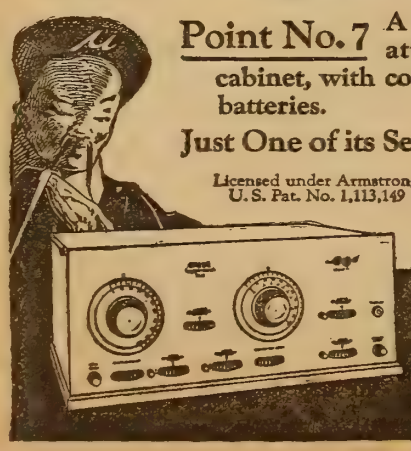

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ELS RADIO CO. 610 Randolph Bldg., Chicago, Illinois

The Week's Advance Broadcast Programs

Tuesday, July 24

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M. Concert, "Scotch Poem." Star Orchestra; "Angel's Serenade," Margaret P. Wilson, contralto; "Hungarian Rhapsody," Manne Roth, violinist; "Dreaming," Orchestra; "Stars Brightly Shining," "Dawn," "Lasan; Selection from "H. M. S. Pinafore," Orchestra; "Londonderry Air," Mannie Roth, "The Valley of Laughter," Margaret P. Wilson; "La Source," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, "Il Baccio," "Spirit of Spring," "Japanese Love Song," "You and I," "April Morn," Mme Tomer Hunting, soprano; "Valse in D Flat," "Hindu Chant," "Concerto in E Major," "Romance Andalousa," Joseph Kreisic, violinist.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; 10:00-11:00 P. M., Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 8:00-10:00 P. M., De Luxe program, Temple Quartet.

KSD (Central, 546), 8:00 P. M., Concert, Isham Jones' Orchestra.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Herbie Mintz, pianist; Cope Harvey's Orchestra; "The Little Irish Song," Margaret P. Winmone est un oiseau rebelle," "Mother's Lullaby," Mae Sheppard Saunders, soprano; 9:05 P. M., Book review, Llewellyn Jones.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Cahoon's Texas Hotel Orchestra.

WBZ (Eastern, 337), 7:00 P. M., Concert, Gertrude Jenkins, contralto; Charles B. Pratt, tenor; Irene Frey, soprano; Mrs. Annette B. Flocken, pianist; 8:20 P. M., Bedtime story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Music, Arcadia Cafe Concert Orchestra; Children's hour; Talk, "Care of Babies," Mrs. Louise Love; 4:30-5:55 P. M., Talk, "Affairs of the Heart," Betsy Logan; Song recital; 7:30 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Musical program, Anna Pinkerton Baker, soprano; 11:00-12:00 P. M., Recital, William A. Sutherland, Jr., pianist.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Concert; 7:00-7:30 P. M., Children's own half hour; Safety talk, Stanley Cowman; 8:00 P. M., Boy Scout Radio Corps, under supervision of Boy Scouts of America; 8:30 P. M., Song and piano recital, Loretta Kerk, pianist; Harold Simonds, baritone; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club, Talk, "Astronomy," Mrs. Lydia E. Ring; 5:00 P. M., "Skalalatoot Stories," George Ernst, reader; 8:30 P. M., Business report, Roger W. Babson; Soprano solo; "Bits of Wisdom," George Brinton Beal; Musical program.

WGY (Eastern, 380), 7:45 P. M., Musical program, "The Field Ensign," "The Mill Dam," Gibson Mandolin Club; "Little Boy Blue," Joseph Carroll, tenor; "Rondo," Ethel Mincoff, pianist; "Rosa," Edith MacCulley Corlette, reader; "Santiago," Mandolin Club; "Absent," Joseph Carroll; "Kinderscenen," Ethel Mincoff; "By Courier," Edith M. Corlette, reader; "Kinderscenen," Part II., Ethel Mincoff; "Good Night, Little Girl," Joseph Carroll; "The House with Nobody in It," Edith M. Corlette; "The Crescendo," "The Indian Smoke Dance," Mandolin Club.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Rotary Club of Louisville, Robert Montgomery, director; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00 P. M., Tenor solos and short talks; 6:00 P. M., Dinner music; WIP Little Symphony Dance Orchestra, Dick Regan, director; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:20 P. M., Short talk; Song recital; Organ recital, Karl Bonawitz, Germantown Theater.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Musical program, "Waltz," Ivah M. Navarro, pianist; "Where My Caravan Has Rested," Marian Manship, Edward Kruse; "Juba Dance," "Castillian Dance," Cecilia Sack, pianist; "Twilight," "Musetta Waltz Song," Marian Manship, singer; "Melodie," Ivah M. Navarro; "The Old Road," "My Violet," Edward Kruse, tenor; "Nay, Bid Me Not Resign, Love," Marian Manship, Edward Kruse; "The Swan," "Hunting Song," Reitza Dine, pianist; Circle Dance Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Musical program, Bush Conservatory of Music; 7:00-8:00 P. M., Talk, Edward C. Taylor; 9:00-10:00 P. M., Concert, LaSalle Orchestra; Program arranged by Jessie B. Hall.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; F. P. Dunkley, baritone.

Wednesday, July 25

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Masaniello," Star Orchestra; Frederick Manning, baritone; "Tambourin Chinois," Harry Adaskin, violinist; "Serenade D'Amour," Orchestra; Frederick Manning, baritone; Selection from "Tales of Hoffman," Orchestra; "Schon Rosmarin," Harry Adaskin; "Pleading," Orchestra; Frederick Manning, baritone; "March of the Prophets," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, "Vimy Ridge," "Poet and Peasant," "Danza Mariquita," "Louis Quinze," Selections from "The Christmas Tree," "First Arabesque," "Ave Maria," "By the Sea," "Ballet la Symphonie," "Aida," KDKA Little Symphony Orchestra.

KGW (Pacific, 492), 3:30-4:00 P. M., Stories, Aunt Nell; 8:00-9:00 P. M., Concert, Columbia Theater Orchestra; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 8:00-10:00 P. M., De Luxe program, Hancock Trio.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Lyon & Healy Concert Dept.; Cope Harvey's Orchestra; Harry Geise, pianist.

PWX (Eastern, 400), 9:00-11:30 P. M., Concert, General Staff Band of the Cuban Army.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, arranged by Dot Echols McCutchan.

WBZ (Eastern, 337), 7:00 P. M., Concert, Fred Gardner, tenor; Ruby Tilton Kingsley, pianist; Victor Garboni, violinist; WBZ Trio; 8:20 P. M., Bedtime story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00 P. M., Dinner music, Arcadia Cafe Concert Orchestra; 4:30-5:30 P. M., Song recital; 7:30 P. M., Bedtime stories, Dream Daddy; 8:00 P. M., Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Fresh Air for Weak Children," Mrs. E. P. Turner.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 6:30 P. M., Concert, Meyer Davis Bellevue Stratford Orchestra; 7:00-7:30 P. M., Children's own half hour, Stories, Cousin Sue.

WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Eunice L. Randall; 8:30 P. M., Talk, "Science Up to Date," Scientific American; Radio drama, Amrad Players.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Carl Zoeller's Melodists; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Song recital; 6:00-6:45 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Musical program, "Somebody Stole My Gal," "Keep Turning," "Sun-Kist Rose," Jack Keefer's Hotel Alms Orchestra; Talk, Dan Meyer; "The City Unseen," H. Marvin, baritone; Pauline Stemler, pianist; Solo, H. Marvin; Swimming lesson, Stanley Brauninger; Orchestra; "A Dream," "O Sole Mio," "Last Rose of Summer," Leah Fred, soprano; "Schone Rosemarin," "The Old Refrain," Rubin Phillips, violinist; "Beloved, It Is Morn," "Carmena," Leah Fred; Rubin Phillips, violinist; Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Musical program, Cosmopolitan School of Music; 7:00-8:00 P. M., Stories, Georgene Faulkner; 9:00-10:00 P. M., Concert, La Salle Orchestra; Evelyn Bostleman, soprano; Lillian Rehberg, 'cellist.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde G. Kern; 6:30 P. M., Sandman; 8:00 P. M., Recital, Erwin Swindell, organist; 10:00 P. M., Musical program, Leona Peterson, violinist; Stewart Moats, pianist; I. M. Arnold, trombonist; Amy Klicen, soprano.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillios A. Kyros.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, July 26

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Phedre," Star Orchestra; "April Weather," Nellye Gill, soprano; "Air," Jaques Sterin, 'cellist; "Glow-Worm," Orchestra; Nellye Gill, soprano; "Indian Love Lyrics," Orchestra; "Berceuse," Jacques Sterin; "I Know of Two Bright Eyes," Orchestra; "Now Sleeps the Crimson Petal," Nellye Gill, soprano; "Pierouette," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Miami String Orchestra.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra.

KHJ (Pacific, 395), 8:00-10:00 P. M., De Luxe program, Gertrude Sykes King, soprano.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, courtesy Presentation Dramatic Club, Gil Brown, director; Cope Harvey's Orchestra; Herbie Mintz, pianist; 9:05-9:25 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fort Worth Police Band.

WBZ (Eastern, 337), 7:00 P. M., Concert, Hazel Card Whalen, violinist, soprano; Esther Forristal, pianist; Florence A. Jensen, reader; 8:20 P. M., Bedtime Story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00 P. M., Fashion talk, Betsy Logan; 4:30-5:55 P. M., Song recital; 7:30 P. M., Dream Daddy.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Gene Lewis; 8:30-9:30 P. M., Musical program, Wednesday Morning Choral Club.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Loretta Kerk, pianist; Strawbridge & Clothier Malo Quartet; 3:45 P. M., Recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 8:00 P. M., Concert.

WGI (Eastern, Daylight Saving, 360), 5:00 P. M., "Twilight Tales," Eunice L. Randall; 8:30 P. M., Radio talk, Rachel Thompson; Concert, G. Dorothy Smith, soprano.

WGY (Eastern, 380), 7:45 P. M., Radio drama, "The Royal Mounted," WGY Players.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Calumet Six Orchestra; Sunday school lesson, Rev. A. E. Reid, pastor of the First Lutheran Church; Talk, Mrs. Chas. B. Semple.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00 P. M., Song recital; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talk; 9:00-9:30 P. M., Organ recital, Karl Bonawitz, Germantown Theater.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland Hotel Orchestra; 8:00 P. M., Concert, Tomson's Novelty Dance Orchestra.

WLW (Eastern, 309), 10:00 P. M., Musical program, "Nola," "Caprice Espagnole," Anna Knova, pianist; Prologue from "Pagliacci," Marcus G. Benham, baritone; "Ave Maria," Mitchell Humphrey, violinist; Talk, Harry J. Plogstedt; "Evening Star," from "Tannhauser," Marcus G. Benham; "Russian Rag," Anna Knova, xylophonist; "Melodie," "The Old Refrain," Mitchell Humphrey, violinist; "When Pa Pays the Monthly Bill," Catherine McPherson, reader; "Where Blossoms Grow," "The Bitterness of Love," Marcus G. Benham; "To Spring," "Rhapsody No. 11," Catherine McPherson.

(Continued on page 9)

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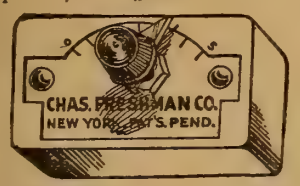

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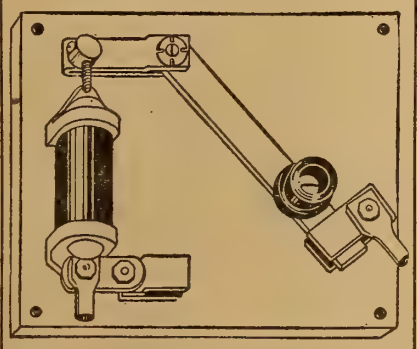

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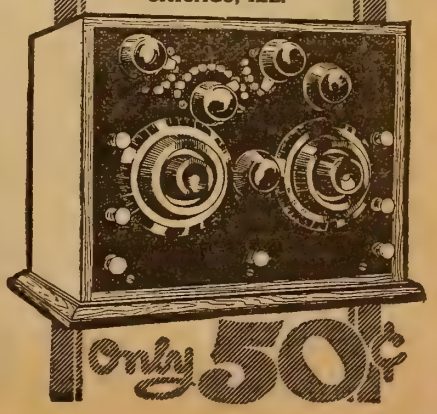

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Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the third part will appear next week.)

KUS, Los Angeles, Calif. 360 meters. 300 mi. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 360 meters. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Calif. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 360 meters. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 360 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYQ, Honolulu, Hawaii. 360 meters. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 345 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central, Daylight Saving.

KZM, Oakland, Calif. 360 meters. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 360 meters. 1,000 mi. Desert News. Slogan, "The Center of Scenic America." Daily ex Sun, 8-9:30 pm, music, news, bedtime stories, etc. Mountain.

KZV, Wenatchee, Wash. 360 meters. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 435 meters. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3 (Tues. only). Dept. Interior: 3:25-4:40, 5:05-5:20, markets, weather 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 meters. 1,500 mi. International Tel. & Teleg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAAB, New Orleans, La. 268 meters. Valdemar Jensen.

WAAC, New Orleans, La. 360 meters. Tulane Univ. Mechanics Inst. No regular schedule.

WAAD, Cincinnati, O. 360 meters. 200 mi. Ohio Mechanics Inst. No regular schedule. Central, Daylight Saving.

WAAF, Chicago, Ill. 286 meters. 300 mi. Chicago. Daily Drovers Journal. Daily ex Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Central.

WAAH, St. Paul, Minn. 360 meters. 500 mi. Commonwealth Elec. Co. Slogan, "From the Land of Ten Thousand Lakes." Temporarily discontinued.

WAAK, Milwaukee, Wis. 280 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 11 am-2 pm, 8-10:30, music. Eastern.

WAAN, Columbia, Mo. 250 meters. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAW, Omaha, Neb. 278 meters. 500 Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 12:45-1:15, 8, market reports; 8:15-9 pm, music. Central.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABA, Lake Forest, Ill. 266 meters. Lake Forest College.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABC, Anderson, Ind. 229 meters. Fulwider-Grimes Battery Co.

WABD, Dayton, O. 283 meters. Parker High School.

WABE, Washington, D. C. 283 meters. Y. M. C. A.

WABF, Mt. Vernon, Ill. 234 meters. Mt. Vernon Register-News Co.

WABG, Jacksonville, Fla. 248 meters. 50 mi. Arnold Edwards Piano Co. Daily ex Sun, Thurs, 3-4 pm, concert. Wed, Sat, 9-10:30 pm, music. Mon, Thurs, 8-10 pm, concert. Eastern.

WABH, Sandusky, O. 240 meters. Lake Shore Tire Co.

WABI, Bangor, Me. 240 meters. Bangor Ry. & Elec. Co.

WABJ, South Bend, Ind. 240 meters. The Radio Laboratories.

WABK, Worcester, Mass. 252 meters. First Baptist Church.

WABL, Storrs, Conn. 283 meters. Connecticut Agri. College.

WABM, Saginaw, Mich. 254 meters. F. E. Doherty.

WABN, La Crosse, Wis. 234 meters. Waldo C. Grover.

WABO, Rochester, N. Y. 252 meters. Lake Ave. Baptist Church.

WAI, Dayton, O. McCook Field, U. S. Army.

WAJT, Marshall, Mo. 360 meters. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. 360 meters. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Irregular schedule.

WBAD, Minneapolis, Minn. 360 meters. Sterling Elec. Co.

WBAF, Moorestown, N. J. 360 meters. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. Wireless Phone Corp. Slogan, "The Silk City of America." 244 meters. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9-11:30 am, 12:30-5:30 pm. Sat morn, only. Sun, 10-12 am, 2-5 pm, 7:30-10:30. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram Club, "Radio Truth League." Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 3:45-4, markets; 5:30-5:45, 6:30-6:45, 8, sports. Daily ex Sat, Sun, 9:30-10:30 pm, concerts. Sat, 7-7:20 pm, bible lesson. Sun, 11 am-12:15 pm, church; 3:30-4:30, concert. Central.

WBAU, Hamilton, O. 258 meters. Republican Pub. Co. Temporarily discontinued.

WBAV, Columbus, O. 390 meters. 500 mi. The Ernor Hopkins Co. Slogan, "We Broadcast a Variety." Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. 246 meters. Marietta College. Temporarily discontinued.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBBA, Newark, O. 240 meters. Newark Radio Lab.

WBBC, Sterling, Ill. 229 meters. Sterling Radio Equipment Co.

WBBD, Reading, Pa. 224 meters. Barbey Battery Service.

WBL, Anthony, Kans. 261 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun 11-12 am, music; 1-2:15 pm, reports; 2:15-2:30 pm, music, reports. Tues, Thurs, Sat, 7:30-9:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Slogan, "Queen City of the South." Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 286 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Sun, 8 pm, church service. Eastern.

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 326 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 268 meters. 200 mi. Clyde R. Randall. Mon, Thurs, 8-9 pm, concert. Central.

WCAH, Columbus, O. 286 meters. 500 mi. Entrekin Elec. Co. Slogan, "The Heart of Ohio." Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 8 pm, Children's Hour. Thurs, 8 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Slogan, "Where Eighteen Railroads Meet the Sea." Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. No definite schedule.

WCAM, Villanova, Pa. 360 meters. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-1 pm. Mon, Wed, 8-9 pm. Eastern.

WCAP, Washington, D. C. 469 meters. Chesapeake & Potomac Tel. Co.

WCAR, San Antonio, Tex. 360 meters. 1,500 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 360 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Slogan 'From the Flour City of the World." Mon, 9:30-11 pm, music, lectures. Mon, Wed, Thurs, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 240 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 286 meters. 500 mi. Durham & Co. Daily 11:45 am. Tues, Fri, 7:30-8 pm, concert. Sun, 10:55 am, church services. Eastern Daylight Saving.

WCAV, Little Rock, Ark. 360 meters. J. C. Dice Elec. Co.

WCAX, Burlington, Vt. 360 meters. Univ. of Vt.

WCAY, Milwaukee, Wis. 261 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Tues, 10:30-11:30 pm, dance music. Sun, 7:30-9 pm, church services. Central.

WCAZ, Carthage, Ill. 360 meters. Carthage College.

WCBA, Allentown, Pa. 280 meters. Chas. W. Haimbach. Wed, Sat, 2-12 pm. Sun, 2-4 pm, 8-10. Eastern.

WCBB, Greenville, O. 240 meters. K. & K. Radio Supply Co.

WCBD, Zion, Ill. 345 meters. 1,500 mi. Wilbur Glen Voliva. Slogan, "Where God Rules, Man Prospers." Mon, Fri, 8-10 pm, concert. Wed, Fri, 2:30-3:45 pm, concert. Sun, 9-9:45 am, Bible school; 2:30-5:30 pm, church services. Central daylight saving.

WCE, Minneapolis, Minn. 360 meters. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. 360 meters. Univ. of Tex.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Slogan, "The Call of the Motor City." Club, "Red Apple Club." Daily ex Sun, 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, 4:30, 4:50, 6:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert, Tues, 10-12 pm, Club, Sun, 10:30 pm, 7:15 pm, church services. Central.

WDAC, Springfield, Ill. 360 meters. Illinois Watch Co. Time and weather, spark only.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Club, "Nighthawks." Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. 263 meters. J. Laurance Martin. No regular schedule.

WDAH, El Paso, Tex. 360 meters. Trinity Methodist Church South. Wed, Thurs, Sun, 7:30-8:30 pm. Mountain.

WDAI, Syracuse, N. Y. 246 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Eastern.

WDAJ, College Park, Ga. 258 meters. 2,000 mi. A & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 261 meters. 150 mi. The Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex., 360 meters. 300 mi. Automotive Elec. Co. Daily, 1-1:30 pm, 7:15-8. Central.

WDAP, Chicago, Ill. 390 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central Daylight Saving.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros. Club, "Good Morning Glory." Daily ex Sun, 12-12:55 pm, music; 2-3 pm, 4:30-6, music, talks; 7:30-8 pm, Dream Daddy. Wed, 8-11 pm, entertainment. Fri, 8-10:50, entertainment; 1 am, Club. Eastern Daylight Saving.

WDAS, Worcester, Mass. 360 meters. Samuel A. Waite

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern Daylight Saving.

WDAX, Centerville, Iowa. 360 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert. Central.

WDAY, Fargo, N. D. 244 meters. 300 mi. Fargo Radio Electric Co. Slogan, "The Biggest Little City in the World." Daily ex Sun, 9:30 am, weather, 6 pm, baseball. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church services. Central.

WDBC, Lancaster, Pa. 258 meters. Kirk Johnson & Co., Inc.

WDBF, Youngstown, O. 261 meters. Robert G. Phillips.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York City, N. Y. 405 meters. Ship Owners Radio Service.

WDZ, Tuscola, Ill. 278 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. 280 meters. 200 mi. Fallain & Lathrop. Slogan, "The Vehicle City." No definite schedule.

WEAB, Fort Dodge, Ia. 360 meters. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 8:40 am-12:20 pm; 5:15 pm, 7-8 music. 9:45, weather. Sun, 10:30 am, 7:30 pm, church services. Central.

WEAD, Atwood, Kan. 268 meters. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. 360 meters. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Slogan, "The Voice to the Millions." Tues, Wed, Thurs, Fri, 11-12 am, 4:30-5:30 pm, 7:30-10. Sun, 3:30-4:30 pm, 7:30-10. Eastern Daylight Saving.

WEAG, Edgewood, R. I. 231 meters. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 360 meters. 500 mi. Wichita Board of Trade. Daily ex Sun, 8:40 am, 9, 10, 11, 12 pm, 1, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. 286 meters. Cornell Univ.

WEAJ, Vermilion, S. D. 360 meters. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Daily ex Sun, 5:15-6 pm. Central.

WEAM, North Plainfield, N. J. 252 meters. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 273 meters. 50 mi. The Shepard Stores. Daily ex Sun, Mon, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern Daylight Saving.

WEAO, Columbus, O. 360 meters. 500 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 360 meters. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAU, Sioux City, Ia. 360 meters. 300 mi. Davidson Bros. Co. Slogan, "The Heart of the Corn Belt." Daily ex Sun, 9 am, 10, 11, 1 pm, 5, markets, news. Mon, Wed, Fri, 8-9 pm, concert. Sun 7-9 pm. Central.

WEAY, Houston, Tex. 360 meters. 1,500 mi. Will Horwitz (Iris Theater.) Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Tues, 9-10:30 pm. Wed, 8-9:30 pm. Sat, 7:30-9 pm, 11 pm-1 am. Central.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 261 meters. 200 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Slogan, "Working For All Alike." Daily, 10 am, reports; 12:30-1 pm, address; 6:15-7, bedtime story; 8:30-9:30, music. Tues, Thurs, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 9:30-10:30 pm, music. Central.

WFAB, Syracuse, N. Y. 234 meters. 100 mi. C. F. Woese. No definite schedule.

WFAF, Poughkeepsie, N. Y. 273 meters. H. C. Spratley Radio Co. Temporarily discontinued.

WFAG, Waterford, N. Y. 360 meters. 300 mi. Radio Engineering Lab. Wed, Sat, 7:45-10 pm, concert. Sun, 2-4 pm, church service. Eastern.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 360 meters. 300 mi. Hutchinson Elec. Service Co. Slogan, "The Gateway to the Ten Thousand Lakes of Minn." Daily, 11:57-12:20, time, weather. Tues, Wed, 8:30 pm, concert. Sun, 2:30 pm. Central.

WFAQ, Cameron, Mo. 360 meters. 300 mi. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 400 mi. Argus Leader. Daily ex Sun, 10:15 am, 12:15 pm, 1:30, 2:30, reports, music. Tues, Thurs, Fri, 8-9 pm, concert. Fri 11 pm, concert. Central.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10 am, 12:40 pm, weather. Thurs, 8 pm, concert. Central.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sat, Sun, 10 am, reports; 1 pm, news; 2, music; 3-4:30, concert; 7-7:30 children's hour. Tues, Thurs, 8 pm, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital, alternating 10:30 am, 7:30, church services. Eastern Daylight Saving.

WGAF, Tulsa, Okla. 360 meters. Goller Radio Service.

WGAL, Lancaster, Pa. 248 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of U. S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAN, Pensacola, Fla. 360 meters. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. 360 meters. Southwest America.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. 261 meters. 300 mi. Ernest C. Albright. Slogan, "The home of the world's largest railroad shops." Tues, Wed, 9-11 pm, music. Sun, 9-10:30 pm, music. Eastern.

WGAX, Washington C. H., O. 360 meters. 75 mi. Radio Elec. Co. Daily ex Sun, 12 m, music, news; 9:30 pm, concert, news. Sun, 10:30 pm, sermon. Central.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 4:30, news. Mon, Thurs, 8:30 pm, concert. Sun, 3 pm, music. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 360 meters. Register and Tribune. Slogan, "The Convention City." Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Slogan, "Amrad, the Voice of the Air." Daily, 5-6:45 pm, Children's Hour, reports, codes. Daily ex Sun, Mon, 8:30 pm, concert. Tues, Fri, 3 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 9, concert. Eastern Daylight Saving.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Tues, Thurs, Sat, 7:45-11:30 pm, concert. Eastern Daylight Saving.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 319 meters. 1,000 mi. Federal Tel. & Telg. Co. Slogan, "The City of Opportunity." Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2:30, 3:30, 5, music, reports; Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern Daylight Saving.

WGV, New Orleans, La. 350 meters. 400 mi. Interstate Elec. Co. Slogan, "Where the Mighty Mississippi Makes a Crescent Near the Gulf." Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 11:30-12 m, 5, reports, time, sports. Mon, Tues, Thur, Fri, 1-1:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 9:30 am, 6:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Mon, Wed, Fri, 7:30 pm, lectures, news, agriograms. Central.

WHAA, Iowa City, Ia. 263 meters. 200 mi. Univ. of Iowa. No regular schedule. Central.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Fri, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 280 meters. 1,000 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAG, Cincinnati, O. 222 meters. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 360 meters. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. 360 meters. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 248 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. 360 meters. Univ. of Rochester.

WHAP, Decatur, Ill. 360 meters. 100 mi. Otto & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 242 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. 231 meters. Paramount Radio & Elect. Co.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the State." No definite schedule.

WHAY, Huntington, Ind. 360 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m-12:30, weather, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Staion Located at the Oldest School of Engineering." Club, R. P. I. Mon, 9-10:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Electric School. Slogan, "Heart of America." Daily ex Sun, 8:25 am, 9:25, 10:25, 11:25, 12:25 pm, 3, reports. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 360 meters. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:55 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Associated Broadcasters, Inc. Slogan, Station of the Sunrise Trail." Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 252 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm. music. Mon, Thurs, 8-9 pm. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 360 meters. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 254 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAF, New Orleans, La. 234 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Sun, 10:45-12 m, church services. Central.

WIAI, Springfield, Mo. 253 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news, weather. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. 360 meters. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 200 mi. School of Engineering. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. 360 meters. Chronicle Pub. Co.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Slogan, "Howdy Folks, This is WIAR, a real Live Wiar." Daily ex Sat, Sun, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. 360 meters. Leon T. Noel.

WIAU, Le Mars, Ia. 360 meters. Am. Trust & Savings Bank.

WIAV, Binghampton, N. Y. N. Y. Radio Lab.

WIAW, Saginaw, Mich. 360 meters. Saginaw Radio & Elec. Co.

WIAY, Washington, D. C. 224 meters. 200 mi. Woodward & Lothrop. Daily ex Sun, 10-11 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Mon, Sat, 8-10 pm, concert. Eastern.

WIK, McKeesport, Pa. 360 meters. 500 mi. K. & L. Elec. Co. Daily ex Sun, 630-7 pm. Tues, Thurs, 9:30-10:30 pm. Sun, 1:30-2:30 pm and 6:30-7 pm. Eastern.

WIL, Washington, D. C. 360 meters. 100 mi Continental Elec. Supply Co. Daily 5:30-7 pm. music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 11 am, church services, starting June 3, every alternate week; fill in weeks, 4:30 pm, concert. Eastern Daylight Saving.

WIZ, Cincinnati, O. 360 meters. 200 mi. Cino Radio Mfg. Co. Daily ex Sun, 12 m, 3:30 pm, 7-8, reports, entertainment. Central Daylight Saving.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

WJAJ, Dayton, O. 360 meters. Y. M. C. A.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Slogan, "WJAK, of the Buckeye State." Mon, Thurs, 11 am, 4 pm, news, music. Thurs, 9-10:30 pm, dance music. Sat, 4 pm, bible lesson. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 50 mi. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 9 am, 10:30, 12:15, markets, reports. Tues, Wed, Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAP, Duluth, Minn. 360 meters. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 360 meters. 200 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House (Pittsburgh Leader). Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 1,000 mi Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment Eastern.

(The third part of the station schedules will appear next week.)

ADVANCE PROGRAMS

(Continued from page 7)

WMAQ (Central, Daylight Saving, 448), 7:00-8:00 P. M., Talk, Rockwell Stephens; Talk, "Circus Days," J. E. Cole; Talk, "China and the Chinese," W. R. Giles; **9:00-10:00 P. M.,** Concert, LaSalle Orchestra; Dawn Hulbert, soprano; Jaroslav Gons, 'cellist.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Concert Orchestra; 8:30 P. M., Musical program.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillios A. Kyros.

Friday, July 27

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "The Merry Wives of Windsor," Star Orchestra; "Were You to Call," Sydney Walsh, tenor; "Ave Maria," Mannie Roth, violinist; "Beautiful Spring," Orchestra; "A Little Coon's Prayer," Sydney Walsh; "Sommell," Mannie Roth; "A Ball Scene," Orchestra; "My World," Sydney Walsh; "Serenade," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, "A Fairy Tale," "Distant Greeting," "Melody," Herbert Saylor, viola; Bert Mustin, the Fun Maker.

KGW (Pacific, 492), 3:30-4:00 P. M., Talk, "Food Preservation," Jessie D. McComb; 8:00-8:15 P. M., Mrs. Percy R. Kelly, singer; 8:15-9:00 P. M., Dance program, George Olsen's Orchestra; 10:00-11:00 P. M., Dance program, George Olsen's Orchestra; 11:00-12:00 P. M., Hoot Owls.

KHJ (Pacific, 395), 8:00-10:00 P. M., De Luxe program, Charles Henry de la Plate, bass; Lecture, Dr. Eugene Francis Storke.

KSD (Central, 546), 8:00 P. M., Opera, "Gypsy Love," Municipal Theater.

KYW (Central, Daylight Saving, 345), 10:00-11:30 P. M., Musical program, Cope Harvey's Orchestra; Herbie Mintz, pianist; Harry Geise, pianist.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Central Methodist Church Orchestra.

WBZ (Eastern, 337), 7:00 P. M., Concert, Mrs. Carl Eckberg, contralto; Anna Ritter, pianist; WBZ Trio; **8:20 P. M.,** Bedtime story for the Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 7:30-8:00 P. M., Bedtime stories, Dream Daddy; 8:00-12:00 P. M., Special features from Stanley Theater; Song recital; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Morning Glory Club.

WFAA (Central, 476), 12:30-1:00 P. M., Sunday school lesson, "Matthew, the Publican," Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Mrs. Hoyt Braselton, singer; Henrietta Warren, reader.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Recital; 3:45 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGI (Eastern, Daylight Saving, 360), 3:00 P. M., Amrad Women's Club, Talk, "Canning and Preserving," Mildred G. Barton, Simmons College; 5:00 P. M., Girl's story hour, Eunice L. Randall; 8:30 P. M., "Silversmith Series," David M. Cheney; Musical program.

WGY (Eastern, 380), 7:45 P. M., Minstrel program, "Emblem of Peace," WGY Orchestra; Ripples from the Antenna, Georgia Minstrel Boys; "Old Uncle Moon," "Don' Go Leabe Me, Honey," Male quartet; More Ripples in the Air, Georgia Minstrel Boys; "Mammy Land," Washington Johnson Lee, baritone; "Medley of Old-Time Dances," "Medley Echoes from the South," Orchestra; A Few More Sparks, Georgia Minstrel Boys; "Mandy Lee," Tambo Jones, tenor; More Minstrelsy, Georgia Minstrel Boys; "Darling Nellie Gray," "Swing Along," Quartet; "Medley of Hornpipes and Reels," Orchestra; 10:30 P. M., Musical program, "Grillen," "Song of the Lark," Raymond Sachse, pianist; "National Apostasy," Raymond Stine, reader; "New Star Polka," Lloyd Beebe, cornetist; "Standchen," the American Trio; "Valse Triste," Raymond Sachse, pianist; "Fleurette," Ruth Cutler, reader; "Salut d'Amour," Leo Kliwen, violinist; "Evensong," Orchestra; "Artist's Dream," Lloyd Beebe; "Rustic Twilight," Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Ray Pfaff's Orchestra; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Song recital; 6:00 P. M., Dinner dance music; 6:45 P. M., "Radio Baseball Dope," Monte Cross, old-time baseball player; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WMAQ (Central, Daylight Saving, 448), 7:00-8:00 P. M., Children's hour; 9:00-10:00 P. M., Concert, LaSalle Orchestra; Pennsylvania Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner dance music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., Song recital; 8:45-10:50 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra, Ray Miller, director; 11:10 P. M., Dance music, Hotel Adelphia Roof Garden.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00 P. M., News Orchestra; Musical program, pupils of Gray Fowler's and Bassillios A. Kyros.

Saturday, July 28

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "May-Day," Star Orchestra; "Vissi D'Arte," Agnes Adie, soprano; "Minuet," Jaques Sterin, 'cellist; "Orientale," Orchestra; "A Kiss in the Dark," Agnes Adie; "Air de Ballet," Orchestra; "Spanish Serenade," Jaques Sterin; "The Magic of Your Eyes," Agnes Adie; Selection from "You're in Love," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, "Egmont," "Don Quixote, Suite in Four Parts," "Midsummer Night's Dream," "Swanee River," "Stars and Stripes," Westinghouse Band, T. J. Vastine, director; "Song of Russia," "By the Window," "Fair as She," "The Wanderer," "Serenata," "Bird of the Wilderness," H. M. Freeman, tenor.

KGW (Pacific, 492), 3:30-4:00 P. M., Stories, Aunt Nell; 10:00-11:00 P. M., Dance program; George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert, under direction of Grace Eaton Dow; 2:30-3:30 P. M., Matinee musicale, direction of Grace Eaton Dow; 6:45-7:30 P. M., Children's hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.

KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater Talent.

KYW (Central, Daylight Saving, 345), 8:00-8:58 P. M., Musical program, Cope Harvey's Orchestra; Harry Geise, pianist; 9:05-9:25 P. M., "Under the Evening Lamp," Youth's Companion.

PWX (Eastern, 400), 9:00-11:30 P. M., Concert, arranged by José Mauri.

WBZ (Eastern, 337), 7:00 P. M., Concert, Teresiana Bianchi, soprano; Florence Martinelli, pianist; Italo Biseti, violinist; **8:20 P. M.,** Bedtime story for Grown-ups, Orison S. Marden.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Current History Comment," Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Martha M. Whitaker, pianist; Walter J. Fried, violinist; 11:00-12:00 P. M., Concert, Watson's Specialty Orchestra.

WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "New England Business Problems," Arthur R. Curnick; Radio drama, Amrad Players.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Musical Program, Mrs. Harry Roy, soprano; Helen Elizabeth Sprague, pianist; Arthur Findling, baritone; Morris Perelmuter, violinist; Philip Plasko, violinist; Reading, "An Interesting Historical Episode."

WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, LaSalle Orchestra; Talk, "Law Not War," Dr. Norman Barr.

WOC (Central, 484), 3:30 P. M., Educational talk, C. G. Hall, 5:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30 P. M., Concert, Schmeman's Band.

Sunday, July 29

WBZ (Eastern, 337), 7:30 P. M., Church services, Rev. W. H. Davenport, pastor East Longmeadow Baptist Church.

WFAA (Central, 476), 2:30-3:30 P. M., Bible class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church; 9:30-10:00 P. M., Choir of the East Dallas Presbyterian Church, Inez Hudgins, organist; 10:00-11:00 P. M., Concert, Strong & Gibney Orchestra.

WFI (Eastern, Daylight Saving, 395), 7:30 P. M., Church services, Arch Street Presbyterian Church; Alton K. Dougherty, organist.

WGI (Eastern, Daylight Saving, 360), 4:00 P. M., Adventure hour, Youth's Companion; Concert, Edison Phonograph Co.; 8:30 P. M., Address, Rev. William E. Gilroy; Musicale.

WGY (Eastern, 380), 10:00 A. M., Church services, Sermon, "Is Modernism Modern?" Rev. B. W. R. Tayler, St. George's Episcopal Church; 6:30 P. M., Church services, Sermon, "The Christian's Faith Unshaken," Rev. B. W. R. Taylor, St. George's Episcopal Church.

WHAS (Central, 400), 9:57 A. M., Organ music; **10:00 A. M.,** Church services, Fourth Avenue Methodist Church, Rev. J. W. Johnson, pastor; Sarah McConathy, organist and choir director; Mrs. Jane Russell Stakes, soprano; Mrs. Earl W. Surman, contralto; Walter Kaegi, tenor; Vinton Nunemacher, bass; 4:00-5:00 P. M., Concert, Mrs. Pleasant Brooks, soprano; Mrs. Willaim Schultz, contralto; Pleasant Brooks, baritone.

WWJ (Eastern, 517), 7:30 P. M., Church services, St. Paul's Cathedral; 2:00 P. M., News Orchestra; 3:00 P. M., Concert, Schmeman's Band.

Monday, July 30

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Dinner music, Arcadia Cafe Concert Orchestra; 4:30-5:55 P. M., Talk, "Affairs of the Heart," Betsy Logan; Song recital; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Concert; 3:45 P. M., Song and piano recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGY (Eastern, 380), 7:45 P. M., Musical program, "Scherzo in B Flat Minor," Mildred B. Hilton, pianist; "Sometimes at Twilight," Ethel Krautter, soprano; "Country Gardens," Milton Hilton; "The Fool," Robert Woolley, reader; "Faded Love Letters," Ethel Krautter, soprano; "Cantique d'Amour," Mildred Hilton, pianist; "St. Peter at the Gate," Robert Woolley; "Caro mio ben," Ethel Krautter; "Craciovienne Fantasy," Mildred Hilton.

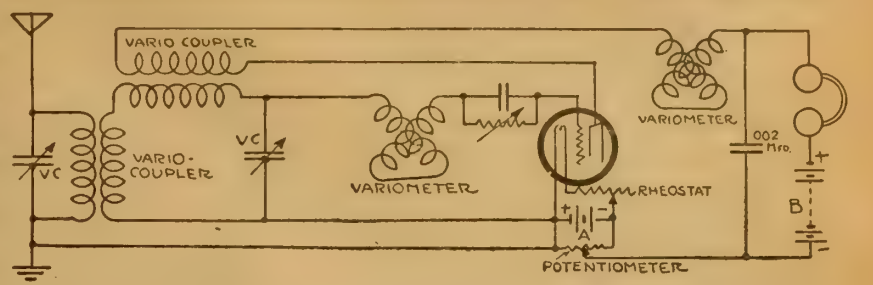
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artists' recital, violin and piano; 6:45 P. M., "Radio Baseball Dope," Monte Cross, old-time baseball star; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00-9:00 P. M., Musical program, The Zoo Grand Opera Co.; Concert, Roger Hill Dance Orchestra; 9:45-10:15 P. M., Zoo Grand Opera Company.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45-8:30 P. M., Dinner dance music; Hotel Adelphia Roof Garden Orchestra; 8:30-9:30 P. M., Concert, Woo Orchestra, Robert E. Goldert, director; Vocal selections, 9:30 P. M., Organ recital, Mary E. Vogt.

SELECTIVE DOUBLE REGENERATOR



A great many hook-ups are presented to the fan; unless he uses care and studies much in making a circuit, he will be disappointed with results. The diagram shows another circuit; it is not entirely new; however, if the fan who makes this exercises good judgment in the selection of apparatus, he will be surprised at the results. The set is very selective.

The circuit is another one of the double regenerative types. Two variocouplers are used—one for the usual primary and secondary tuning unit, another for regenerative feedback between the plate and grid. In addition, the usual plate variometer is used. Both the primary and secondary circuits use varable condensers for wave length tuning.—Edward Clein, Atlanta, Ga.

Ground Connections

For the best results the ground connection should be made to some conducting area on about the same level as the receiver. A steam or hot water heating system give a good ground. Avoid a long ground wire, as this gives height and lack of selectivity without compensating additional signal strength. This is an important point when the receiver is installed in an upper floor of a building such as an apartment. In this latter case the piping system of the building will furnish a good ground. Never run a separate wire down to the ground floor. The wires from antenna and ground where they approach the receiver should be separated as much as possible and the receiver should be placed as near as possible to the point where the antenna wire enters the building.

Ampere Hours of Batteries

Storage battery capacities are rated by their manufacturers in ampere hours. Thus, theoretically, a 60-ampere-hour cell will supply 6 amperes of current for about 10 hours, three amperes for about 20 hours, or one ampere for about 60 hours. In practice, however, as the discharge rate is increased the capacity of a single charge is reduced, and a 60-ampere-hour battery would deliver 10 amperes for approximately only five hours instead of six.

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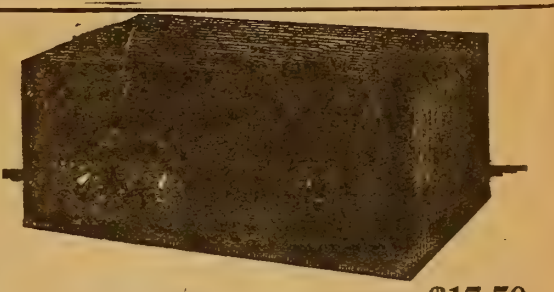

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. VI Chicago, Saturday, July 28, 1923 No. 3

Understand Your Set

To Know the Why of a Set Is Gratifying

ONE OF the foundation stones of this republic of ours is the broad principle that all men are created equal. It requires, however, but a few years of living to convince one that this principle, if it is to be accepted as true, must be subjected to several limitations. Similarly, it may be said that Radio broadcasting is intended for everybody, intended but not realized yet.

Now the thousands of Radiophans who listen with keen enjoyment nightly to the programs of their favorite stations may be surprised when they are told that the amount of pleasure they receive from their sets could be increased many times if only they would make the slight effort to understand something of the principles underlying the operation of their sets. Even a very slight knowledge of the whys and wherefores of tuning, for example, will place the possessor in a position superior to that of one who knows merely enough to turn the dials until he happens upon some station that he wants to hear.

Period of Poor Reception Passed

Stations Will Now Come in with Increasing Ease

GOOD news for Radiophans is the announcement by scientists that the period of poorest reception has just passed, and that from now on distant stations will come in with increasing ease and frequency.

The cycle of audibility, as scientific men designate the ability to receive Radio signals at different periods of the year, begins to drop during the month of March rather rapidly and reaches its lowest point during the middle of June. After June 15 reception begins to improve, until maximum audibility is reached in winter.

Reception of long distance stations during the remainder of the summer will be possible about twenty-five days each month. Toward the middle of October fans may figure on getting back to highest efficiency in tuning in the elusive far-away broadcasts.

Due to the use of better equipment and short aerials, very little interference has been noted by fans even during the period of lowest audibility, and Radio reception has been almost as good as during the winter. The broadcasting stations have suffered far more from the summer weather than have the owners of receiving sets. Most of the local stations have had to shut down occasionally because of heavy charges of electricity from the air getting into the transmitting tubes.

Sets for Outdoor Use

Improvements Make Summer Radio Possible

TWO ELEMENTS of Radio receiving sets which have been perfected during the last year or two have gone far to help in making it convenient and satisfactory to use Radio receiving sets outdoors. The first of these is the dry battery tube, that is, electron tube detectors and amplifiers which require only a small dry battery rather than a heavy storage battery to light the filaments. The second improvement is the development of more satisfactory loud speakers which furnish a considerable volume of sound without undesirable distortion. Thus it is possible now with small portable receiving sets which can be purchased or which can be fairly easily assembled, to receive satisfactory Radio broadcasting while camping, boating or motoring. It is a noteworthy fact that exploring parties now take Radio receiving sets with them for the dual purpose of furnishing amusement during the evening hours at camp and for receiving time signals with which to check their chronometers.

It must be recognized that Radio transmission conditions are not as good in the summer as in the winter. Transmission range is decreased so that it is not possible to hear the distant station which can be received in the winter. The presence of atmospheric disturbances or static often makes it difficult to hear weak signals; reliance must be placed on stations which are near and powerful enough to produce loud sounds from the receiving set. Fortunately it is not necessary to rely entirely on distant stations since there is now more than [illegible] licensed broadcasting stations in the United States.

RADIO INDI-GEST

Introducing Mike and Izzy

Friends and readers of Indi-Gest, meet Mike (left) and Izzy (right), trained antenna raiser chimpanzees, for the great nameless Walla Walla station of this Radio-knut column. Inasmuch as our contributors failed to contribute enough printable and sad jokes to fill the column this week, we were asked by Mike and Izzy if we would give them a little free publicity. As was remarked in an issue previously, they are very intelligent, both having been fired from the Harvard zoo on the same day, less than three feet apart.

After seeing the above picture they said indignantly, in chorus, "Why, you've made monkeys outa us!"

Another cute thing they do (see picture), is hang on the frame of their picture. Asked why they did this, Mike replied, "The matter has been called to my attention that you print your paper Indi-Gest on a rotary press and print over 100,000 copies, so I didn't want to fly off the roller." Izzy had a much more simple explanation. (He is very simple.) He answered, "I just had a temporary ether wave put in my tail, and I didn't want to change the wave length."

To prove their excellent education, listen in on the following conversation:

Mike: "Who invented Radio anyhow?"
Izzy: "Macaroni, but not anyhow. He just invented it anyway."
Mike: "Why, oh why did he do it?"
Izzy: "Because he had a corner on the spaghetti tubing market and wanted to round it off."

(Curtain.)

All of which goes to prove they don't know anything.

A-B-C Lessons for Indigest Beginners

Chapter VI—Such as Spark Amateurs, Etc.

BY GOSH

F IS for the filament,
A very useful toy,
And when it's awfully white and hot,
The things you hear—Oh joy!

They're Priceless and Not Mailable

Dear Indi: Please send me a special prize for NOT constructing the Stebbins Sooper. I won't try it for three reasons: (1) being a model young man, I don't want a Degenerative set; (2) I don't like soup; (3) I haven't got the parts. H. M. R.

(P. S.)—Where can I buy the parts?

Good Enough for Indi-Gestion

Dear Indi: Here's my contribution; hope I make the Column. Shoot this on your Chef:

RADIO BANQUET MENU
ENTREES
Socket Salad, Flewelling Dressing
Aerial Sauce with Browned Galena
DRINK
Drops from Grid-Leak, (99%)
MEAL
Boiled Variometers
Mashed Condensers
Fried Name Plates
Burned "B" Batteries
Hot Solder with Paste
DESSERT
Iced Binding Posts
TO ORDER
Hot Filaments on Toast
Potato Cord Chips

O. S. CILLATOR.

Resting here is John
McCuttcheon Fast
Who made a high dive
From his antenna mast.

They Don't Grow Bananas in Alaska

Dear Indi: Please refer this missive to your R. E. I set up my Stebbins Degenerative set and had to erect an aerial. I hooked one end of the wire to the house and the other to a banana tree. (I live in Alaska.) The first music to come through was "Yes, we have no bananas today." Howcom?

RITA M.

Looking Ahead

Awards in the Name Contest Next Week—Indi-Gest next issue will carry full, complete and total returns and awards in the Walla Walla broadcasting station call contest. The beautiful, brass, round, beveled edge switch point must be awarded as much of the lacquer is coming off. Who will obtain this super excellent accessory? Buy Indi-Gest next week from your most inconvenient newsdealer, 10c.

A Glimpse into the Future

Condensed

By DIELECTRIC

Adjust your headsets and then slip off into a sound sleep. "Sound" it will be. You may never have learned to speak French, Japanese or Russian during your waking moments, but just allow the subconscious mind to lay hold of addresses in these strange tongues and when you come to, your family will be amazed to find a linguist in their midst. Code is learned in a very short time, we are told, if we will only follow this course. Would it teach silent periods?

After reading Mr. Brady's articles in this paper on the present patent tangle, as applied to Radio, you will be convinced that the commercial phase needs some adjustment to prevent complete control by a single group. Not so much publicity has been given to this particular feature of late and it is well that some facts be brought to our attention. It is quite proper to refer to the difficulties met in the automobile industry and their subsequent solution. Much that applied there has equal concern with this newer industry; possibly may be corrected in the same manner.

We may find a great many uses for our receiving sets to yield saving of labor. It is reported that a Frenchman has invented an alarm clock which serves its evil purpose when a certain wave length leaves Eiffel tower. Why not have Radio open the drafts on your heater next winter in the early morning hours, so that the house will be warm when you wish to get dressed? Use it to put out the lights at night when Arlington warns your daughter's caller to be up and going! A Radio razor (safety) would be a valuable asset.

Station WRAD has indeed made a record of which it may be proud. Only a ten-watt station, yet it has been heard in thirteen states and in Canada. It is located at Marion, Kansas. It is one thing to be picked up at a great distance on rare occasions and quite another to be consistently heard in far states. A record of equal interest is that made by a station in California which was picked up through interference six thousand miles away, and only one-half kilowatt used. This latter may lead to important discoveries.

There are those who still contend that the broadcasting of church services has a tendency not for the best. They should not lose sight of the many instances where, except for Radio, there would be no chance to hear preaching. A new recruit to the ranks of listeners in to religious meetings is that lumberjack who is getting a loud speaker for the benefit of his fellows in camp. He had lived eleven years without hearing a single church service.

The matter of Radio broadcasting in Italy seems to be taking a turn for the better. Although much has been said of the desirability of having the Italian government look with favor on a plan to foster broadcasting stations, nothing came of it until the progressive Premier took charge of the case himself. It is hard to conceive of the nation which gave birth to Marconi holding back in anything pertaining to this great branch of scientific discovery.

Rules applying to the use of Radio during war time have been formulated and published. The Commission of Jurists at the Hague having this decision to make apparently covered every phase of the subject and produced regulations which it would be difficult to misinterpret. Rules of conduct by nations at war have been ignored, as all of us recall, but Radio has not reached the stage where it may operate without nearly everybody listening in, consequently the chances of avoiding detection when violating these rules are very slim. Efforts to perfect secret transmission will no doubt increase. There is much to learn in this broad field.

First Steps for Beginners in Radio

Chapter XI, Part I—Super Regeneration

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XI, Part II—Super Regeneration.

Chapter XII—Reflex Circuit Operation.

Chapter XIII—About Headsets and Loud Speakers.

Chapter XIV—Batteries Used in Radiophony.

THE mere mention of the word super-regeneration gives rise to ideas and dreams of the Master Set that will eventually be evolved from the maze of circuits now in use and make possible the reception from every station on the face of the old world. And although it promised much, the three tube set as originally described by Armstrong seems to have fallen down when taken in hand by the amateur and even by the more experienced men in Radio. This is no reflection on the efficiency of the circuit, but simply means that much work must be done before the more complicated circuits are made simple enough for the average man to handle.

Theory of Super-Regeneration.

The theory of super-regeneration is so simple that it is strange it was not thought of long ago. Since the first days of regenerative receivers it was noticed that when the coupling between the tickler and the grid was made too close the set howled. This was due to the plate current feeding back into the grid, the added negative charge on the grid further varying the plate current, which again reacted on the grid more forcibly. In this manner the currents built up to such a strength that the tube went into self-oscillation and howled or screamed. The intensity of this howling was many times that of any signal coming in on the set. And everyone would say, "Gee, if the stuff would only come in like that." And why not?

Since this building up of the currents in the tube is gradual, or step by step, taking only a very small interval of time, it is conceivable that we could permit the tube to build up the currents to a high value and then check the process and let the building up begin all over again. Were this checking to take place at a rate above audibility, the resultant sounds would be unbroken. And this is just what Armstrong did to produce the super-regenerative circuit.

Operation of the Circuit.

The operation of the circuit will be clear by considering Figure 46, which shows a modified circuit that can be readily assembled by the experimenter. The contents for the various parts are given in the illustration. It will be seen that the first tube is in a regenerative circuit, the plate being coupled to the grid circuit by a tickler coil.

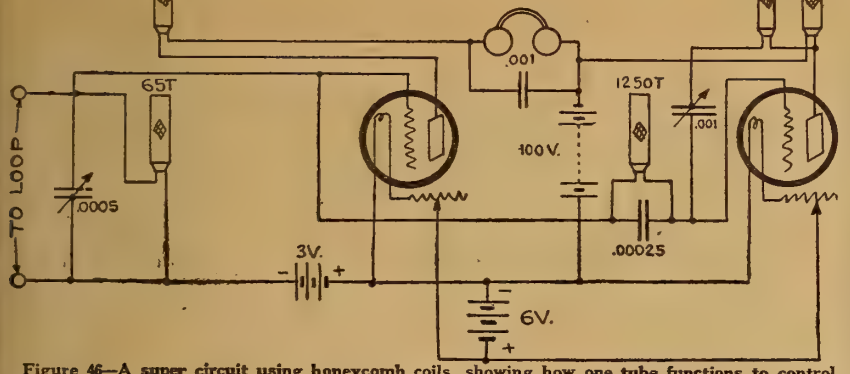

Figure 46—A super circuit using honeycomb coils, showing how one tube functions to control regeneration in other tube

The second tube is connected to form an oscillator, the plate being closely coupled to the grid with a condenser in the grid circuit to control the amount of energy reaching the grid and thus the intensity of the oscillations. The grid of the second tube is connected through a filter to the grid of the first tube. This filter keeps the received currents from reaching the grid of the oscillator tube.

The action can be described in this manner: When the tubes are lighted a high whistling note is heard in the receivers. This is due to the oscillations in the second tube taking place at audible frequency. On adjusting the variable condenser across the primary coil of the first tube a series of harmonic notes will be heard, due to the beat action between the oscillatory currents in both tubes.

Now, when a signal is received and the circuits properly adjusted, the first tube will tend to regenerate and build up to a howl, but before the tube can start to howl the oscillations in the second tube make the grid too negative and the tube stops oscillating for an instant, when the current from the oscillating tube changes its polarity the first tube starts to build up again and is again checked. In this manner extremely loud signals can be obtained. But we must make a compromise. It is logical that the longer the building-up process is allowed to go on the louder will be the signals, but since the checking point will then be further apart, they occur at an audible frequency. When we check them at a frequency above audibility the first tube cannot build up as long, and a loss in signal strength results. The usual practice then is to have the checking occur at such a rate that a faint high pitched whistle is constantly heard in the receivers. By proper adjustment, this whistle is not annoying and does not interfere with the received signals.

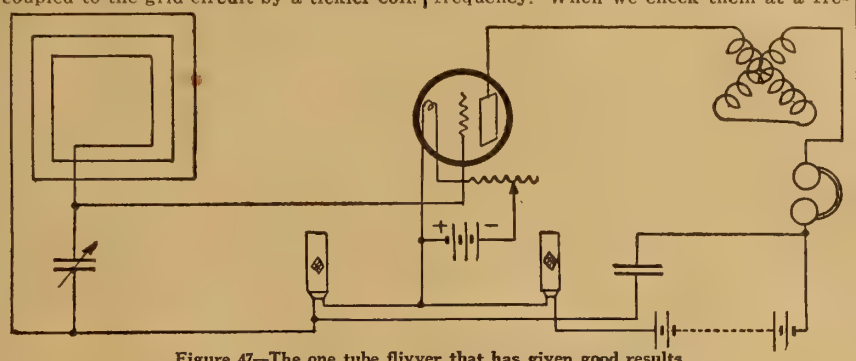

Figure 47—The one tube flivver that has given good results

Use of Power Tubes.

For the best results, it is necessary to use power tubes with high voltages on the plate, although the regular amplifying tubes can be used with some loss in signal strength. There is no doubt that this circuit does give excellent results when properly adjusted, but it takes infinite patience and many hours of testing before one gets the hang of making all the adjustments necessary to get results. The writer has worked for hours over such a circuit, pulled it apart in disgust and hooked it up again, determined to make it work before any results worthy of note were obtained.

The circuit originally demonstrated by Armstrong employed one stage of audio frequency amplification, which introduced further difficulties. Realizing that the audio frequency amplifier would amplify the audible controlling current, it is necessary to filter this out before it reaches the amplifier, or it will reach an annoying volume.

We can then sum up super-regeneraton as simply a regenerative circuit which is prevented from oscillating during one-half the cycle of the oscillation in a second tube and permitted to build up during the other half of the cycle. Therefore, any regenerative circuit that is subject to a checking potential on its grid at or near the highest range of audibility will functino as a super-regenerator.

The One-Tube Flivver.

By combining the source of audio frequency, or, as it is often termed, the variation frequency, in the same circuit with the tuning inductance we have the one tube flivver super-regenerator that is making good. This circuit is shown in Figure 47 and consists of a tuned plate regenerative circuit using a loop aerial with honeycomb inductances connected in the plate and grid circuits. The coil in the grid ciruit is a 1,250-turn coil, that in the plate being a 1,500-turn coil. The condenser across the B battery and coils serves to bypass the higher Radio frequency currents in the cir-

(Continued on page 14)

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COCKADAY CIRCUIT

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ACCORDING TO OUR INSTRUCTIONS
RESULTS GUARANTEED—PANELS ON ALL SETS DRILLED—READY TO MOUNT

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Complete Parts for Flewelling Circuit, $12.45

Reg. Price	CONSISTING OF	Our Price
$ 1.26	6x14 Formica Panel	$1.10
3.30	23 Plate Variable Condenser	1.45
3.00	Three .006 Mica Condensers	2.25
1.85	CRL Variable Grid Leak	1.35
.40	Remler Grid Leak	.25
4.00	2 Coil Adjustable Honeycomb Coil Mounting with Knobs	2.65
.75	50 Turn Honeycomb Coil	.40
.80	75 Turn Honeycomb Coil	.40
1.20	2 Remler Coil Mounts with Straps	.80
1.00	1 Remler Bakelite Socket	.45
1.50	Howard Vernier Rheostat	1.35
1.00	1 Bakelite 3" Dial	.25
.30	1 Baseboard for Mounting	.20
.80	8 Binding Posts	.40
1.00	1 Blueprint with Complete instructions for Assembly & Wiring	.50
Value $22.16		Our Price $12.45

Complete Parts for Knocked-Down Receiving Set, $17.95

Reg. Price	CONSISTING OF	Our Price
$10.00	2 Variometers	$3.90
5.00	1 Variocoupler	1.75
3.00	3 Bakelite Dials	.75
1.00	Remler Bakelite Socket	.45
1.10	Howard Rheostat	.80
5.00	Cunningham C-300 Detector Tube	4.45
4.50	Mahogany Cabinet	2.75
2.25	Genuine Formica Panel	1.75
.80	8 Binding Posts	.40
.50	Switch Lever	.25
.40	12 Switch Points	.20
1.00	Freshman Grid Leak and Condenser Combined	.75
1.00	Complete Drawing for Assembly and Wiring	.50
Value $30.85		Our Price $17.95

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All Parts Licensed Under Hazeltine Patents

1 7x21x3/16 drilled formica panel
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3 23 plate variable condensers
1 Wave control neutroformer
2 Radio frequency amplifying neutroformers
2 Grid neutralizing condensers
1 .00025 micon grid condenser
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1 .006 micon condenser
1 Marco variable grid leak
1 Base board for mounting 25 feet tinned copper bus bar wire and complete instructions for assembling and wiring.. $28.60

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$ 1.05	7x10 Formica Panel or other suitable size	$0.85
4.75	High Ratio All-American or Thordarson Transformer	3.95
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2.20	2 Howard Rheostats	2.00
2.00	2 Remler Bakelite Sockets	.90
3.00	3 Double Pacent Jacks	1.50
1.30	13 Binding Posts	.65
.30	Baseboard for Mounting	.15
	Wiring Diagram, with complete instruction for Drilling and Assembling Panel.	
Value $20.10		Our Price $12.45

Complete Parts for Reinartz Sets, $11.45

Reg. Price	CONSISTING OF	Our Price
$ 1.89	7x18 Formica Panel	$1.70
1.00	Remler Bakelite Socket	.45
1.50	Howard Vernier Rheostat	1.35
3.30	23 Plate Variable Condenser	1.45
3.10	11 Plate Cuni Variable	1.35
1.50	3 Switch Levers	.75
.80	2 Dozen Switch Points	.40
3.00	1 Schoonhoven Reinartz Coil	1.95
1.00	Freshman Variable Grid Leak and Condenser Combined	.75
.80	8 Binding Posts	.40
.30	25 Feet Tinned Wire	.20
.50	Baseboard for Mounting	.25
1.00	Blueprint with Complete Instructions for Assembly and Wiring.	.50
Value $21.69		Our Price $11.45

Complete Parts for Ultra Audion Circuit, $11.90

(Known as the Wonder Circuit)

Reg. Price	CONSISTING OF	Our Price
$ 1.42	9x10½ Formica Panel	$1.20
3.30	23 Plate Condenser	1.45
1.00	Bakelite Socket (Remler)	.45
3.00	Special Ultra Audion Coil, plain or bank wound with tape	1.95
1.50	Howard Vernier Rheostat	1.35
1.50	CRL Grid Leak	.95
.35	.0005 Micon Condenser	.25
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.50	18 Switch Points	.30
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.20	25 ft. Hookup Wire	.10
	Each order includes complete instructions for drilling, assembling and wiring. These construction plans are not drawn in schematic form but are drawn so that anyone without any technical knowledge can follow with ease.	
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Control Unit for Dry Cell Tubes

Dry Cell with Rheostat Mounted on One Base

When the experimenter desires to keep his instruments separate, that is, not all sharing the same panel, but each instrument having an individual base and panel, the following is a convenient assembly of the parts involved directly or indirectly with the filament-lighting circuit:

A base is made from ¾-inch board, 6 inches long and 4 inches wide. A board ⅜ inch in thickness, 7 inches long and 4 inches wide will serve for a panel. These boards are finished smoothly with sandpaper. The panel is attached to the base with two screws, and holes are drilled for the rheostat and binding posts in the approximate positions shown in the sketch; screw holes are drilled in the base for semi-permanent mounting.

A cup for holding the dry cell in place is made from the lower end of a cylindrical cardboard box (such as a mailing tube, with bottom), which is screwed to the base, allowing sufficient space on the latter, next to the panel, to mount the tube-socket. The panel, base and cup are painted with a flat-black paint; when the paint is dry, shellac is applied.

The rheostat, grid condenser and leak, and the "antenna" and "plate" binding posts are mounted on the panel; the cup and tube socket are on the base. Connections are made as follows: From antenna binding post to GL and condenser, thence to grid terminal on socket; from one terminal of rheostat to one filament terminal on socket; from other terminal of rheostat to dry cell, thence to remaining filament terminal on socket; from plate terminal on socket to plate binding post on panel.—George Frederick, Washington, D. C.

Insulation Tube

A good insulation tube for Radio work can be made very cheaply by wrapping empire cloth around a cardboard tube. Shellac the cloth and when it becomes sticky, wrap it around the tube and smooth out the wrinkles with a cloth. This is very suitable for a CW transmitter inductance tube. A tube about 8 inches long and 5 inches in diameter can be made for about twenty cents.—Tecumseh Woodland Baltimore, Md.

Loose Coupler Used with WD-11

The accompanying sketch shows design data and diagram of connections for an outfit which I have been using with great success. This hook-up is the result of my attempt to develop a WD-11 outfit which would give the maximum control with a minimum of instruments.

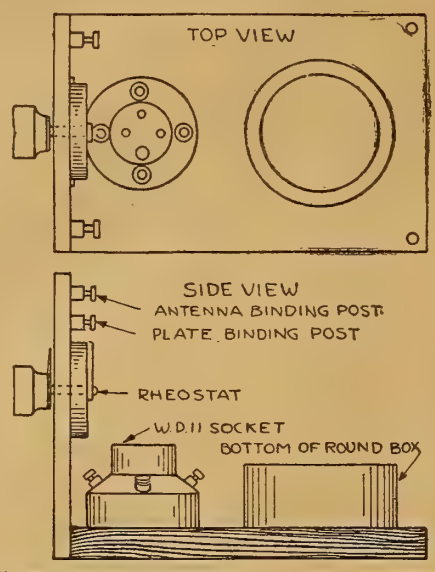
The primary of the loose coupler is made with 175 turns of No. 23 enameled wire with 195 turns of No. 22 scc wound in the opposite direction on the secondary. The diameter of the primary is 4½ inches and the length of the coil is 6½ inches. The diameter of the secondary is 3¾ inches and the length is 6½ inches.

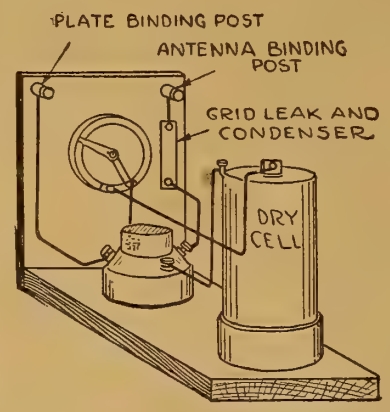
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

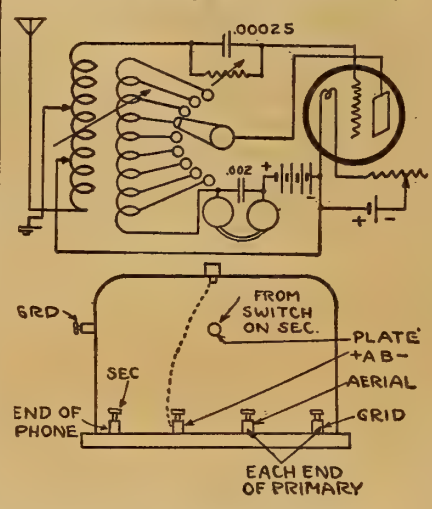
RADIO KINKS DEPARTMENT,
Radio Digest
123 W. Madison St., Chicago

ALL PARTS NECESSARY IN UNIT





I am located about 1½ miles from the broadcasting station WAAK (100 watts) and about 1 mile in the same direction from broadcasting station WCAY (250 watts). I had the good fortune one evening to pick up both stations at once and with the hook-up mentioned I could tune out either at will. I can also pick up DX within a thousand miles. Occasionally I have picked up NAA time signals without using loading coils.—Wm. Luetge, Milwaukee, Wis.



Shielding Panels

In making and operating a Radio set, I found the following plan to be of great help. After trying tinfoil, which did not give satisfactory results, either in operation or appearance, I painted the back of the panel with aluminum paint. I used an extra large brass washer to insure better connection between the paint and the binding post.

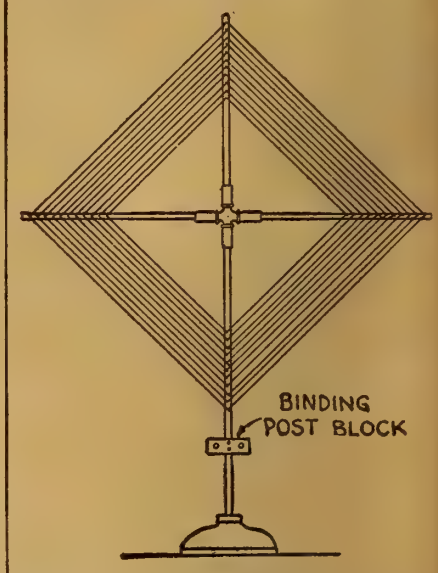
In painting the panel I place the front flat on the table, so that the paint will not run into the holes for the shafts of the instruments. As an added precaution, I use blotter washers for the shafts and glue them to the panel.

One of the good features is that the entire surface can be covered with the aluminum paint. Another advantage of the aluminum paint is the lower cost as compared with aluminum plates. I found that practically all body capacity was eliminated. -Frank Gavitt, Wichita, Kans.

Long Distance Received with Homemade Loop

A loop of good appearance can easily be made of the following materials: 1 polished brass ½-inch cross, 4 polished brass 3-inch nipples, 2 or 4½-inch dowel rods, according to the size of the loop to be made, 1 piece of bakelite for a binding post block, 1 desk lamp base, small wood screws, stain and varnish.

Cut the threads off from one end of the



nipples and turn the other ends into the cross. Cut the dowel rods to the size required and insert them into the nipples. The wire spacing should be marked on the rods and small brass wood screws may be used for attaching the wires, or holes may be drilled to receive them.

My present loop measures 18 inches diagonally and has 11 turns of 10-28 litz wire. With a .001 mfd. variable condenser I am receiving stations within a 1,500-mile radius.—Peter S. Schott, Perth Amboy, N. J.

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This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Either set is easy to build, easy to operate. Everything clearly shown.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 140 to 670 meters.

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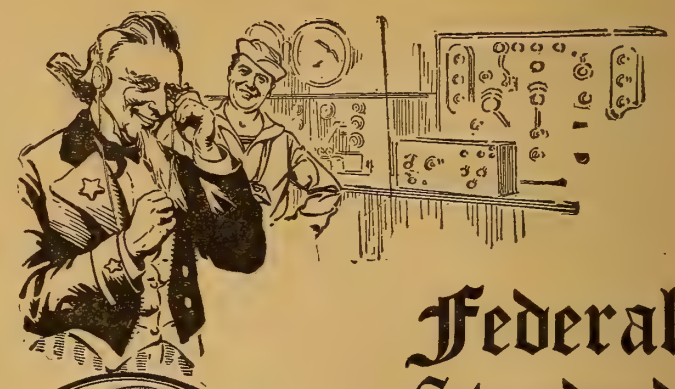

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Western District Office: 417 South Dearborn St., Chicago, Ill.

Condenser Dial Markings for Wave Lengths

Types of Condensers and Their Values

By H. J. Marx

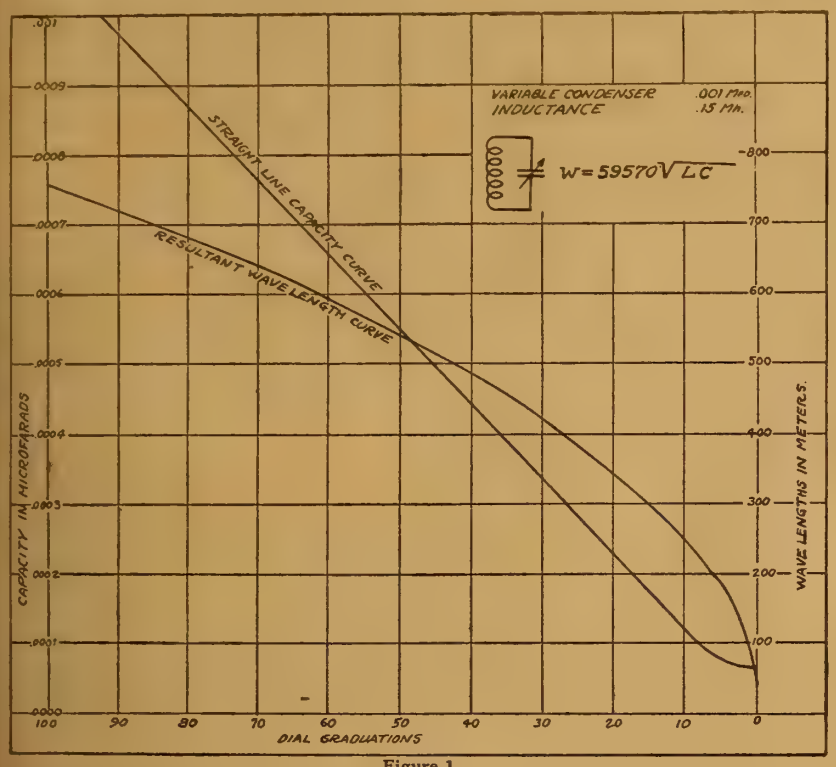

Figure 1

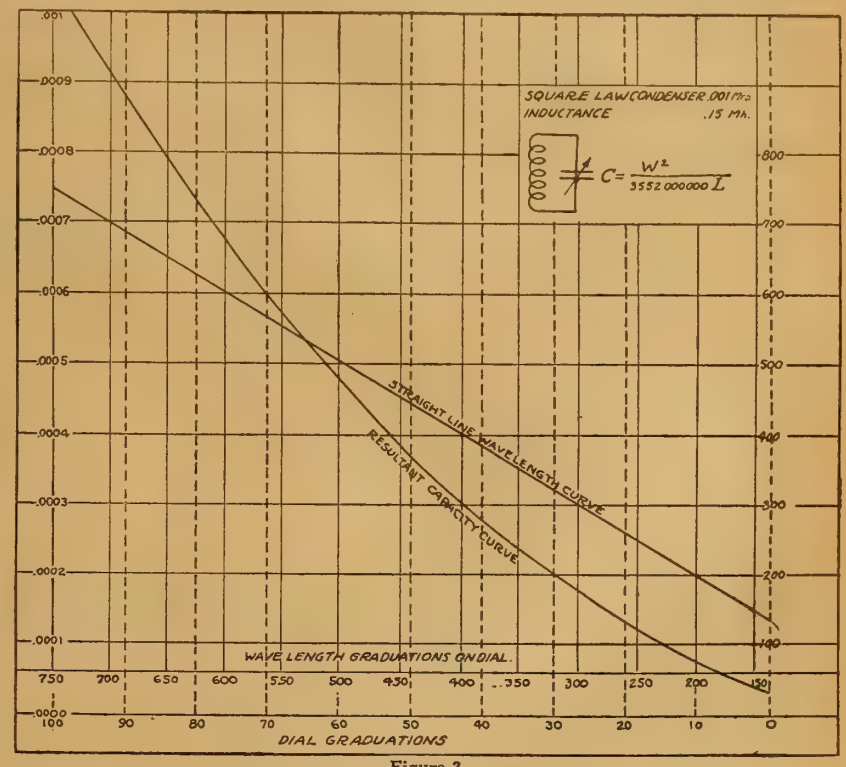

Figure 2

IT IS not unusual to receive a letter from some fan who wonders why the dials are not graduated in wave lengths. His idea is not unreasonable, and the time is not far off when sets will have wave length graduated dials instead of just the usual zero to one hundred or the angular degree graduations. There are, however, a number of factors which effect this, of which the fan usually does not know; it is these factors that will be discussed in this article.

First, we need not define wave length, but it is generally known that wave length is dependent upon the inductance and capacity of the circuit. Expressed in a formula, we have:

$$W = 59570 \sqrt{(LxC)}$$

where W = wave length in meters.
L = inductance in milhenries.
C = capacity in microfarads.

Antenna or Primary Circuit

The antenna circuit includes the aerial and ground, with its capacity and inductance in addition to the tuning units. The antenna inductance and capacity are not necessarily fixed values. Both vary to a limited extent, depending on a number of conditions; then, again, one fan has an aerial 100 feet long and 40 feet high, while another has one 60 feet long and 50 feet high. It is, therefore, impossible to graduate a dial for wave lengths in the primary circuit. If, however, a loop aerial is used and its inductance determined, the dial of the usual tuning condenser can be graduated for wave lengths, but this condition is parallel to what is taken up under secondary circuits, and will be more fully discussed under that heading. All circuits operating without an aerial, usually a fixed or variable inductance incorporated in the circuit, can also be handled the same way.

Secondary Tuning Circuit

In the secondary circuit there would be little trouble in having the dials graduated for wave length. The main condition imposed would be the necessity of a fixed inductance value. Naturally, if the inductance is variable, every change in the inductance would alter the condenser setting for the same wave length. This fixed inductance value is not unusual; for example, the rotor of a variocoupler has no taps, therefore, the inductance value is fixed. Similarly, the loop aerial, unless tapped, has a fixed inductance value.

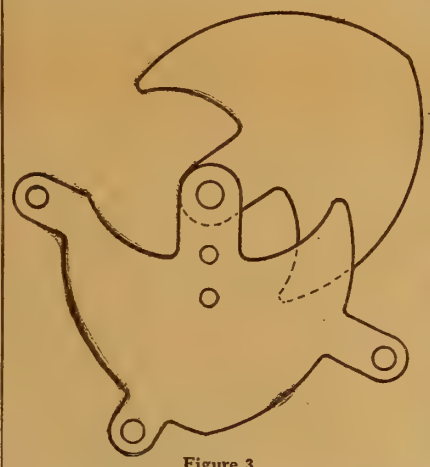

Figure 3

Where a double or even triple honeycomb coil circuit is used, the secondary circuit is tuned by means of the variable condenser shunted across the secondary honeycomb coil.

If, then, the inductance value is fixed, the tuning control being centered in the variable condenser, it is the dial on this apparatus that can be used to indicate the wave length for its different positions. This naturally emphasizes the importance of accuracy and workmanship in its construction.

Variable Condenser

Up to this time there has been but limited development in condenser design. The present type of rotating plate condensers is seldom very accurate. Though spacing may be fairly uniform when manufactured, handling soon changes positions of plates. Many of the plates are stamped out with rough edges. Unless the metal is carefully treated, temperature changes will produce warping of the plates. The plates may not be shorted, but there is no uniform capacity change. Gradually development and improvements in design will help eliminate these uncertain factors. The other types of construction, if efficient, are usually too

(Continued on page 14)

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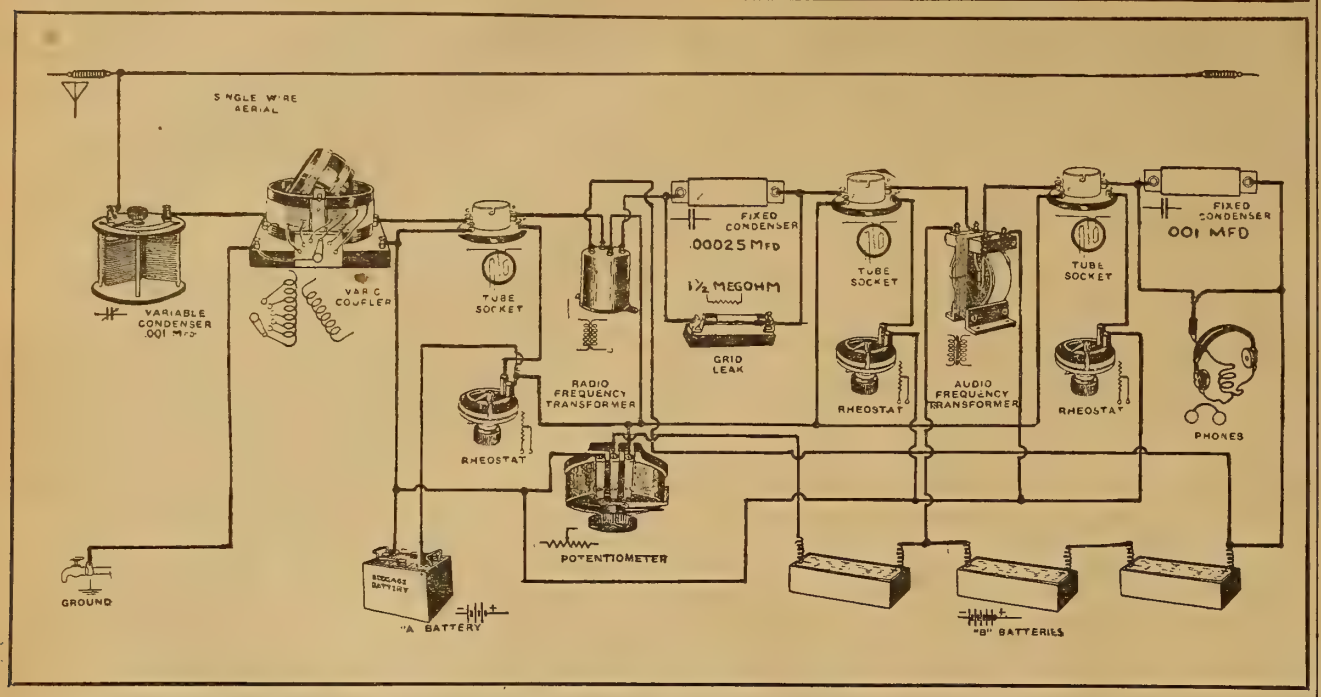

ONE stage of Radio frequency amplification, detector, and one stage of audio frequency amplification is the second of the simplex diagrams.

As can be readily seen by examining the diagram, this circuit consists of a variocoupler, used as a simple tuning arrangement with a variable condenser of .001 mfd. capacity in the aerial lead. No regeneration is used. The variocoupler tunes the aerial circuit and then passes it on through the Radio frequency amplifier tube, a UV-201. The plate circuit of this stage consists of a Radio frequency transformer, 67½ volt B battery, and potentiometer. The potentiometer is very necessary if good results are to be obtained.

The detector circuit is the usual conventional arrangement employing a fixed condenser of .00025 mfd. capacity and grid leak of 1½ megohms resistance in the grid lead. A soft tube is used as a detector, preferably a UV-200. The plate circuit of the detector is completed with the primary of an audio frequency transformer and B battery of 22½ volts. The single stage of audio frequency amplification employed is of the usual type, consisting of a UV-201 and B battery of the same strength as that of the Radio frequency amplifier.

This arrangement may be used with any receiver where Radio frequency amplification may be advantageously employed and the usual results of such amplification obtained. Tuning is effected with the variocoupler, variable condenser, rheostats and potentiometer in the order listed.

FIRST STEPS IN RADIO

(Continued from page 11)

cuit and to increase the wave length of the coils so a longer period is obtained between checking points. The two coils need not be put in inductive relation to each other, the feedback being obtained through the capacity of the plate and grid, as described under tuned plate regenerative receivers.

The action of this circuit is identical to that using two tubes, but one tube functions as both oscillator and detector.

Oscillation in the Circuit.

When the tube is lighted the circuit begins to oscillate at a frequency determined by the values of the honeycomb coils and the capacity across them. This current will have a frequency between twenty and thirty thousand cycles per second, which is near the upper limit of audibility and a high pitched whistle will be heard in the receivers constantly. If annoying, the pitch of the whistle can be varied by changing the capacity across the battery and coils. If the whistle is pushed above audibility, the signal strength will be reduced, as mentioned previously because the tube is not allowed to build up as long. The grid circuit containing the loop aerial and condenser are tuned to the wave length to be received, and when the signals are heard the set is made to regenrate by adjusting the plate variometer. We find, however, that the regeneration can be carried to a point where the set will operate a loud speaker nicely because the oscillations from the honeycomb coils only permit regeneration to occur during one-half the cycle, and thus the tube is not permitted to howl or squeal.

This little set is ideal for the man limited to one tube and desiring to work with a loop aerial. For the benefit of those who would care to build a set of this type, full details of construction will be given in the next chapter as well as the theory of operation of the Flewelling circuit, showing that the operation therein is very similar if not identical to that in the Armstrong super sets.

(TO BE CONTINUED)

DIAL MARKINGS FOR W. L.

(Continued from page 13)

high priced, so for the present only the rotating plate type will be considered.

This type can be divided into three different classes, namely:

The semi-circular plate construction.

The straight-line capacity type.

The square-law type.

The average variable condenser that appears on the market falls in the first class. The second type are not so numerous, and as a rule are much larger in size, due to the contour and size of the plates. Of the third class, there are very few on the market.

The capacity curve of the condensers of the first class, based on the dial graduations, is very irregular; no two are alike. It is very difficult to graduate a dial in wave lengths because of the irregularity of such graduations. This will become more apparent when the other classes are analyzed.

The Straight Line Condenser.

The illustration, Figure 1, shows the straight line graph by plotting the capacity against the usual dial graduations. The markings on the dial are taken as zero to one hundred; some dials are graduated to 180; that would mean merely that the divisions on the bottom of the graph would cover 180 points in the same distance that the 100 are covered. Naturally, 180 degrees of rotation are assumed. Using the formula for wave length, the different wave lengths are calculated, assuming a 50-turn honeycomb coil (.15 milhenries) is used as the inductance. The illustration shows the resultant wave length curve. Since the curve is not a straight line, the dial graduations would be irregular.

For example, from graduations 42 to 100 the wave length would run from 500 to 750 meters, or a total of 250 meters range. But the lower part of the scale, 0 to 42, would cover a wave length range from 0 to 500. In other words, the lower half of the graduations, would cover over twice the range that the upper half does.

In order to remedy this difficulty, the third class of condensers, called the square law type, were developed. They are used mostly in wavemeter work and for laboratory testing.

The Square Law Condenser.

The wave length formula can be changed around to read:

$$C = \frac{W^2}{3552000000\ L}$$

using the same unit values as before.

This indicates that in a circuit with a fixed inductance value the capacity varies as the square of the wave length, divided by the product of a constant and the fixed inductance.

In Figure 2 the wave length is first plotted as a straight line, the necessary capacity values are calculated and the curve drawn in. The condenser is so designed that the plate areas required for the various dial settings check up with capacities as called for on the graph. The dial range in wave lengths would then run from about 150 to 750 meters. Naturally any change in the maximum capacity of the condenser or the inductance of the coil alters these dial values.

At the base of Figure 2 the wave length values at the different points of the dial graduations are marked in steps of 50 meters. This can be carried further and kept handy with a set, so that the dial graduations can readily be interpreted in terms of wave length.

The illustration Figure 3 shows the form of plate used in one of the square law type of condensers at present on the market.

With the new tubes just on the market, it is suggested that tube sockets be mounted on a cushion base to minimize vibration.

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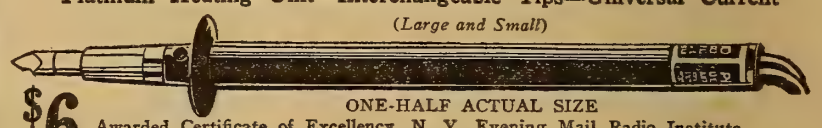
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Questions and Answers

Interference

(3603) KB, Wilkes-Barre, Pa.

I have a two-stage regenerative set which is the same as that used by my neighbors. When I am tuned in and they tune in it tunes me off and causes noise. Our aerials are about 20 feet apart; mine is about 5 feet lower than theirs. They have two wires about 125 feet long; mine is one wire, 160 feet long.

Will raising my wire have any effect?

A.—Noting difficulties occasioned by interference of regenerative circuit in proximity we are advising that two methods are suggested for overcoming the annoyance. Ask your neighbor to construct a single wire antenna which will in no way decrease the efficiency of his circuit but rather make it more selective, and construct your own of the same type at right angles and as far away as possible. This method should eliminate all conflicting operation.

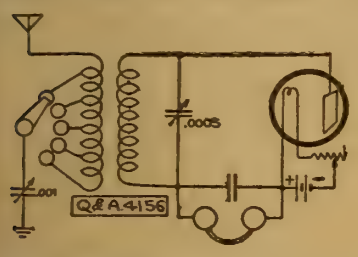
If this plan is not possible it will be necessary for each of you to add Radio frequency amplification to your sets. The employment of one stage will prevent reradiation from the receiver which is the cause of interference cited.

Diode Tube Circuit

(4156) JTL, Mt. Vernon, S. D.

Will you please publish a diagram of a hook-up consisting of a variocoupler and variable condenser for tuning in, using the two-element Diode tube?

How far will this tube receive broadcasts and what will the wave lengths include, using a standard variocoupler? Will it be as sensitive as a crystal?



A.—A circuit employing the Diode tube accompanies this article. This will have a wave length from 200 to about 500 meters and a receiving range of about 150 miles, winter reception. It will be more sensitive than a crystal detector.

Super Heterodyne

(2858) HEP, Providence, R. I.

I have noted your article and diagram R. D. 73 on the Super Heterodyne on page 14 of the February 24 issue, but it is not plain enough for me, and I desire further information. Would you be so kind as to answer the following questions:

Should the inductance L2, which is shown in an upper and lower section, be wound one over the other or in two separate coils of 18 turns each, side by side? If two separate coils are used, is there a variable inductive relation to each other?

You do not mention the inductances which are shunted by condensers C4 and C5. Of what are these composed and what is the size of each? Should they have a variable inductive relation?

Is it necessary to use separate A and B batteries, as shown, or can one A battery be used for the whole circuit, even if using separate B batteries?

Will this circuit function with the WD-11 tubes or DeForest 1¼ V tubes?

Should the two tubes composing the heterodyne (the first two on the left) be hard or soft tubes?

Does this super heterodyne require 4 stages of Radio frequency as shown or can it be operated on a lesser number, such as 2 or 3 stages ?

Is this circuit as shown good for all wave lengths up to 20,000, and if so, would inductances mentioned in the second question remain the same for all waves?

A.—Inductance L2 consists of two separate coils wound on the same tube but not over each other. The two coils are wound side by side with taps taken from the center, as per diagram.

Inductance shunted by condensers C4 and C5 may consist either of honeycomb coils or a variocoupler, and are variable in inductance relation.

One A battery may be used, but separate B batteries are advisable.

It is doubtful if 1½-volt tubes will function as effectively as 6-volt tubes. Would advise 6-volt tubes for results desired.

Two tubes composing the heterodyne should be hard.

The circuit may be used with less stages of Radio frequency than designated, although volume will not be great with less than four.

By substituting the proper size inductances in the tuning controls this circuit will accomplish 20,000 meters wave length. Inductances mentioned will remain constant.

Reinartz Reception.

(2892) HCN, Rapid City, S. Dak.

I built a Reinartz set according to one of your hook-ups, and have received 155 stations in four weeks, but would like to ask a few questions on this hook-up.

Can you use Radio frequency on a Reinartz? Is it advisable? Will it cure the kick-back which bothers neighboring receivers?

I am not using a phone condenser. What advantage would it give me?

I have no amplification, but get some stations so loud can lay phones on table and hear words ten feet away. My ground wire is very long, about 35 feet. Would shortening it by burying copper plates or driving pipe into the ground help to bring in signals appreciably louder? If so, how long pipe would be necessary?

What advantages does a north and south aerial have over one running east and west, or vice versa? Would a combination of both be superior to either one alone?

How can you cut out interference on a Reinartz, or is there any way of making it more selective?

I am using 22½ volts on the plate. Would more voltage have a beneficial effect? Is there any advantage in connecting two 6-volt filament batteries in parallel?

Can a Homecharger be used to charge B batteries?

Have received about 25 stations over one thousand miles distant. Are these good results?

A.—We are pleased to congratulate you upon your success with Reinartz circuit. That is as it should be, after careful construction.

The use of Radio frequency is highly desirable and does away with the bothersome feature of disturbing other sets in vicinity and also increased range of reception.

It is doubtful if phone condenser will afford any special advantage.

Would advise the use of cold water pipe as making the best ground.

Antenna is slightly directional off the lead-in end affording that advantage in direction from which reception is most desired. Combination of north, south, east and west directions would have a little advantage.

The circuit is fairly selective under proper skill in tuning. There is nothing we could suggest to increase its selectivity.

Twenty-two and one-half volts on the plate is sufficient. There would be no advantage in connecting two 6-volt A batteries in parallel, as suggested.

A Homecharger is effective in charging B batteries.

Static and Tube Noires

(3574) LCT, Jones, Ala.

I would like to ask you a few questions as to a "Flewelling" set which I am installing.

How may I keep down static tube noises and body capacity?

How may I increase the clearness and range of my set?

A.—Answering your inquiry with reference to disturbances encountered in the operation of the Flewelling circuit, we advise that tube noises should be eliminated by careful tuning, and body capacity effect by shielding the back of the panel with tin foil and a grounding shield. By skillful adjustment of the grid leak the signals should be clear. The circuit has a consistent range of one thousand miles which probably will not be materially increased by any method.

Static interference is not peculiar to any circuit; it is difficult to combat. However, with a selective circuit, of which the Flewelling is a type, it should be at a minimum. A short one wire antenna is advised for the circuit in question.

The Question and Answer department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard, therefore when asking questions please make out your query on a separate piece of paper and written on one side only. **Do not** mix your questions with other material, write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered.

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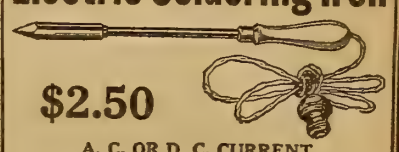

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Radio has become very popular with the outdoor girl. Miss Mimi Palmeri, noted stage beauty, takes her first dip of the season and listens in to the Radio
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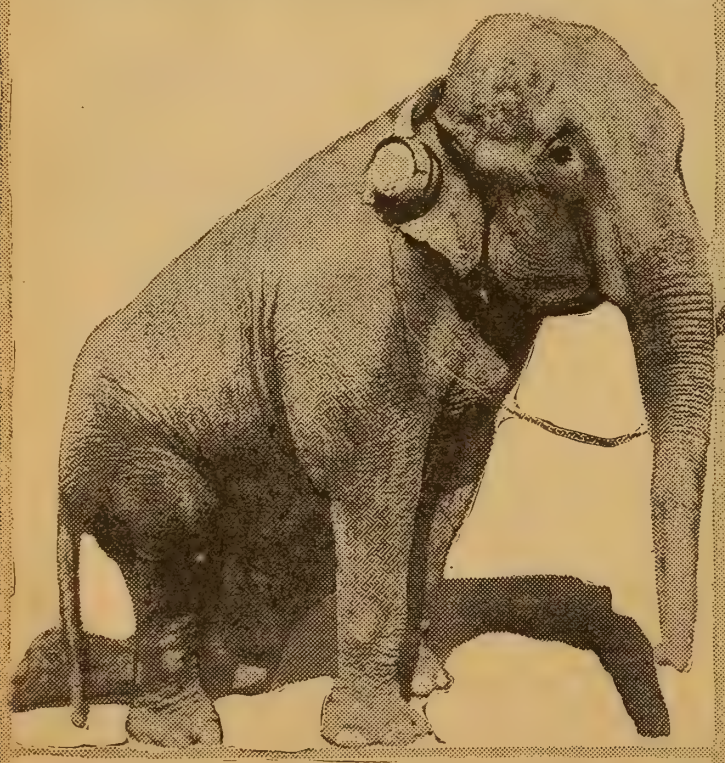
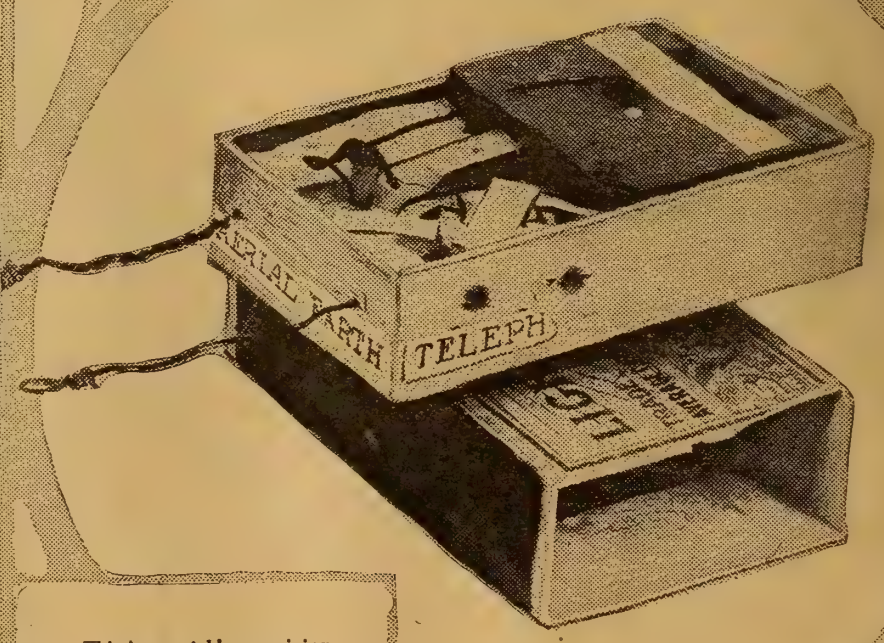


The world's largest Radiophan is Babe, modern elephant. He enjoys all the concerts and shimmies when the band strikes a foxtrot. These huge receivers are really loud speakers © Fotograms



This is a matchbox receiving set because it occupies a matchbox. It was made by a Londoner at a cost of sixpence. Excellent results have been obtained by means of this novel device. Gotta match?

AUG -6 19 C18583239

Picture Hook-Up; New Reinartz; Making a Super

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

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FORD DENIES STORIES

AIR COMPASS BARS "DOC" COOK STUFF

RADIO NEEDLE TO PROVE POLAR PARTY'S POSITION

Naval Airship to Rely on Stations South as Guide on Trip to Top of World

By Carl H. Butman

WASHINGTON.—When the great Naval Airship ZR-1 goes to the North Pole, she will carry Radio to the top of the world, whether it is late this summer or early next spring. If she reaches that northern pinnacle (and experts insist there is no reason to doubt her ability), the naval airship will be able to prove the fact by virtue of her bearing from northern Radio stations. In these days of scientific achievement, proof is required, and in the event an arctic explorer gets to the pole with a Radio compass or a transmitting set, there can be no doubt of his exact position.

Together with a complete Radio receiving and transmitting set, the ZR-1 is equipped with the latest type of Radio compass, which at the pole would show all Radio stations picked up as bearing directly south, while at all Radio stations within communication distance, her position would be due north.

Radio to Exact Pole First Time

By the time the aerial explorers are ready to start their northern flight, toward the end of August, Captain MacMillan's experiments from the Bowdoin will have proven whether Radio will carry through the aurora, a point on which there seems to be some doubt. MacMillan, however, will not be able to take his set very near the pole, but will be forced to abandon it and the Bowdoin at the edge of the ice, leaving it to the navy to carry Radio to the pole itself.

Weather Bureau officials report that messages from Amundsen's Maude have been received by relay, and that a daily message on meteorological conditions is received regularly during the winter months from Spitzenbergen, located at Latitude 78 North. If it is possible to put Radio messages through from the far north, the world will hear of the ZR-1's progress and her arrival over the northernmost point on earth.

Day Versus Night Trip

Captain Evelyn B. Baldwin, arctic explorer, who suggested an aerial polar flight years ago, recently talked to the ZR-1 crew on polar exploration, answering innumerable questions. Among other things, he explained the advantages of a summer flight, as against one undertaken

(Continued on page 2)

HIS PLANT NOT FOR POLITICS

Hitherto unpublished photograph of Henry Ford, great automobile manufacturer, who declares his new broadcasting station will be used purely for commercial purposes, and has no political significance. The latter rumor, he says, may be attributed only to overwrought reporters

NEW STATION FOR POLITICS RUMORS HINT

New Super Broadcaster at Dearborn, Mich., for Commercial Use Only

Quiet on Campaign Plans

Neither Denies Nor Affirms Presidential Intentions—Will Tell When Ready

By F. J. Huntley

DETROIT.—"Political broadcasting is the last thought in the building of our new broadcasting station," said Henry Ford, when interviewed recently about the building of a giant new station equal in size to the largest in the country. "The station is being built primarily to link up the various Ford manufacturing and assembling plants, as is its predecessor, WWI, but of course the new station will have thousands of miles range where the present equipment has hundreds. The story that has gained much circulation saying that political propaganda will be put on the air in behalf of my alleged presidential campaign is entirely mythical and the dream of an overwrought newspaperman," he continued.

Declines to Discuss Politics

The misstatement referred to by Mr. Ford has appeared in several Wisconsin newspapers and elsewhere, and evidently had its birth in the planned extensions to the service of Station WWI, the Ford broadcaster at Dearborn, Mich. Owing to the numerous rumors and concoctions made by various publications all over the country regarding Mr. Ford's political plans, he now declines to discuss politics with any one.

Mr. Ford has made no public announcement as to his presidential intentions. No one, not even his most intimate friend, knows what Mr. Ford intends to do.

He is not given to making vague insinuations. When he does make an announcement, if he ever does, it will be

(Continued on page 2)

RADIO CALLS BRIDAL COUPLE TO SICKBED

BOSTON.—A broadcasting appeal by Radio for knowledge of the whereabouts of Mr. and Mrs. George A. Lange, who were known to be on a honeymoon tour of New England, recently resulted in locating the couple in a secluded inn at Lost River, N. H., whence they made their way home at once on receipt of a message that the bridegroom's mother, Mrs. Annie Lange of Jamaica Plain, was dangerously ill.

MUSIC BROADCAST MANY YEARS PAST

College Students Transmitted Harmony Over Five Miles Fifty Years Ago

SCHENECTADY, N. Y.—Radio broadcasting is a development of the past three years but the broadcasting of music goes back a great many years. George S. Pierson, a consulting engineer of Kalamazoo, Mich., writing Station WGY of the General Electric Company here, tells of a broadcasting stunt enacted by the students of Union College on a frosty March night in 1874.

The generator, he explains, was what is commonly known as a horse fiddle, a great wooden box on the main floor of a circular building, now the library, then in course of construction and roofless. The top boards of the box were well resined and a plank thirty-eight feet long used as the fiddle bow was also resined. With six men standing on the plank, the bow was drawn back and forth across the edges of the box. No one in Schenectady slept that night and the terrifying notes of the mammoth fiddle were heard five miles away.

"PALM READ, SIR?"; ALLOW WDT TO DO IT

NEW YORK.—Special arrangements have been made by Station WDT of this city with William Checker, noted palmist, for Radiophans to have a free palm reading through that station. Details will be broadcast by Radio and the date will be announced in the regular program of the station. Palmistry by Radio is one subject so far omitted from broadcasting station programs.

LETTERS TELL HOW PARTS OFFER WINS

APPRECIATION OF COUPON PLAN MOUNTS STEADILY

Missives from Arkansas, Iowa, New Hampshire and Massachusetts Indicate General Gratitude

SPECIAL REWARD OFFER
Coupon Number 10

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Not only does the number of answers to the special offer of Radio Digest grow but the appreciation of subscribers and other readers and their confidence in this publication continue to increase.

Of the very large number of letters received during the last few days the following excerpt from a missive sent from Rogers, Ark., indicates deep interest: "There are so many things I want but I don't know where to get enough coupons."

From 'way up in Rye Center, New Hampshire, a letter came bearing the following conclusion: "Thanking you for this opportunity to get first class material at a low price . . . ." A letter from Milford, Ia., said in part—"I think your coupon offers are just great. I am saving the other coupons for more valuable articles." And from staid Worcester, Mass.—"I thank you a whole lot for this opportunity to obtain Radio material at such a saving and I intend to take advantage of this unusual offer again in the near future."

The numbers of the coupons that you send to this office must be consecutive; they need not begin with Number One but they must run in order. The number of series that you may send is unlimited. Send as many coupons as you desire, choose the parts you want and send the money. The parts will be sent to you on the day we receive your letter.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer.

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Looking Ahead

Another Picture Diagram—One R. F. and Detector—will be given in next issue. Beginners are finding the picture hook-ups of great aid in building sets. You can't miss the various connections by following the picture diagram layout.

The Operation of Reflex Circuits—by Thomas W. Benson. Mr. Benson will take up this subject next issue in the next chapter of his series for beginners in Radio. Reflex circuits are interesting from the standpoint of their economy of tubes and clearness of reception.

Tube Constant Calculations—by H. J. Marx, August 11 issue. Mr. Marx will continue the article started on page 13 this issue, by showing how mutual conductance, the output impedance, and amplification constants are calculated.

Pictures of the Leviathan's Radio Equipment—Next week will be shown the Radio telephone and telegraph apparatus used by the largest ship afloat. This great vessel has an immense investment in its Radio room alone.

Part IV of the Radiophonist's Telephone Book—next issue will contain the state, city-station index, necessary in using the first three parts devoted to station schedules.

Have a Copy with You on Your Vacation

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

FORD DENIES STORIES

(Continued from page 1)

straight from the shoulder and so positive that there can be no doubt as to just what he intends to do.

Rumored Ford Would Make Sets.

Sometime ago a rumor gained much circulation in the Radio industry. This was that Ford was planning to go into the business of making "flivver" Radio sets. The rumor, widely told, was affirmed partly by a statement of Will Rogers, famous Follies lariat artist and philosopher, in an interview with a Radio Digest representative. Mr. Rogers is a personal friend of the "flivver king," and in the interview said that Ford had told him that he might go into the Radio manufacturing business. Upon careful investigation the Digest received a denial from Mr. Ford, who said that the idea had never even entered his head. The illustration, however, serves to show how many rumors there are of which the famous motor car builder is made the subject.

In perfect disagreement with the story circulated about the new super broadcasting station, the new equipment is being installed purely as an amplification of the big corporation's existing Radio facilities. The new station will have an antenna input of 1,000 watts, which means that it will be equal to the largest now permitted by the government to be built.

To Link Corporation's Holdings

Station WWI, the present equipment, is already carrying on telegraphic communications between Springfield, Ohio, and also Northfield, Mich. The communication between Springfield, Ohio, and the Dearborn plant deals primarily with operations of the D., T. & I. Railroad, which is owned by Mr. Ford and his son, Edsel. Radio has been found so successful even with the smaller plant now in existence that it was decided to expand its operations to other departments of the Ford interests.

It is the intention of the Ford Motor Company to use this new super station-to-be in immediate communication with its interests in various parts of the United States and Canada. Just how much farther this station will cover the engineers having the construction in charge decline to say. They do expect, however, to be in easy communication with Central America, and perhaps foreign points still farther away.

This plant has been in contemplation for a considerable time. It will be installed with the very latest in Radio construction. It will be housed in a new and specially constructed building some distance from the present structure. The only outside construction thus far is the erection of the high steel towers. These have been erected on the opposite sides of a small lake, which, it is believed, will materially aid in effective broadcasting. This is something out of the ordinary, and the engineers are quite interested in the experiment. They are assured, however, the scheme will be most effective.

Will Have Best of Equipment

F. L. Black, in control of the Ford Radio department, says the company has done but little in the way of Radio experimentation, but it has been a close observer, and that the equipment to be installed is the very latest in design. No expense is being spared in making this station the best equipped and most powerful of its kind in the United States.

"It is being installed," Mr. Black said, "primarily for commercial purposes. Communication between the Ford interests in all parts of the United States and Canada is enormous, and this plant is intended to do its share in relieving the situation.

"For a year or more now we have been broadcasting programs on Wednesday nights. We are planning to go into this somewhat more extensively with the new plant. The programs probably will be more elaborate and extended to two-hour periods, but we will only devote one night a week to this, as we are doing now. As I said before, this plant is primarily intended for commercial purposes."

The station will not be completed for about four months.

BARS DOC COOK STUFF

(Continued from page 1)

in darkness and cold. A winter trip, however, Radio experts point out, would aid Radio transmission materially. But with her Radio operating from a 300-foot antenna at a great height, it is felt that the aerial cruiser would be able to send satisfactorily in the Arctic day as well as in the night.

According to Ralph Upson's report on using Radio from his balloon during the recent balloon race at an altitude of over 3,000 feet, he encountered no static whatever.

Easy to Check Position

Radio stations in the North are fairly numerous, and it is believed that the ZR-1, once on her trip could keep in communication with several to check her course. In the event she was uncertain of her position, she would either call two or more Radio compass stations and ask for her position, or, having picked up two or more Radio stations and observing their bearings by her Radio compass, plot her own position.

RADIO BARES SPIRIT LIFE, WIZARD SAYS

SEES AIRPHONE INCREASE FORCES OF OCCULTISM

Thurston Predicts That Coming Attempts to Talk with Mars Will Prove a Hereafter

(Special to RADIO DIGEST)

NEWARK, N. J.—Howard Thurston, the internationally famous magician who recently created a big sensation at the annual dinner of the American Magicians' Society by openly stating that he had been converted into a Spiritualist, delivered a lecture, "Spiritualism," recently from Station WOR, L. Barberger & Co., of this city.

In an interview previous to the broadcast Mr. Thurston said:

"For the past ten years I have been carrying on experiments, in all parts of the world, which have firmly convinced me that there is something very definite back of this belief in spiritualistic communication. It actually has a tangible foundation, in spite of the fact that about ninety-five per cent of the professional mediums are frauds of the most contemptible type who should be suppressed without delay. I know that such a statement from me sounds paradoxical, but, never-the-less, I mean every word of it.

Was First Radio Magician

"I was the first magician to make use of Radio as you may know, and I have employed it for fifteen seasons. I have recently convinced myself, almost against my will, that there is a definite connection between Radio and the so-called 'occult forces' and I think the coming attempts to communicate with Mars and other planets by Radio, will be the cause of extraordinary revelations which will make dyed-in-the-wool Spiritualists of a new variety out of all of us. I want this strange assertion to go down on record right here and now. I, the most pronounced anti-psychic imaginable, wish to state that I actually believe that it is possible for us to communicate with unearthly forces which, for want of a better name, I will call spirits."

Psychic Discoveries Coming Soon

"Extraordinary psychic discoveries will be made during the next five years, unless I am badly mistaken, and I think I will eventually be given credit for one or two of them.

"However, I wish to stress the fact that I have not been converted to the spiritualistic beliefs professed by Sir Arthur Conan Doyle and Sir Oliver Lodge. I still disagree with them in almost every respect. But, I do believe that we are continually surrounded by unearthly forces, which may or may not be the spirits of our departed, who are trying to communicate with us. I am also of the opinion that these forces, what ever they may be, will soon succeed in getting in touch with us, without the aid of professional mediums with their crude magical apparatus.

Broadcasts Answers to Telegrams

"Of course, I will have to admit, that these unearthly forces may simply be the inhabitants of other planets trying to Radio to us.

"I will be delighted to have listeners in dispute my assertions, ask questions and volunteer information. I will gladly give personal consideration to all serious interrogators."

A special branch telegraph office was installed in the WOR studio to enable psychics and anti-psychics in all parts of the country to send messages to Mr. Thurston during his address. These telegrams, hundreds of which were received, were broadcast together with the eminent magician's replies.

Mr. Thurston, it will be remembered, first gave an inkling of his conversion to spiritualism to the press when he was interviewed several months ago by a representative of Radio Digest.

At one time during the past year there were 112 separate makes of Radio head receivers on the market.

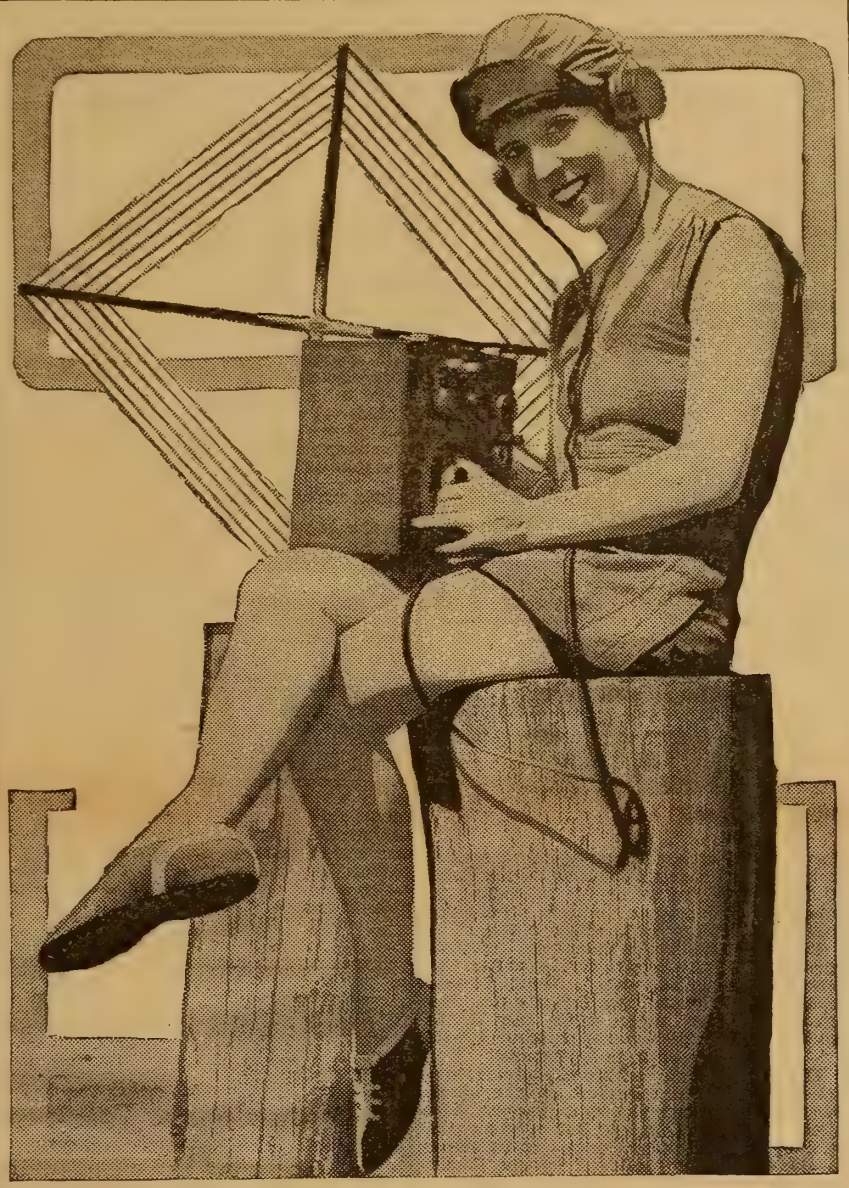
WLW BIDS YOU TO AIR NUPTIALS AT FESTIVAL

CINCINNATI, O.—Applications are getting more plentiful every mail from couples who wish to participate in the Radio wedding to be broadcast by WLW, the Crosley Manufacturing Company Station here, during the last week in August and the first week in September at the Cincinnati Fall Festival. There will be two weddings, one each week.

GIRL AGAIN TO TRY SEA CHAT BY RADIO

CHICAGO.—Miss Florence MacDonald, who maintained communication by Radio with her brother here through the Drake Hotel, station WDAP, during her voyage to Europe on the Berengaria last January, recently started homeward on the same liner. She intended to chat with friends at home all the way across the Atlantic, listening in on the set used previously.

ANOTHER WAY TO KEEP DRY



Zita Lockford of the "Passing Show," a real French girl and a marvelous athlete, listens to the American broadcasters at a Chicago beach. Zita can hardly understand English but enjoys the "moosick" anyway © Radio Digest

Vaughn de Leath, First Lady Announcer, Assumes New Role

NEW YORK.—Vaughn De Leath, popular with Radiophans through her frequent appearances before the microphone, has challenged the approval of Radio audiences in a new role—that of studio and program manager of Station WDT, new class B plant of this city.

Miss De Leath was the first woman in the United States, also the world, to broadcast vocal music for the benefit of the general public, with whom she has proved a decided favorite. She is widely known as the "Original Radio Girl."

Japs Plan Radio as an Aid to Fish Crews and Market

WASHINGTON, D. C.—The chief of the Nagasaki Perfectural Marine Products Bureau, together with a committee of men interested in marine products, is reported to be investigating the possibilities of installing Radiophone outfits on the larger sized fishing boats which have their base at Nagasaki, to enable them to communicate with shore when in difficulties, and to report the catch in time for their owners to realize on it.

Loud speakers cost from $5 to $175.

TESTS PROVE PUPILS LEARN CODE ASLEEP

NAVY EXPERIMENTS HELP STUDENTS OF AVIATION

Additional Data from Pensacola Reveal Success of Method to Teach During Slumber

By L. M. Lamm

WASHINGTON, D. C.—Further reports from the naval air station at Pensacola, Fla., on the success that has been attained in teaching Radio code to student aviators in their sleep, give interesting information on the progress of this novel and useful experiment. In fact it may be said that the experimental stage in the trials has been past and the method has become standard, as a means of saving students from failure in the course.

When the test was started twelve students were unsatisfactory in their progress in code study. After two nights during which Radio code was sent to the students in their sleep only two of the students were unsatisfactory. These two men had left before the experiment was finished, professing disbelief in it.

Watch Sleeping Students

The procedure has been to have the students sleep on the tables in the Radio room where the code is taught in the regular school periods. Operators send messages at varying speeds all night. The students concentrate on the messages that are sent through until they drop off to sleep. To quote a report on the subject:

"It is very interesting to watch the students during one of these night periods. If the operator intentionally and continuously makes errors in sending the students will toss around most unusually in their sleep. If the sending stops or the rate of sending changes appreciably, it is sure to disturb them, and in most cases will arouse them. Even in the midst of their deepest slumbers, the call 'SOS' at a different rate of speed will awaken them instantly."

It is planned to obtain electrical sending machines to send all night and do away with the necessity for an operator.

DECIDE PLANTS NEED FREQUENCY INDICATOR

Design Device to Keep Broadcasters Within Limits

WASHINGTON, D. C.—At the Second National Radio Conference held in Washington, it was resolved, among other things, "That every broadcasting station should be equipped with apparatus such as a tuned circuit coupled to the antenna and containing an indicating instrument or the equivalent for the purpose of maintaining the operating wave frequency within two kilocycles of the assigned wave frequency."

The Bureau of Standards of the Department of Commerce has designed a preliminary model of a Radio frequency indicator to meet the above need and has prepared specifications covering its construction. These specifications may be had by any broadcasting station upon request. The instrument consists essentially of a 72-turn space-wound coil on a 3¾" tube, an air condenser, and a sensitive thermo-galvanometer. These three elements are connected in series. The condenser, which is of the variable type, is provided with a locking device so that it may be locked and soldered into position after the instrument has been adjusted to indicate the required frequency. This instrument may be set to indicate any Radio frequency in the range from 1350 kilocycles (222 meters) to 555 kilocycles (545 meters).

If an instrument is constructed according to the specifications and sent to the Bureau of Standards Radio Laboratory by a licensed broadcasting station, it will be adjusted for a nominal fee to operate at the frequency of the station.

THE ANTENNA BROTHERS — Spir L. and Lew P. — A Wicked B Battery

SURVEYS INDUSTRY'S TANGLE OF PATENTS

"Cooperative Competition" Leaves Maze of Stumbling Blocks for Independent Manufacturer

By John B. Brady

(Editor's Note.—Mr. Brady, a patent attorney of Radio repute, has achieved a remarkable survey of the network of patents, locking and interlocking the Radio industry in a veritable Gordian knot. His serial treatise on the patent situation started July 14 issue.)

PART IV

MANY claims for patent infringement were filed against the government for the manufacture and purchase of Radio apparatus from others than patent holders under the "save harmless" contracts, and many of these claims, although severely contested over a period of years, are still pending. The government in operating its chain of high power Navy Radio stations and Signal Corps net, appreciated the value of a patent situation and acquired where possible licenses in the several inventions indicated by the chart.

The Federal Telegraph Company by further negotiation with the government secured a retransfer of the title to its patents covering the arc transmission system and extended certain licenses thereunder for the broader commercialization of the arc system. Having secured a return of its patents the Federal Telegraph Company were again potentially strong and, in working out the Chinese high power Radio station contracts entered into a license agreement with the Radio Corporation forming a Federal Telegraph Company of Delaware and of California.

Government Strengthens Situation

The government since the close of the war had also been perfecting its patent situation to a point where rights existed under the multiplex telephony patents of General Squier, the arc patents, alien owned Radio patents seized by the alien property custodian and purchased by the Navy, the Rogers and Lyon underground antenna patents, the Kolster direction finder patents, the Cohen statically coupled receiver patents, the Dubilier condenser patents, the Sperry airfan generator patents for aircraft Radio, the Vreeland beats and oscillators patents, the patents controlling the Hanson audio frequency system and piloting cable, and numerous inventions by employees of War, Navy, Commerce and Post Office Departments, including a license under the heterodyne, and patents of the International Radio Telegraph Company and Westinghouse Electric and Manufacturing Company.

Independent Organizations

Among the independent organizations represented on the chart herewith there is the Independent Wireless Telegraph Co., including the Cutting and Washington Co., who have recently been sued by the Wireless Specialty Apparatus Co., under the Pickard loop patent 876,996.

The Liberty Electric Corporation is licensed under the Federal arc patents by an agreement with the government whereby the government obtained licenses under certain inventions on the arc by engineers of the Liberty Electric Corporation. The license is restricted to arcs up to ten kilowatts.

The Inter-City Wireless Telegraph Co., has recently been successful in a mandamus suit against the Secretary of Commerce, compelling the Secretary to renew an operating license to the company. The suit was favorably decided for the Inter-City Co., by the supreme court of the District of Columbia and has now been appealed by the Secretary of Commerce to the United States Supreme Court to determine whether or not the Department of Commerce has authority to decline to reissue a license to any station previously found interfering with other traffic.

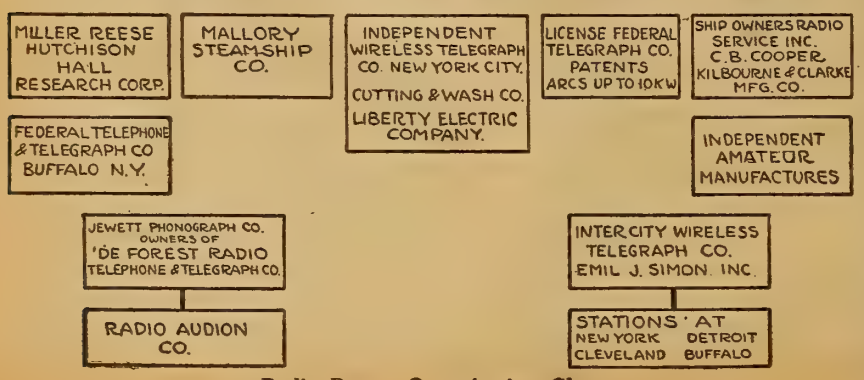
The DeForest Radio Telephone and Telegraph Co. has certain rights under the many Stone and DeForest patents. It was under the DeForest tube patents that the agreement was made with the Radio Audion Co., manufacurers of Myer tubes.

Course Open to Independents

The independent amateur manufacturers have been represented on the chart with these independent organizations. The striking analysis brought out by the chart is that if the independents are to share in the monopoly exercised by the Radio Corporation they must enter by way of a patent situation which the corporation must recognize. This is true of all of the patents gathered together under the cross license agreement in the Radio Corporation.

A well-known author once said, if a man writes a better book or preaches a better sermon or builds a better rat trap, even though he lives in the woods, the world will beat a path to his door. This is a policy which the small manufacturer should adopt by building such a patent situation that instead of the Radio Corporation forcing him out of the industry it will be compelled to welcome him into the industry and extend license privileges under its patents in reciprocation of license privileges under patents owned by the small manufacturer. The situation is one which compels concentrated effort in patents on the part of every manufacturer who wishes to grow in this remarkable industry.

(THE END)



Radio Patent Organization Chart

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Types of Flewelling Supers

(Submitted by E. H. T., Seattle, Wash.)

Question. I have been using the Flewelling circuit for some time with honeycomb coils and the bank of three condensers but I would like to reconstruct the set to improve its looks and in doing so would like to take advantage of the simplified form of circuit which uses but one condenser. Would it be possible for me to use a variometer instead of the usual tickler coil, as I understand that the use of a tuned plate circuit is of more advantage on the short wave lengths?

Answer. When the first experiments were carried on with the Flewelling circuit we were unable, seemingly, to use a variometer in the circuit. In one of the earlier articles this was discussed. Mention was made that there was no reason why a variometer could not be used, but at the time we were unable to find one that was suitable. The answer to your question is that a variometer certainly can be used and does offer slight advantage, due to enabling the tuning of the plate circuit. In the first place any standard variometer will operate. We have found that a certain amount of advantage seems to result from the use of a bank wound variometer. This is a little touch of refinement; I would not recommend its use if you have one of the standard types on hand. Note also that you must give the circuit a small fraction of a second in which to go into operation when first starting. I speak of this because one is very likely to turn the variometer control so fast that they go past the point at which it works properly. Of course if you use a variometer you are always sure that your circuit will work upon finishing the set provided the wiring and the like are right, meaning by this that you will not have to worry about the proper polarity of the tickler coil as you would when using that type of circuit.

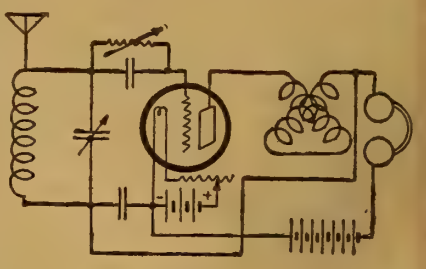


Figure 1

There have been so many inquiries covering the various types of Flewelling super circuit that I believe it would be a good idea to show a few variations of the circuit. Take, for instance, Figure 1. This diagram shows the type of circuit that you speak of with a variometer tuned plate circuit and an inductance coil for tuning.

This type of circuit may also be used

(Continued on page 8)

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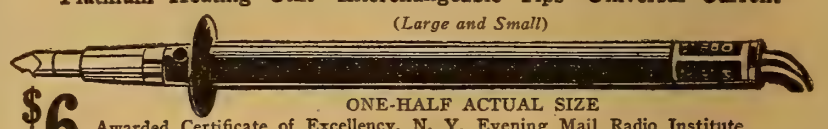

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FLEWELLING CIRCUIT Complete Parts
Baseboard, two honeycomb coils, mountings and coil plugs, 3 .006 condensers, .002 phone condenser, variable grid leak and condenser, grid leak ½ meg. 23 plate variable condenser, vernier rheostat, tube socket, 3" dial, 8 binding posts, 16 ft. bus bar, PANEL ALREADY DRILLED, TOGETHER WITH DIAGRAM AND INSTRUCTIONS..... $11.95

REINARTZ CIRCUIT Complete Parts
Baseboard, Reinartz coil increased wave length, tube socket, vernier rheostat, 23 plate and 13 plate variable condensers, 3 inductance switches, 2 3" dials, variable grid leak and condenser, .002 phone condenser, 16 ft. bus bar, 23 switch points, 29 nuts, 6 steps, 8 binding posts, PANEL ALREADY DRILLED, TOGETHER WITH DIAGRAM AND INSTRUCTIONS..... $10.95

Parts for TWO-STAGE AUDIO FREQUENCY AMPLIFIER, for either of above circuits, with drilled panel and book of instructions..... $11.00

ALUMINUM LOUD SPEAKING HORN, nickel plated, high polish, list $8.00	$3.75
3000 OHM TELEPHONE HEADSET, list $8.00	3.50
AUDIO-FREQUENCY TRANSFORMER, designed for use with W. D. 11 tube, also excellent for all other tubes, list $4.50	2.75
VARIOCOUPLER, Litz wire wound secondary, 150-600 meters, list $4.50	2.25
Triple Coil Mounting $3.35	Double Coil Mounting 2.45
Multiple Point Inductance Switch with knob and dial (15 points)	1.45
Reinartz coil, increased wave length	1.55

Honeycomb coil, mounted 50 turns	$0.95
Honeycomb coil, mounted 75 turns	1.00
Freshman var. grid leak and cond.	.75
Freshman variable grid leak	.60
V. T. Socket	.40

CONDENSERS

3 Plate Variable, value $1.75	$1.05
13 Plate Variable, value 2.50	1.20
23 Plate Variable, value 3.50	1.35
43 Plate Variable, value 4.50	1.95
13 Plate Vernier, value $5.50	3.75
23 Plate Vernier, value 6.00	4.00
43 Plate Vernier, value 6.50	4.25

Ball bearing inductance switch	.25
Single circuit jack, list 65c	.30
Double circuit jack, list 90c	.45
Lightning arrester, approved by underwriters	.90
3" dials, high finish, heat resisting	.30
2" dials, high finish, at	.25
Filament rheostat, 6 ohms	.65
Filament rheostat, 20 ohms	.80
Filament rheostat, 50 ohms	.90

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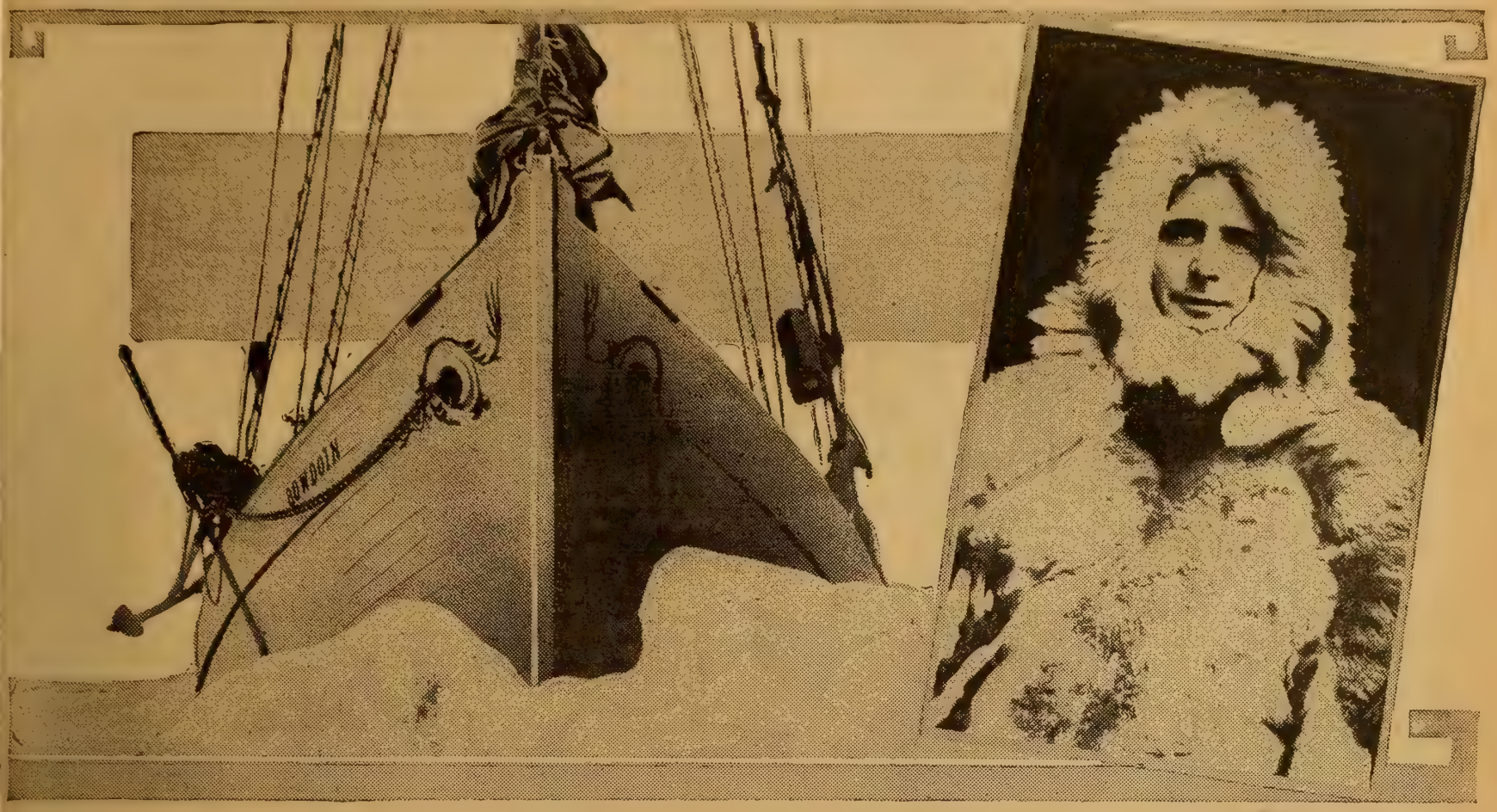
FIRST TO DEFY BOREALIS WITH RADIO



While most of the civilized world is panting under the sun or wondering about the fate of Europe or Babe Ruth, a staunch little schooner, the Bowdoin, true to name, is sturdily battling her way to the North Pole, not so much to do what others have done but to do what never has been done—solve the mystery of the Aurora Borealis or Northern Lights in relation to Radio. What her personnel, including Donald B. McMillan (picture above), captain, and Donald H. Mix, Radio operator, may learn under the polar skies, what they may tell the world as the Aurora Borealis and its effect on Radio, may revolutionize or upset many scientific theories. The crew of the Bowdoin, who regularly are airphoning their progress to the States day by day as they make their way through the ice fields, find their receiving apparatus a great source of entertainment as well as service. Many of the big American broadcasters are heard regularly, according to dispatches © U. & U.

Listener in Frees Youth from Prison

Fine of Boy Trombonist, Held for Speeding in Fort Worth, Paid by Radiophan

FORT WORTH, Tex.—Radio recently added another accomplishment to its list when it rescued an unfortunate trombonist repining in the local jail.

The Rotary Boys Band of this city was booked for the Friday night concert at WBAP, the Star Telegram station, but when 9:30 o'clock rolled around the director was missing. He came in a few minutes later saying one of the lead trombone players, a fifteen-year-old boy, had been "pinched" for speeding and the stern minions of the law at headquarters would not release him. An offer of Director King's check was spurned as was the offer of the Radio Department to guarantee the boy's bond, King said. Nothing but twenty iron men from Uncle Sam's Treasury would satisfy "the law" and the boy must remain in jail until it was paid, was the dictum.

Broadcast Plight

It was already twelve minutes past starting time at WBAP, so Director King started the music without the trombone player and the situation was broadcast to fans.

Charley Fowler, local Radiophan, reposing in the most comfortable position in the hot weather, with an electric fan at his elbow and the phones securely lashed on his head, heard the sad plight of the trombone player broadcast and rushed "to the rescue" in his automobile. The relief expedition, headed by Fowler, arrived at headquarters, paid over the twenty and the boy departed from his room at the City Hotel.

Air-Borne Appeals Help Oklahoma Flood Victims

When Telegraph and Telephone Fail, Radio Saves Many

SAND SPRINGS, OKLA.—Sticking to their Radio sets for three days and nights during the recent unexpected rise of the Arkansas River, Radio amateurs in this vicinity recently maintained communication between this place and Tulsa when floods swept a large section of Tulsa County.

The towns are connected normally by electric interurban, four telephone lines and the telegraph wire, but all were down except the latter and one telephone line. Scores of refugees who frantically besieged local telephones had to wait three hours before they could get a call, although the distance is only seven miles.

H. H. Friend, member of the American Radio Relay League, offered to send messages through by Radio, also bulletins on the rise of the river for the daily newspapers at Tulsa. He got in touch with R. U. McKinney, 5SG, and J. B. Lewis, 5WX, at Tulsa, also E. W. Abrey, 5GA, at Osceola, Ark. The first night the amateurs kept fifteen-minute schedules until 2 a. m. and the next two nights forty-minute schedules until after midnight.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390	.....	10:00- 2:00	.....	10:00- 2:00	.....	10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-11:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	7:15- 9:30	.....	.....	.....
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	.....
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:25-10:55	.....	.....	.....	9:25-10:55	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	7:00-12:00	7:00-12:00	7:00-12:00	7:00-12:00	7:00 12:00	7:00-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30-11:00	7:30- 9:00	.....	6:30- 7:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

London newspapers, as a rule, express the opinion that broadcasting helps rather than hinders the entertainment business as carried on in theaters and public halls.

FINE PROGRAM MARKS WOR, ONE YEAR OLD

Station in Newark Celebrates Anniversary with Notables

NEWARK, N. J.—An elaborate celebration marked the first birthday recently of WOR, the popular station of L. Bamberger & Company of this city. Two all-star programs were staged in which over a score of head-liners participated. In the afternoon there was a special Radio matinee of Broadway's latest and greatest musical-revue success, "Adrienne," in which Louis F. Werba presented Vivienne Segal, Richard Carle, Billy B. Van, a dozen other New York favorites and "the most animated chorus in the world." All of the charming features of Mr. Werba's huge production that were especially suitable for broadcasting were given and the principal comedians, Van and Carle, ably interpolated extra stunts written for this, their initial Radio "appearance" together.

In the evening program there were short addresses appropriate to the occasion by Gov. George S. Silzer of New Jersey; Frederick C. Breidenbach, mayor of Newark; U. S. Senator Edward I. Edwards of New Jersey and U. S. Senator Royal S. Copeland of New York.

In addition to the officials' talks there were speeches by Melville E. Stone of the Associated Press, Will H. Hays, director general of the moving picture industry, and Dr. Lee de Forest, inventor of the audion tube and the father of broadcasting.

Philadelphia Air Wedding Lags as Best Man Forgets

PHILADELPHIA.—This city had its second Radio wedding within one month recently when Miss Sarah Olsen became the bride of Alfred W. Ogden, at Station WDAR. Mr. Ogden is pianist and violinist of the station. Fans were kept waiting "on the air" for about one-half hour because John W. Nagle, Jr., best man, forgot that he had promised to call for Magistrate Atkinson Costello, who performed the ceremony. After the marriage ceremony, the groom stepped up to the microphone and invited everybody listening in to attend the wedding reception.

New Rules Benefit Amateurs

WASHINGTON.—The Department of Commerce has authorized a broadcaster band of wave lengths for general and restricted amateur stations, and created a new class of amateur operator's license to be known as Amateur Extra First Class.

NEW YORK, N. Y.—The Benny Leonard-Lew Tendler fight was handed Radio and fight fans recently through Station WJZ, this city, direct from the Yankee Stadium where the bout took place.

FAN MODIFIES ULTRA REINARTZ; LIKES RESULTS

THERE is always a certain amount of fascination, in changing a circuit around to see what happens. Sometimes the results are disappointing, and once in a while they surprise you. One fan tried it with the Ultra Reinartz and likes his revised set better, so here's his hook-up shown as RD-91.

The Ultra Reinartz articles started in the March 24 number. Since the same tuning unit as in the original was used, the illustration of the tuner is repeated with details for winding.

Fiber, bakelite or even cardboard tube can be used. The wire used in winding the tuning unit is Number 18 double cotton covered. In winding a spacing cord—any light-weight string or heavy thread will do—is kept between the turns of wire. Another method is to use some Number 20 bare copper wire, winding the two wires together. When finished, the tube and winding are given a coat of celluloid-acetone solution or other "dope." When this is dry, the bare copper wire is removed. This leaves the insulated winding fixed in position with even spaces and gives a minimum of between-turns capacity in the coil.

Turn Numbers and Taps

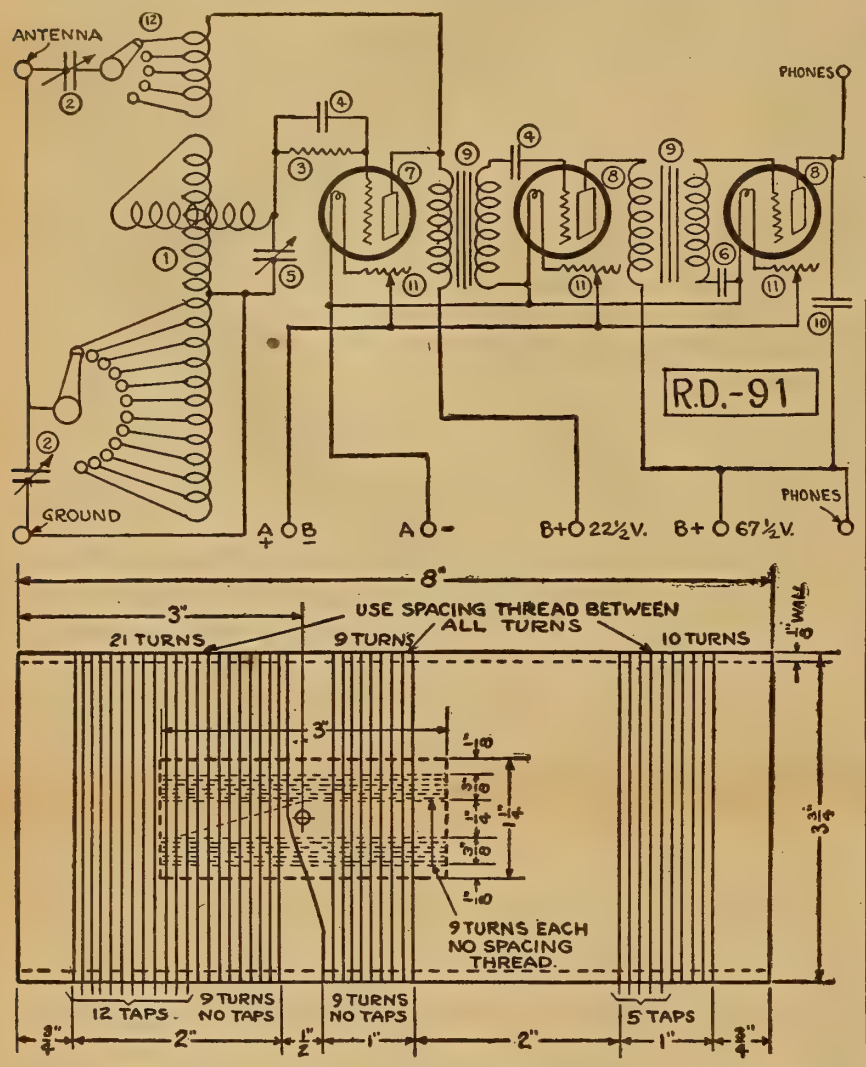
The primary winding starts with twelve turns tapped every turn. Then nine turns are wound without taps. After leaving a half-inch space nine more untapped turns are wound. The end of this winding is then connected with pigtail braid to the rotor winding.

The rotor winding consists of two sets of nine turns each, wound with Number 22 D.C.C. wire not separated by spacing thread. A quarter-inch space is left between the two sets of turns. The free end is connected to a terminal on the large tube by another pigtail connection.

Tickler Coil Winding

The feed back winding is spaced two inches from the finish of the last winding on the large tube. The first five turns are each tapped, but the last five are not.

All taps should be staggered around the tube so that sufficient clearance will be had for making soldered connections to the contact points of the switches without crossing and touching of the leads.



Identification of Parts

No. 1 is the tuning unit, No. 2 are both .001 mfd variable condensers, No. 3 one megohm grid leak, No. 4 are two .00025 fixed condensers, No. 5 is a .00005 mfd variable condenser, No. 6 is a .00015 mfd fixed condenser, No. 7 is a detector vacuum tube, No. 8 are two amplifying vacuum tubes, No. 9 are two audio frequency transformers. No. 10 is a .002 mfd fixed condenser. No. 11 are three rheostats suited for the tubes used. No. 12 is the tickler winding on the tuning unit.

This circuit is very selective and has no body capacity.

Blind Farmer's "Canned" Music Broadcast by WSB

Virginian's Old Tomato Containers Carry Sounds on Air

ATLANTA, GA.—Real "canned" music was recently broadcast by WSB, the Atlanta Journal, for the first time in history.

Lambdin Kay, announcer for the station, is the discoverer of the music, and Jafes Dunsford, a blind Virginian farmer, is the man who made the harmony. Kay stopped before a crowd congregated around Dunsford, who had announced he was about to give a concert.

"What do you play?" the blind musician was asked.

"Tin cans," he replied, and from a worn and tattered haversack he drew two pint-sized tomato cans. Each had two right angle slits in the top and from four prongs thus formed, Dunsford began to pick melodies. His repertoire consists of anything from the "St. Louis Blues" and "Yes, We Have No Bananas," to the sextet from "Lucia."

Kay says the blind musician just naturally made the old tomato cans talk, and accordingly he was put on the air by the popular southern broadcaster.

Vaudeville Theater Picks Up "Hermit Show" Tunes

CLEVELAND, O.—The Hermit club orchestra, under the direction of Frank B. Meade, was the attraction which kept local Radiophans delighted recently when Station WJAX of the Union Trust Company broadcast the Cleveland News concert.

It was an evening of tuneful music, some of which was heard at B. F. Keith's E. 105th street theater when the Hermits staged their annual play, "The Hermits in Mexico." Hits of former Hermit shows were played as well as numerous popular selections.

AMATEUR LOW WAVE AS GOOD AS LONG

LOS ANGELES 120-METER IS HEARD ALL OVER COUNTRY

Other Tests as to Length May Cause Further Changes in Making of Equipment

Will there be a scramble of all Radio interests to "get in" on the once supposedly worthless ether band below 150 meters wave length?

The onward march of Radio transmission has undergone so many changes within a period of mere months that even the most expert hesitate to express an opinion for fear of being called upon to retract. This has been true of most all predictions about the value of short waves.

In recent weeks there has been a great deal of comment on the possibility of long distance communication below 150 meters and it is only natural that the amateur should again demonstrate that he is the pioneer when it comes to this particular phase of Radio development.

During the recent short wave test under American Radio Relay League auspices, 6G1, an amateur station operated by A. Wade, of 465 N. Lake street, Los Angeles, Cal., transmitting on a wave length of 120 meters, was heard in every state in the union. This station holds the record for short wave transmission, the power being only five watts.

Other long distance records on short waves have been reported by amateurs who participated in the short wave tests. It would appear from this information that much better results can be obtained on 150 meters than is ordinarily the case on 200 meters, the band commonly used by amateurs.

As the more powerful commercial stations operate on wave lengths between 1,000 and 25,000 meters, the short wave tests are an indication that the most successful Radio transmission will be at the two extremes.

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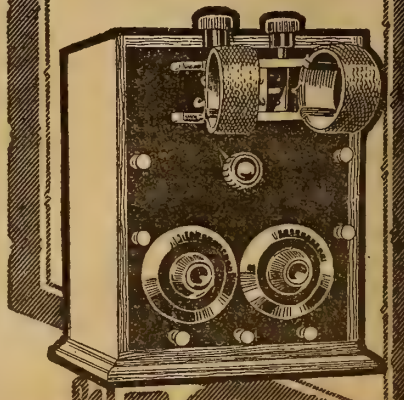
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The Week's Advance Broadcast Programs

Tuesday, July 31

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Mirella," Star Orchestra; "Sunday," Mary Bothwell, contralto; "The Blue Danube," Orchestra; "From the Canebrake," Mannie Roth, violinist; "Solveig's Song," Orchestra; "In Summer Fields," Mary Bothwell; Harry Adaskin, violinist; "Saphic Ode," Mary Bothwell; "Mignon," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, Ethel Edwards, soprano; James Traynor, first tenor; George Hurrell, second tenor; Evan Lloyd, baritone; Clarence E. Drylie, bass.

KGW (Pacific, 492), 3:30-4:00 P. M., Talk, Jeanette P. Cramer, Home Economics Editor of The Oregonian; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program, Don Mulligan and his original compositions.

KSD (Central, 546), 8:00 P. M., Concert, Grand Central Theater talent.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, Lithuanian music; M. Janauskas, soprano; J. Ramanauskas, tenor; K. Sabonis, baritone; J. Byanskas, pianist; A. Olis, pianist; 8:05 P. M., Book review, Llewelyn Jones.

WBAP (Central, 476), 9:30-10:45 P. M., Concert, Fred Cahoon's Texas Hotel Orchestra.

WBZ (Eastern, 337), 6:40 P. M., Talk, "Modern Bank Service." Member of Springfield National Bank; Talk, "Joy in the Underworld," Joseph Taylor, ex-bandit; **7:00 P. M.,** Concert, Maurice Freedman's Ensemble.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Children's Hour; 4:30-5:55 P. M., Song recital; Talk, "Affairs of the Heart," Betsy Logan.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Henderson's Happy Six; Thomas Waller, pianist; Trixie Smith and her Down Home Syncopators; Rosa Henderson, Roland Irving, entertainers; Talk, "The Reason Why," Floyd G. Sneldon, editor of "The Tattler;" Trixie Smith; Henderson's Happy Six.

WFAA (Central, 476), 12:30-1:00 P. M., Address, DeWitt McMurray; 8:30-9:30 P. M., Musical program, Horace Adams, violinist, and assisting musicians; 11:00-12:00 P. M., Concert, R. W. Trowbridge's Saxophone Quartet; Krause's Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00 P. M., Bedtime stories, Cousin Sue; 8:00 P. M., Boy Scout Radio Corps; Song and piano recital; 10:30 P. M., Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; 3:00 P. M., "Hospitality Talk," Ida Bailey Allen; 5:00 P. M., "Skalalatoot Stories," George Ernst; 8:30 P. M., Business report, Roger W. Babson; Talk, "Bits of Wisdom," George Brinton Beal; Musical program.

WGY (Eastern, 380), 7:45 P. M., Musical program, "The Sea Hath Its Pearls," Mixed Quartet; "For You," Charles Selter, tenor; "Sweetest Story Ever Told," Mildred Schilling, soprano; Marvin J. Roeck, baritone; "A Cradle Song," "I'm Wearing Awa'," Theresa Milne, contralto; "American Beauties," "Romance of a Busy Broker," Ruth Schilling, reader; "Moonlight," Mixed Quartet; "Two Grenadiers," "A Love Song," Marvin J. Roeck, baritone; "Some Day Again," Theresa Milne, Charles Selter; "The Singer," "I Heard You Go By," Mildred Schilling; "When the Heart Is Young," Mixed Quartet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Musical program, Carolyn Pell, soprano; Mrs. Edwin Horn, contralto; Al G. Crowder, George L. Gephart, banjoists; Byron Holloway, baritone; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00 P. M., Artist recital; 6:00 P. M., Dinner music, WIP Little Symphony Orchestra, Dick Regan, director; 7:00 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Short talk; 8:15 P. M., Artist recital; 8:45 P. M., Short talk; 8:55 P. M., Dance music; 10:00 P. M., Song recital.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Musical program, "The Lazy Song," Sara Frances Johnston, singer; "Serenade," "Fairy Sailing," Mrs. Lucy McKeever, violinist; "Aida's Death," "Solsagdeico," Robert Trendler, pianist; Mrs. Emma Klein, reader; "Trinity Chimes," Irene Carter, pianist; "My Birthday," Sara Frances Johnston; "La Gitana," Mrs. Lucy McKeever; "My Eyes Have Told You So," Dr. A. W. Ganzel, singer; "Waltz in C Sharp Minor," Irene Carter; the Circle Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program by Grenn Dillard Gunn School of Music; 7:00 P. M., Babson report; Lesson in Syncopation, Axel Christensen; Talk on Home Economics.

WOC (Central, 484), 3:30 P. M., Educational Talk, A. G. Hinrichs; 5:45 P. M., Chinese concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital; Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; Town Crier; Lucile Lincoln, soprano; Aloha Trio; Alf D. Fleming, baritone.

Wednesday, August 1

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "La Source," Star Orchestra; "Daffodils a-Blowing," Kathleen Monk, soprano; "Mystic Beauty," Orchestra; "The Rosary," Harry Adaskin, violinist; "Extase," Orchestra; "In the Time of Roses," Kathleen Monk; "Old Refrain," Harry Adaskin, violinist; "The Fairy's Lullaby," Kathleen Monk; Selections from "Erminie," Orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert, KDKA Orchestra; Chauncey Parsons, tenor; Leora Sage McKennan, soprano.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's hour, Aunt Nell; **8:00-9:00 P. M.,** Musical progrma; **10:00-11:00 P. M.,** Dance program, George Olsen's Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's hour, "Uncle John;" 8:00-10:00 P. M., Musical program, Gladys G. Hill, soprano; Otto Ploetz, tenor.

KSD (Central, 546), 8:00 P. M., Concert, Letter Carriers' Band, J. H. McClure, director.

KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, under auspices of Inland Electric Company; Cope Harvey's Orchestra; Herbie Mintz, pianist.

WBZ (Eastern, 337), 7:00 P. M., Concert, William Tilton, bass; Mrs. Percy P. Fletcher, soprano; Stanley Fletcher, pianist; WBZ Trio; **8:20 P. M.,** Bedtime story for Grown-ups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; **4:30-6:00 P. M.,** Song recital; Talk, "Affairs of the Heart," Betsy Logan; **7:30-8:00 P. M.,** Bedtime stories, Dream Daddy; **8:00 P. M.,** Features from Stanley Theater; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Luckey Roberts and Mrs. Luckey Roberts, singers; Paul Pass, singer; **7:00 P. M.,** Musical program, "Calm as the Night," "Deep River," John Eckles, tenor; "The Dance of Desire," "Dance of the Reed Flutes," Hazel Thomas, pianist; "Just a Little House of Love," "Where My Caravan Has Rested," Blanche Smith-Eckles, soprano; "Scherzo Tarantella," "Ave Maria," Errington Kerr, violinist; "Celeste Aida," "The Star," John H. Eckles; "Bamboola," "Polonaise in E Major," Hazel Thomas; "Madame Butterfly," "Elegy," Blanche Smith-Eckles; "The Goblin Dance," "Eili, Eili," Errington Kerr.

WFAA (Central, 476), 12:30-1:00 P. M., Talk, "Co-operative Cotton Marketing," John T. Orr, president Texas Farm Bureau Ass'n.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 8:30 P. M., Talk, "Science Up to Date," Scientific American; Musical program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Manning's Hawaiian and Jug Orchestra; Address, Major L. L. Pendleton; O. E. Ves Sells, baritone; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; **6:00 P. M.,** Dinner dance music; **7:00-7:30 P. M.,** Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00 P. M., Musical program; Accordion solos, Salvador Ercoline; "I Want the Moon," "That Lullaby Croon," LaVergne Sims, singer; Mandolins and guitar trio, Mrs. Nellie Fuerstenberger and son and Hazel Jacobs; "Uncle Harry's Laughing Comedy," Harry Brockmeyer; Mrs. Alma Jackson, pianist.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program by Cosmopolitan School of Music; **7:00 P. M.,** Stories, Georgene Faulkner; Mr. and Mrs. Paul G. Hummel, pianist and soprano; **9:15 P. M.,** Concert, LaSalle Roof Garden Orchestra.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde G. Kern; **8:00 P. M.,** Organ recital, Erwin Swindell; **10:00 P. M.,** Musical program, Mrs. Sam Erwin, soprano; A. H. Lovett, baritone; Catherine O'Brien, reader; Howard Snyder, pianist; Mae Marshall, soprano; Hans Mettke, 'cellist.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45 P. M., Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; Town Crier; Concert, Schmeman's Band.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, August 2

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "English Airs," Star Orchestra; "Go to Sea," Arthur Fisher, baritone; "Song Without Words," Jaques Sterin, 'cellist; "Narcissus," Orchestra; Arthur Fisher, baritone; "Three Irish Pictures," Orchestra; "Aria," Jaques Sterin; "The Windmill," Arthur Fisher; Selection from "Floradora," Orchestra.

(Continued on page 9)

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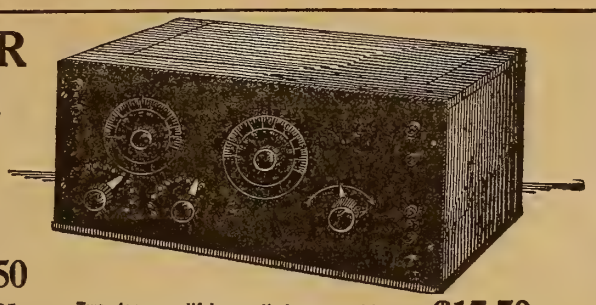

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Fisher	5.00	1.95
Raven	5.00	1.95
Tuska with Dial	6.00	2.95
Pathe	6.00	2.95
Columbia	6.50	3.95
Workrite	6.00	2.95
Eagle Bakelite	8.50	4.95
Fisher, Large	6.50	2.95
Pearlco Bakelite	6.50	4.45
VARIABLE CONDENSERS (Moulded Ends)		
3 Plate	2.00	1.25
11 Plate	3.50	1.75
17 Plate	4.00	1.95
23 Plate	4.00	1.95
43 Plate	5.00	2.25
11 Plate Vernier	6.00	3.25
17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
43 Plate Vernier	7.50	3.95
"B" BATTERIES		
EVEREADY—No. 763—22½ Volts	$1.75	$1.45
EVEREADY—No. 767—45 Volts	5.50	4.50
BRIGHT STAR—No. 15-50—22½ V.	1.75	1.10
BRIGHT STAR—No. 15-03-6—22½ V.	2.25	1.45
BRIGHT STAR—No. 30-90—45 Volts	5.00	3.50
FRANCO—No. 1529V—22½ Volts	2.50	1.85
FRANCO—No. 3045V—45 Volts	5.75	3.95

SETS	List Price	Our Price
Aeriola Jr. (Westinghouse)	18.00	5.95
Cutting & Washington 3-Tube Type II	125.00	55.00
Tuska Regenerative	35.00	22.50
Crosley Regenerative	....	19.00
Crosley 2-Step Amplifier	....	17.00
2-Step Amplifier, Assembled	....	11.95
General Radio 1-Step Amplifier	8.00	6.95
LOUD SPEAKERS		
Magnavox Type R3	35.00	24.95
Atlas	25.00	17.50
Western Electric	55.00	Special
Music Master	30.00	24.95
Wooden Horn	8.50	5.75
Aluminum Horn	10.00	4.95
TUBES		
UV-199, UV-201-A, WD-12, WD-11, All Genuine	....	5.75
VT-2 Western Electric	....	7.95
De Forest DV-6	....	3.75
UV-200	....	4.50
De Forest DV-6A	....	4.75
COMPLETE PARTS FOR		
Flewelling Circuit	....	13.95
Reinartz Circuit	....	11.95
Neutrodyne Circuit	....	35.00
Cockaday	....	13.95
2-Step Amplifier	....	9.95
Fada Neutrodyne Parts	....	25.00

PANELS—3/16" Thick

	Hard Rubber	Hard Bakelite		Hard Rubber	Hard Bakelite
7x10	$0.95	$1.35	7x18	$1.65	$2.45
7x12	1.25	1.60	7x21	1.85	2.75
7x14	1.40	1.95	7x24	2.15	3.25

CABINETS

Extra fine quality—Hinged top—Mahogany finish.

7x10	$2.75	7x18	$3.50
7x12	2.95	7x24	3.95
7x14	3.25	12x14	3.95

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PHONES	For Parcel Post Ins. Add
Dietzen 3,000 Ohm	$3.75 $0.12
Holtzer Cabot, Universal Type	7.95 .14
Brandes	5.75 .14
Dictograph	5.75 .14
COUPLERS	
Ames Variocoupler	2.45 .12
VARIABLE CONDENSERS	
Dietzen 14-Plate Vernier	2.65 .14
Dietzen 24-Plate Vernier	2.95 .16
Dietzen 46-Plate Vernier	3.45 .18
Murdock 43-Plate	3.45 .18
TRANSFORMERS (Audio Frequency)	
Dietzen	3.45 .12
Sampson	4.95 .14
Ames 4½ to 1	2.95 .12
TRANSFORMERS (Radio Frequency)	
Cotoco	2.45 .12
Owl	.95 .10
MISCELLANEOUS	
Ritter Portable Loop	1.00 .10
Argus Lightning Arrester	.95 .09
Welsh Peanut Tube	2.00 .08
Peanut Tube Socket	.50 .03
Switch Lever, Fada Type	.19 .06
Ammeter Testing B Battery	.49 .08
Two Slide Tuning Coil	1.25 .12
Hydrometers	.49 .08
Double Phonograph Attachment	.95 .08
Cockaday Coil	2.25 .14
2 Coil Honeycomb Mounts	2.95 .12
Wave Trap	4.95 .15
Electric Soldering Iron	3.95 .15
100 Feet Copper Antenna Wire	.39 .08
RHEOSTATS	
Bradleystat	1.49 .10
SOCKETS	
Bell V. T. & W. D. 11	.89 .10
V. T. Bakelite	.50 .10
DIALS	
2-inch	.25 .06
3-inch	.35 .08
4-inch	.49 .08

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Radiophone Broadcasting Stations

Corrected Every Week—Part III

(Note.—The third part of the schedule list appears and is completed below. The fourth part consists of the state, city-station index and will appear next week.)

WJAZ, Chicago, Ill. 448 meters. 1,500 mi. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex. Sun. 10 pm-2 am, music, entertainment. Sun, 5-8 pm, concert. Central Daylight Saving.
WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.
WJH, Washington, D. C. 273 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.
WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.
WJY, New York City. 405 meters. 1500 mi. R. C. A. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.
WJZ, New York City. 455 meters. 1500 mi. R. C. A. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11 pm, special program. Sun, 10:30 am-1 pm, church service; 8:30-10:30 pm. Eastern Daylight Saving.
WKAA, Cedar Rapids, Ia. 360 meters. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.
WKAC, Lincoln, Neb. 275 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.
WKAD, East Providence, R. I. 240 meters. Charles Looff.
WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.
WKAN, Montgomery, Ala. 360 meters. 200 mi. Alabama Radio Mfg. Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.
WKAP, Grandston, R. I. 360 meters. Wilcox Flint.
WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 11 pm-12:30 am, entertainment. Intercolonial.
WKAR, East Lansing, Mich. 280 meters. Mich. Agri. College.
WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri, Sat, 8-9:15 pm, music. Central.
WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.
WKAW, Beloit, Wis. 226 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.
WKAX, Bridgeport, Conn. 231 meters. 75 mi. Wm. A. Macfarlane.
WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.
WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern Daylight Saving.
WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 7:30 pm, sports; 9-11:30 pm, "Raven Frolic." Central.
WL2, Fairfield, O. 360 meters. U. S. Army.
WLAC, Raleigh, N. C. 360 meters. N. C. State College.
WLAG, Minneapolis, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Slogan, "The Call of the North." Club, "Tooth Brush." Daily ex Sun, 8:30, 9, 9:30 am, 10:10, 10:30, 12:30, 1:30, 3:30 pm, reports; 7 pm, children's hour; 7:30-8:30, lecture. Daily ex. Wed, Sun, 8:30-10 pm, concert. Sun, 10 am, church services; 4 pm, concert; 5, children's hour; 7:30 services. Central.
WLAH, Syracuse, N. Y. 234 meters. 900 mi. Samuel Woodworth. No regular schedule.
WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.
WLAK, Bellows Falls, Vt. 360 meters. Vermont Farm Machine Co.
WLAL, Tulsa Radio Co. 360 meters, Tulsa, Okla.
WLAN, Houlton, Me. 360 meters. Putnam Hdwe. Co.
WLAP, Louisville, Ky. 360 meters. W. V. Jordon.
WLAQ, Kalamazoo, Mich. 244 meters. 100 mi. A. E. Schilling. No regular program. Central.
WLAT, Burlington, Ia. 360 meters. Radio and Specialty Co.
WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.
WLAW, New York, N. Y. 360 meters. New York Police Dept.
WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)
WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.
WLAZ, Warren, O. 100 mi. 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.
WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sat, 2 pm, special. Sun, 9:30-11 am, church services. Central Daylight Saving.
WMAC, Cazenovia, N. Y. 261 meters. 500 mi. C. B. Meredith. No definite schedule.
WMAD, Rock Port, Mo. 360 meters. Atchinson County Mail.
WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp. Slogan, "From the Land of the Pilgrim Fathers."
WMAH, Lincoln, Neb. 341 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central.
WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun. 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.
WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.
WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.
WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.
WMAN, Columbus, O. 286 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.
WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.
WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Central Daylight Saving.
WMAT, Duluth, Minn. 266 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.
WMAV, Aubu.n, Ala. 250 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7:30-8:30 pm, music. Central.
WMAW, Wahpeton, N. D. 360 meters. 50 mi. Wahpeton Elec. Co. Daily, 5:45 pm, sports, news. Fri, 10-11 pm. Central.
WMAY, St. Louis, Mo. 360 meters. 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.
WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.
WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC, Memphis, 'Down In Dixie.'" Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8 music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.
WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.
WMU, Washington, D. C. 262 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.
WNAB, Bowling Green, Ky. 360 meters. 500 mi. R. D. Nichols. Daily ex Tues, 4-5 pm, 7:30-9, music. Central.
WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Mon, Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.
WNAD, Norman, Okla. 360 meters. 200 mi. Okla. Radio Engineering Co. Daily ex Sun, 7:45-8:15 pm, news. Central.
WNAL, Omaha, Neb. 360 meters. R. J. Rockwell.
WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.
WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.
WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.
WNAR, Butler, Mo. 360 meters. C. C. Rhodes.
WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)
WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern Daylight Saving.
WNAV, Knoxville, Tenn. 360 meters. 1,000 mi. People's Tel & Telg Co. Tues, Thurs, Sat, 9-11:30 pm, concert. Sun, 10:30-12 am; 7:30-8:30 pm. Central.
WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.
WNAX, Yankton, S. D. 236 meters. Dakota Radio Apparatus Co. Daily, 10 am, reports. Wed, Sat, 9-10 pm, music. Central.
WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.
WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun. 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.
WNO, Jersey City, N. J. 360 meters. Wireless Telephone Co. of Hudson Co., N. J.
WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.
WOAB, Grand Forks, No. Dak. 50 mi. 360 meters. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.
WOAC, Lima, O. 266 meters. Maus Radio Co.
WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.
WOAE, Fremont, Nebr. 360 meters. Medland College.
WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun. 12 m, weather, markets; 7 pm, weather, codes; 10:15. U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.
WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.
WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.
WOAI, San Antonio, Tex. 385 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 7, news, markets. Tues, Sat, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 5-6 pm, concert. Central.
WOAJ, Parsons, Kans. 258 meters. 50 mi. C. E. Erwin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.
WOAK, Frankfort, Ky. 240 meters. Collins Hardware Co.
WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.
WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.
WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.
WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.
WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.
WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.
WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.
WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Wed, 8:30-10 pm, music. Fri, 9:15-10:45 pm, music. Sun, 7:45 pm, church services. Eastern.
WOAW, Omaha, Nebr. 526 meters. 1,000 mi. Woodmen of the World. Slogan, "Gateway to the East and West." Mon, Tues, Thurs, Fri, Sat, 9 pm, concert. Sun, 9:30 am, 9 pm, church services. Central.
WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.
WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.
WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.
WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.
WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.
WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12-1 pm, concert; 4:45 pm, organ recital; 10:55, time; 11:02, weather. Mon, Fri, 7:45-11 pm, music, concert. Eastern, Daylight Saving.
WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Sat, 8 pm, concert. Sun, 7 pm, concert.
WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern Daylight Saving.
WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.
WOV, Omaha, Neb. 360 meters. R. B. Howell.
WPAB, State College, Pa. 360 meters. Pa. State College.
WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.
WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, music. Mon, 6:30-7 pm. Tues, Thurs, 8-9 pm, concert. Wed, Thurs, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.
WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.
WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.
WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.
WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.
WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.
WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.
WPAM, Topeka, Kans. 360 meters. Awerbach & Guet
WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.
WPAR, Beloit, Kans. 50 mi. 360 meters. R. A. Ward. Fri, 8 pm, entertainment. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.
WPAS, Amsterdam, N. Y. 360 meters J. & M. Electric Co.
WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.
WPAU, Moorhead, Minn. 360 meters. Concordia College.
WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.
WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.
WPI, Clearfield, Pa. 360 meters. Elec. Supply Co.
WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.
WQAB, Springfield, Mo. 236 meters. Southwest Missouri State Teachers College.
WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.
WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.
WQAE, Springfield, Vt. 275 meters. 300 mi. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Daily, 7-7:30 pm. Sun, 2:30-4:30 pm. Eastern.
WQAF, Sandusky, O. 240 meters. Sandusky Register.
WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.
WQAJ, Ann Arbor, Mich. 360 meters. Ann Arbor Times News.
WQAK, Dubuque, Ia. 360 meters. Appel-Higley Elec. Co.
WQAL, Mattoon, Ill. 258 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.
WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.
WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.
WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern Daylight Saving.
WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.
WQAQ, Abilene, Tex. 360 meters. 300 mi. Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.
WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.
WQAT, Richmond, Va. 360 meters. 200 mi. Radio Equipment Corp. Daily ex Sun, 2-5:15 pm, music. Sun, 3-5 pm. Eastern.
WQAV, Greenville, S. C. 258 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.
WQAW, Washington, D. C. 236 meters. Catholic University of America.
WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.
WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.
WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.
WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.
WRAD, Marion, Kans. 360 meters. Taylor Radio Shop. Daily, 12-12:45 pm, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.
WRAF, La Porte, Ind. 224 meters. Radio Club, Inc.
WRAH, Providence, R. I. 360 meters. Stanley N. Read.
WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.
WRAN, Waterloo, Ia. 229 meters. 100 mi. Black Hawk Electrical Co. Daily ex Sun, 5 pm, 5:30, concert, news. Mon, Fri, 8:30-9:15 pm, concert. Sun, 11:15, church services. Central.
WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.
WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.
WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.
WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.
WRAV, Yellow Spring, O. 360 meters. Antioch College.
WRAW, Reading, Pa. 238 meters. Horace D. Good.
WRAX, Gloucester City, N. J. 268 meters. Flexon's Garage.
WRAY, Scranton, Pa. 280 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15-11:30 pm, music. Sun. 4 pm, chapel. Eastern.
WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Wed, Sat, 9-11 pm, music, lecture. Sun, 2-4 pm, music. Central.
WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.
WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.
WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.
WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.
WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.
WSAA, Marietta, O. 360 meters. 50 mi. B. S. Sprague Elec. Co. Wed, 7:30 pm. Eastern.
WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.
WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.
WSAD, Providence, R. I. 261 meters. J. A. Foster Co.
WSAG, St. Petersburg, Fla. 244 meters. Loran V. Davis.
WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.
WSAI, Cincinnati, O. 309 meters. United States Playing Card Co. Tues, Thurs, 8-10 pm. Sat, 10-12 pm. Eastern.
WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.
WSAK, Middleport, O. 258 meters. The Daily News.
WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.
WSAN, Allentown, Pa. 229 meters. Allentown Radio Club.
WSAP, New York, N. Y. 263 meters. Seventh Day Adventist Church. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.
WSAQ, Dartmouth, Mass. 280 meters. Round Hills Radio Corp.
WSAR, Fall River, Mass. 254 meters. Doughty & Welch Elect. Co.
WSAT, Plainview, Tex. 268 meters. Plainview Elect. Co.
WRAZ, Newark, N. J. 233 meters. Radio Shop of Newark.
WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music; 2:30, reports; 4-4:45 pm, music, reports; 5-6 pm, 7-8, 10:45-12, music. Sun, 10:54 am, 5-6 pm, 7:30-9, church services. Central.
WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.
WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Sun, 11 am, 7:30 pm, church services. Central.
WTAB, Fall River, Mass. 248 meters. Fall River Daily Herald.
WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.
WTAG, Providence, R. I. 258 meters. Kern Music Co.
WTAK, Steubenville, O. 266 meters. The Swan-Bower Co.
WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.
WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.
WTAW, College Station, Tex. 254 meters. 200 mi. Agricultural and Mechanical College of Tex. No regular schedule. Central.
WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.
WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.
WWAD, Philadelphia, Pa. 360 meters. Wright & Wright, Inc.
WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.
WWB, Canton, O. 268 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.
WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.
WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.
WWL, New Orleans, La. 360 meters. Loyola Univ.
WYG, San Antonio, Tex. 1,500 mi. U. S. Army. Kelly Field. No regular schedule.
6KW, Tuincucu, Cuba. 315 meters. 1,500 mi. Frank H. Jones. Slogan, "If you hear the koo of the cuckoo you are in tune with Tuincucu." Mon, Tues, Thurs, Sun, 9 pm, music. Central.

(Note.—This completes the station schedule list. The fourth part of the directory consists of the state, city-station index, and will appear next week.)

FLEWELLING ANSWERS

(Continued from page 4)

in connection with a loop, using either the inductance coil in connection with the loop or tuning the loop alone, as shown in Figure 2.

It will be noticed that in this diagram

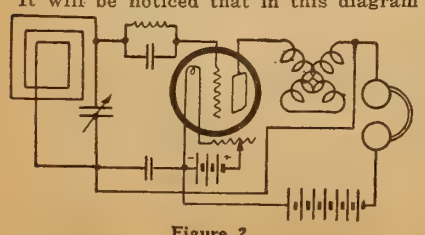

Figure 2

the tuning condenser is shown in multiple with the loop. This is simply a matter

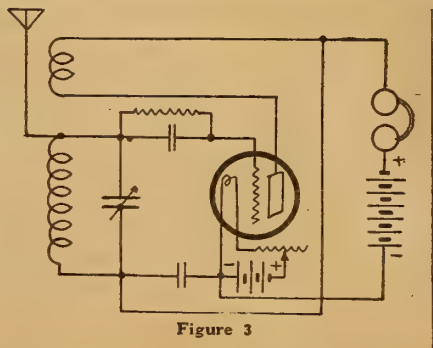

Figure 3

of proper tuning; it is easy to conceive of conditions where the condenser might be in series with the loop. For those who prefer to do without an outdoor antenna we may say that very wonderful results have been reported in relation to this circuit.

Then there is the original honeycomb tuned inductance tickler circuit, using either a honeycomb coil or tapping the coil for various tuning adjustments. This is shown in Figure 3.

Another type of circuit that has been used successfully and for which the claim as to stability has been made is that one which uses a rotor ball revolving within a cylindrical tube. The entire plate winding may be placed upon the rotor ball or, if an attempt is made toward stability, half of the rotor winding is placed upon the ball and the other half upon the tube, next to the tuning inductance winding, thus giving a combination of tickler and variometer plate control. This, too, is shown in Figure 3. The wiring diagram is of course the same, the only change being mechanical.

Testing B Battery Voltage

In testing a B battery for voltage, do not leave the voltmeter on the terminals any longer than is absolutely necessary. This is a dead short circuit, and will use up the battery in a hurry. The same thing holds true of any testing with either voltmeter or ammeter. Always test the storage battery with a hydrometer for the best results. When the solution reads below 1,150 it is time to recharge, and when the reading reaches 1,250 or 1,300 it is time to stop the charge.

Vertical Position for Tubes

When planning a vacuum tube set, place the electron tubes in a vertical position, or so that the filament lies in a vertical plane. A tungsten filament will lengthen when heated, and the filament must be placed in such a position that the sag will not cause it to touch the grid of the tube.

ADVANCE PROGRAMS

(Continued from page 7)

KDKA (Eastern, 326), 7:20 P. M., Concert, Christine Adams, 'cellist; Helen McAneny, soprano; Lida Kiefer, accompanist.
KGW (Pacific, 492), 3:30-4:00 P. M., Child training program; 10:00-11:00 P. M., Dance music, George Olsen's Orchestra.
KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Musical matinee, Naomi Sweeney Brown; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.
KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, Lyon & Healy Concert Department; Cope Harvey's Orchestra; Herbie Mintz, pianist; 8:05 P. M., "Twenty Minutes of Good Reading," Rev. C. J. Pernin, Loyola University.
WBZ (Eastern, 337), 7:00 P. M., Concert, Charles O'Connell, pianist; Mrs. McGertie, soprano; Mrs. Fife Donnahue, 'cellist; 8:20 P. M., Bedtime stories for Grown-ups, Orison S. Marden.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital; Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; Feri Sarkozi, director; 2:00-3:00 P. M., Dinner music, Arcadia Cafe Concert Orchestra; Song recital; Talk, Betsy Logan; 4:30-6:00 P. M., Song recital.
WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical Program; Talk, "The American Officer," Claude Levine; Harry Roberts, pianist; Joe Hollander, singer; Harry Roberts, pianist.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "The Juror in the Court System," Hon. Towne Young, Judge Special District Court, Dallas County; 8:30-9:30 P. M., Concert, Gussie Montgomery's Harmony Six Orchestra.
WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Piano recital, Loretta Kerk; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00 P. M., Children's Own Half Hour, stories by Cousin Sue; 8:00 P. M., Concert.
WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 8:30 P. M., Radio talk, Rachel Thompson; Radio drama, Amrad Players.
WGY (Eastern, 380), 7:45 P. M., Musical program, "Mammy Land," Joseph Eichner's Melody Boys; "Tomorrow Morning," "When All the World Forgets You," Melody Boys; "I'm Drifting Back to Dreamland," James De Long, tenor; "While You Were Making Believe," Melody Boys; Address, "Silver Black Fox Farming," Perry A. Cole; "Who'll Take the Place of the Songbird Now Gone," Melody Boys; "Down in Picardy," Melody Boys; "Why Don't My Dreams Come True," James De Long, tenor; "Wet Yo' Thumb," "Rio Nights," Melody Boys; "Mother's Love," James De Long; "Old King Tut," "Faded Love Letters," Melody Boys.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Concert, Bel Canto Male Quartette; Katherine Hannon, reader.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz; Germantown Theater; 3:00 P. M., Song recital; 7:00-7:30 P. M., Bedtime stories, Uncle Wip; 8:00 P. M., Travel talk; 8:20 P. M., Dance music, Ten Virginians, Hotel Walton Roof Garden; 9:00-9:30 P. M., Organ recital, Karl Bonawitz, Germantown Theatre.
WJAX (Eastern, 390), 8:00 P. M., Concert, Gregory Zwinitzky, violinist; Harry Dunham, baritone; Helen Wilkom, soprano; Charles Ruetschi, pianist; Richard Kimball, tenor.
WLW (Eastern, 309), 10:00 P. M., Musical program, Ruth Heubach, soprano; Ed Decker, tenor; Irwin McConnell, pianist; Budd Rudd Collegian Dance Orchestra.
WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Program, Lyceum Arts Conservatory; 7:00 P. M., Talk, "Auto Trails," Rockwell Stephens; Mrs. Rose Samuels Sequin, soprano; 9:00 P. M., Concert, LaSalle Roof Garden Orchestra; Mrs. Eva Ray, soprano; Leonard J. Huber, baritone; Edward Schreiner, tenor.
WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., Song and piano recital; 8:45-10:55 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra; 11:00 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra.
WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; Schmeman's Band.

Friday, August 3

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Ruy Blas," Star Orchestra; "It Was a Dream," Ethel Cotteril, soprano; "In Old Vienna," Harry Adaskin, violinist; "Sans Souci," Orchestra; "She Wandered Down the Mountain," Ethel Cotteril; "Mazurka," Harry Adaskin; Selection from "Sometime," Orchestra; "A Perfect Day," Orchestra; "The Flight of Ages," Ethel Cotteril; March from "Tannhauser," Orchestra.
KDKA (Eastern, 326), 7:20 P. M., Concert, KDKA String Ensemble.
KGW (Pacific, 492), 3:30-4:00 P. M., Lecture, "Fires and Careless Campers," Shirley Buck, National Forest Inspector; 8:00-9:00 P. M., Vocal solos; George Olsen's Orchestra; 10:00-11:00 P. M., Dance program, George Olsen's Orchestra; 11:00-12:00 P. M., Hoot Owls.
KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.
KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater talent.
KYW (Central, Daylight Saving, 345), 10:00-11:30 P. M., Dance program, Cope Harvey's Orchestra; Herbie Mintz; Harry Geise.
WBZ (Eastern, 337), 7:00 P. M., Concert, Mrs. Gertrude M. Jenkins, contralto; Frances I. Bailey, violinist; Mrs. LaZazzera, accompanist; 8:20 P. M., Bedtime story for Grown-ups, Orison S. Marden.

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CHICAGO

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00 P. M., Musical program; Short Talks, 4:30 P. M., Song recital.
WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Harry Pease, Ed Nelson, singers; Jimmy Flynn, singer; Lewis Plotti, singer; Bob Miller, singer; Jack Val, pianist; 11:00-12:00 P. M., Musical program, Rome and Dunn, singers; Pianologue, Jack Smith; Orchestra; Kammnitz and Hall, entertainers; "Wet Yo' Thumb," Al Bellan, singer; "Bright Bits," Billy Gleason; Orchestra.
WFAA (Central, 476), 12:30-1:00 P. M., Address, "Mary Magdalene," Dr. Robert Stewart Hyer, Southern Methodist University; 8:30-9:30 P. M., Jewish Juniors, dramatic reading.
WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Recital; 6:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra.
WGI (Eastern, Daylight Saving, 360), 12:15 P. M., Organ recital, E. Lewis Dunham; Talk, "The Pushcart Vendor," Dorothy H. Goodwin; 5:00 P. M., Girls' Story Hour, Eunice L. Randall; 8:30 P. M., "Silversmith Series," David M. Cheney; Musical program.
WGY (Eastern, 380), 7:45 P. M., Musical program, Radio comedy, "Her Own Money." WGY Student Players; 10:30 P. M., Musical program, "Theme and Variations," Doris Francis, pianist; "Were You to Call," Isabel Franklin, soprano; "Indian Lament," William Helm, violinist; "Gavot-Musette," Doris Francis, Mrs. W. J. Loane, pianists; "April Ecstasy," "Dan Cupid," Isabel Franklin; "Song of India," William Helm; "Papillon," Doris Francis; "Pinin' Just for You," Isabel Franklin; "Serenata," "Viennois," William Helm.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00 P. M., Myrtle George Stinger, soprano; L. V. Davidson, Paul P. Martin, tenors; L. V. Davidson, saxophonist; Mary Bell Garrett, soprano; Reading, "An Interesting Historical Episode."
WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:00 P. M., Dinner dance music; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.
WMAQ (Central, Daylight Saving, 448), 7:00 P. M., Virginia Tidd, soprano; Talk, Hearing America First," Mrs. Marx E. Oberndorfer; 9:00 P. M., Concert, LaSalle Roof Garden Orchestra.
WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., Song and piano recital; 8:45-10:55 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra; 11:00 P. M., Dance music, Hotel Adelphia Roof Garden Orchestra.
WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30 P. M., Concert, News Orchestra; Schmeman's Band.

Saturday, August 4

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Cavalleria Rusticana," Star Orchestra; Kathleen Cameron, soprano; "The Swan," Jaques Sterin, 'cellist; "Air de Ballet," Orchestra; Kathleen Cameron, soprano; "Ritornell," Jaques Sterin; "Moment Musical," Orchestra; Kathleen Cameron, soprano; "Three Dances from Nell Gwynn," Orchestra.
KDKA (Eastern, 326), 7:20 P. M., Concert, Westinghouse Band, T. J. Vastine, director; Bert Mustin, fun maker.
KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, Aunt Nell; 10:00-11:00 P. M., Dance program, George Olsen's Orchestra.
KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 P. M., Musical matinee; 6:45-7:30 P. M., Children's Hour, "Uncle John;" 8:00-10:00 P. M., De Luxe program.
KYW (Central, Daylight Saving, 345), 7:00 P. M., Musical program, National School of Music; "Invictus," The Kappa Alpha Psi Four; "Love's Old Sweet Song," The Ladies' Singing Four; "Thora," Aubrey B. Hawkins, tenor; "Mister Mocking Bird," The Fulton Four; "Habanera," from "Carmen," Mme. Camille Cohen-Jones, soprano; "Song of the Toreador," from "Carmen," Emmitt G. Berger, baritone; Cope Harvey's Orchestra; Cornella Lampton, pianist; "Jesus Is Coming Soon," W. C. Mason, baritone; "Negro Spiritual," Foulton Four; "La Donna Mobile," from "Rigoletto," Lawrence Lomax, tenor; "Battle Hymn," Kappa Alpha Psi Four; 8:00 P. M., "Under the Evening Lamp," Youth's Companion.
WBAP (Central, 476), 7:00-7:30 P. M., Sunday School Lesson, Mrs. W. F. Barnum.
WBZ (Eastern, 337), 7:00 P. M., Concert, Raymond Le Doux, violinist; Frances E. White, reader; M. Frank Regnier, baritone; Mrs. A. W. Mosher, pianist; 8:20 P. M., Bedtime story for Grown-ups, Orison S. Marden.
WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Musical program, Fletcher Henderson, pianist; Edna Hicks, singer; Emma Gover, singer.
WFAA (Central, 476), 12:30-1:00 P. M., Address, Prof. Clyde Eagleton, Southern Methodist University; 8:30-9:30 P. M., Concert, Texas, Band; 11:00-12:00 P. M., Musical program, J. W. Hubbell, tenor; David Gulon, pianist.
WGI (Eastern, Daylight Saving, 360), 8:30 P. M., Talk, "New England Business Problems," Arthur R. Curnick; Radio drama, Amrad Players; Music.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater; 7:30-9:00 P. M., Concert; Sylvian Trio; Mrs. J. Gex William, soprano; Elwynne Griffith, pianist; Henrietta Everett, soprano; Reading, "An Interesting Historical Episode."
WMAQ (Central, Daylight Saving, 448), 8:00 P. M., Concert, LaSalle Orchestra; Mrs. Franklin Knight, contralto; Robt. MacDonald, pianist; Chicago Theater talent.
WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes concert; 6:30 P. M., Sandman; 9:30-10:30 P. M., Dance program, P. S. C. Orchestra.
WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30 P. M., Concert, Schmeman's Band.

Sunday, August 5

KYW (Central, Daylight Saving, 345), 5:00-8:00 P. M., Concert, Sisson Trio.
WBZ (Eastern, 337), 7:30 P. M., Church services, Edgar Austin, Agent Massachusetts Society for the Prevention of Cruelty to Children.
WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Rev. William F. Galbraith, pastor Colonial Hill Presbyterian Church; 9:30-10:00 P. M., Singers from the choir of Haskell Avenue Methodist Church; 10:00-11:00 P. M., Concert, Dizzy Four Orchestra.
WFI (Eastern, Daylight Saving, 395), 4:00 P. M., Church services; 7:30 P. M., Church services.
WGI (Eastern, Daylight Saving, 360), 4:00 P. M., "Adventure Hour," Youth's Companion; Concert, Edison Laboratory Phonograph; 8:30 P. M., Talk, "Present Day Russia," Rev. L. O. Hartsman; Musical program.
WGY (Eastern, 380), 9:30 A. M., Church services, Albany Street Methodist Episcopal Church; Sermon, "Why Religion?" Rev. James L. Ellenwood, pastor State Street Methodist Church, Troy; 6:30 P. M., Church services, Albany Street Methodist Episcopal Church; Sermon, "The Crowd Outside," Rev. James L. Ellenwood.
WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church services, Fourth Avenue Presbyterian Church; Dr. Charles W. Welch, pastor; Warren Memorial Church Choir; 4:00-5:00 P. M., Concert, arranged by Myrtle George Stinger.
WWJ (Eastern, 517), 11:00 A. M., Church services, St. Paul's Cathedral; 5:00 P. M., News Orchestra; 4:00 P. M., Concert, Schmeman's Band.

Monday, August 6

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music; 2:00-3:00 P. M., Musical selections, Arcadia Cafe Concert Orchestra; 4:40-5:55 P. M., Song recital and short talks.
WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00 P. M., Concert; 6:30 P. M., Dinner music, Meyer Davis Bellevue-Stratford Orchestra.
WGY (Eastern, 380), 7:45 P. M., Vaudeville program; "Medley of Marches," Mr. and Mrs. Robert Beerle, pianists; Novelty act, "Racing at Saratoga," William F. Madden; "Melody," Wilbur Bowman, violinist; Dialogue, Herman Schulman, Fred Cheman; "Drifting Back to "Dreamland," "Side by Side," Robert Beerle, saxophonist; "Moments of Mirth," Maurice G. Randall; "Madrigal," Wilbur Bowman, violinist; "Silver Moon," "Sleep, Baby, Sleep," William F. Madden, yodler; Saw solos, "Aloha Oe," "Carry Me Back to Old Virginny," Herman Schulman; Duet, "It Took a Wild, Wild Woman to Make a Tame Man Out of Me," Tom Morris, Frank Purcell; "Cradle of Liberty," Mr. and Mrs. Robert Beerle, pianists.
WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra.
WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45 P. M., Radio baseball dope, Monte Cross, old-time baseball star; 7:00 P. M., Bedtime stories, Uncle Wip.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00 P. M., Organ recital, Mary E. Vogt; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30 P. M., Orchestra and vocal selections, music by WOO Orchestra, Robert E. Golden, director; 9:30 P. M., Organ recital, Mary E. Vogt.

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7x18 Formica Panel	$1.89	$1.70
Remler Bakelite Socket	1.00	.45
Vernier Rheostat	1.50	1.35
23 Plate Variable Condenser	3.30	1.45
11 Plate Cunl Variable	3.10	1.35
3 Switch Levers	1.50	.75
2 Dozen Switch Points	.80	.40
1 Schoonhoven Reinartz Coil	3.00	1.95
Variable Grid Leak and Condenser Combined	1.00	.75
8 Binding Posts	.80	.40
25 Feet Tinned Wire	.30	.20
Baseboard for Mounting	.50	.25
Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$21.69	

Our Price **$11.45**

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CONSISTING OF	Reg. Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.75	.40
2 Coil Mounts with Straps	1.20	.80
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1 Bakelite 3" Dial	1.00	.25
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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. VI Chicago, Saturday, August 4, 1923 No. 4

Study the Science on Warm Days

Keep a Record of Your Receiving for Reference

ON warm days you will notice that some of the stations you have been hearing at a distance will come more weakly; perhaps you will cease to hear some of them for a time.

Like some of us poor mortals, the Radio waves do not travel so far on hot, sunny days as they do on crisp, cool ones, and they prefer to travel by night rather than by day.

You can make an interesting study and at the same time contribute something to the knowledge of Radio telepathy if you will keep a record of the weather on days when you have difficulties. Such a study, continued for a considerable length of time, may aid the solution of some of your difficulties. It should be worth trying.

We Are Benefited by the Lull

Much Interest Shown in Distance and Hook-ups

THE science of Radio seems to have settled down to a matter of distance and hook-ups. There is much to be done to improve present apparatus so that it will be more effective.

The lull in the progress of development does not mean, however, that scientists are resting after their first successes. On the contrary, more research is done nowadays than ever before.

But this is the quiet, plodding kind of work which retains its secret until it has accomplished something big in the development of the science. When the scientists are ready to announce their next developments, it will be like another wave in the advancement of Radio. Meanwhile Radiophans are getting their fill of hook-ups and changes for their receiving and transmitting sets, in order to gain what seems to be the greatest desire—distance.

Fading Signals

Daylight Range Taken as a Reliable Working Distance

A PERSON does not have to operate a Radio receiving system over a very long period of time before the discovery is made that under certain conditions, distant stations may be heard very loudly and that other stations, at times entirely inaudible, are heard with ease. It is usually the case that the receiving range is greatly increased at night, especially when both stations are included in the period devoid of sunlight. It will be further noted that on certain nights signals from one direction vary in strength over a short interval of time, that is, the signal may come inaudible within five seconds and five seconds later it will swing back stronger than before. On the same night signals from another direction may be inaudible beyond the usual range of the receiver. The succeeding night may see the conditions reversed with the fading signals heard from a different direction and apparently affecting signals only from that direction.

Many observations have been made of conditions and localities where the so-called fading is experienced; many data have been compiled as a result of numerous tests to ascertain the exact causes of this phenomenon but so far little has been accomplished. Various theories have been advanced in the attempt to explain why such variations in signal strength should exist; while most persons agree that atmospheric conditions probably have much to do with the action, no generally exceptable explanation has yet been advanced. Thus far the most practicable solution to the problem has been to employ sufficient amplification at the receiving station to render the signal audible even when it has faded away to its minimum value.

Ionization due to the action of the sun's violet rays has been advanced as the cause of the reduced range of Radio stations during periods of daylight. It is interesting to note that the effect of this condition is somewhat more pronounced when employing very short wave lengths than when using waves several thousand meters long.

Due to the fact that the range attained at night is a variable factor, the daylight range is taken as the reliable working distance over which the set can be depended on to maintain communication under any condition.

RADIO INDI-GEST

JSKWSKVXZGWV PGYXXZKSQPT WINS INDI-GEST NAME PRIZE WITH BLAH

WALLA WALLA.—Breaking a genuine, completely full, bottled in bail, untouched quart bottle of pre-1919 three star vanilla extract on the Indi-Gest super bum broadcasting station's counterpoise, the plant was christened "BLAH" amid the heart-felt, equator-heated, dark drown cheers of the dusky inhabitants of this South Sea isle. Thus ended the great, world-wide search for call letters by which to designate the works of Bambdin Bray, unofficial announcer, and Wattle knees, musical director. The handsome, round, beveled edge, pure brass switch point prize for the naming, was awarded to Jskwskvxzgwv Pgyxxzksqpt, who submitted the name selected. J. P., as we will call him hereafter for the sake of the printers, has always had a great gift for names, having named himself all alone. He is also called by many other names by larger persons than himself. These are rumored to be more pronounceable and emphatic in nature.

The counterpoise, while not mentioned in this column's excellent exclusive description of the oscillatory system of the triode tube transmitter, is nevertheless there. (We know it is, because they broke the bottle thereon.) But to go on with this miserable story, the counterpoise was added to give Station BLAH poise, microphonically speaking.

To avoid unnecessary correspondence on "where didja get the vanilla?" let it suffice to say that the latter is still condensed by Dielectric. Send him all the orders and Indi-Gest, the cash remittance.

One of the Many Losers

Dear Indi: I have had the pleasure of hearing your super bum broadcasting station two times. I have also had the pleasure of getting the earache twice and paying two doctor bills. I hasten to give your station the call letters "BSS" (bring smelling salts). LUKE WHATIV DUNN.

A-B-C Lessons for Indigest Beginners

Chapter VII—Oh! We Thot They Cooked on It

BY GOSH

G IS for grid,
(It's really a traffic cop)
That bosses electrons
And makes 'em go and stop.

Walla Walla

or

A Cannibal Chief's Story

Lemme sit down a minute, so I can tie my shoe,
Stop throwing fifty-watt tubes at me, I ain't done nothin' to you,
Once I was a masher, and always wore silk hose,
But that was long before Radio came, and a washline was used for clothes,
Don't stare at me with that empty look, and fill my heart with hate.
Just listen to what I'm going to tell, a story I would relate.
Way down in Walla Walla, where you'd sink in sand to your knees,
I had a cross-eyed daughter, but she looked straight if you please.
Fellows? Why she had them by the jug full, thy came to her fast and thick,
But she didn't like those Cannibals, and claimed they made her sick.
When along came a crew from America, sent by Indi-Gest.
To build a broadcasting station, they claimed they were from the West.
Well, it's the same old gag boys on which many a Moo's* got tripped.
One Turk from the crew fell hard for my Moo, and away from the isle they skipped.

But this isn't all of the story, I was chief of the isle,
And when I heard my Moo vamoosed, it was hard for me to smile.
I swore if I caught this Romeo, this bird who stole my Moo.
That I'd pickle him first in seaweed, then slice him up for stew.
My aching heart was breaking, and my hands itched for this Turk.
For since my Moo has left me, I've had to go to work.
Each night as the skies get rosy, I sit by the beach and dream,
Till the stars come out of their hiding and the moon begins to beam.
I will yearn and yearn for her return, and perhaps she'll come some day,
But she'll come alone, he'll leave her cold, so the natives say.
Oh, Moo, if you knew I was blue for stew, you would bring him back to me,
And come yourself to this quaint lil' isle, back to your Chief Teehee.
So just give me another shellful, a big one if you please,
And I'll look for her and lay for him 'till Hell begins to freeze.

—*ROZEE.*

*Moo means "Maiden" in Walla Wallan.

IN THE BEST OF FAMILIES

Planted here is the mother-in-law of
Isadore James Henry McPine,
She went to move his Radio set—
Shattered a U. V. One Ninety-Nine.

ROTOR E. GAPP

But Did You Count Ten?

Dear Indi: Listening in to the Firpo-Willard bout broadcast, I thot it would improve matters to have the right atmosphere, so I did my tuning with a pair of boxing gloves on. The result was a knockout! SPIDER WEBB.

To offset any mistaken rumors, let it be said here that no material used in Indi-Gest is purchased. The idea is to try to see how good you are and whether or not it is possible for you to achieve that achievement greatest of all, to have your contrib appear herein. Indi says it's bad enough to read the contribs, let alone print them!

Traveling Right Along

Condensed

By DIELECTRIC

The suggestion has been made frequently that in time all broadcasting would have to be supported by the public directly. Whether that time has arrived or not, the Philadelphia Chamber of Commerce purposes urging the establishment of a broadcasting station in the Quaker City to be operated by the public. They have hopes of building the first such station in the country to be powerful enough to reach at least half the receiving sets in the United States. The idea originated with the National Radio Chamber of Commerce.

It is thought that at least two million persons listened to the detailed description of the discussion beween Firpo and Willard. If you were listening to the ringside announcements you had no difficulty in accepting the estimate that one hundred thousand folks were present—when they yelled! After WEAF ceased broadcasting did you find other stations in the midst of telling their listeners just what took place in each round? Slow? Just recall the days before Radiophony.

In most cities there are public parks; at least one of these usually boasts a band. At present the one band is made to serve musical refreshment to patrons of all the other parks (in a great many instances) simply by relying on the aid of Radio. Detroit, so much alive to the advantages it offers, has made Radio serve in various capacities. Twelve city parks are to be supplied with music from Schemen's band broadcast through station WWJ. In New York city WJZ is broadcasting the Goldman band concerts given in Central Park.

The seeming possibilities of Radio are so unlimited as to give rise to fanciful stories at times. One such was spread not long ago to the effect that Station POZ in Germany had developed a means of stopping autos by electromagnetic waves. They can't even stop the mark; that has had quite a little magnetism. It is rather likely that the Germans would, if they could, produce some startling discoveries in Radio in the hope of marked advantage over those countries with which they were at war. However, any discovery would not long remain the secret of one nation.

It would seem to me highly desirable to equip every legislative hall with receiving sets. (The Assembly at Albany, N. Y., possesses one, which may be due partly to the extensive use of Radio broadcasting by Governor Smith.) Our chosen representatives would then have ample means of knowing the stations which refrain from spreading propaganda relative to the shortage of a very popular fruit—bananas! All broadcasting stations coming within that group could be subsidized and all others legislated out of existence. Jazz needs no such titles to make it barbaric.

Not only does Radio provide a way to keep in touch with the rest of our fellows while camping in the mountains but it brings to us the experiences of sportsmen. WGY, among a number of stations, has broadcast information of value to the prospective fisherman, telling him the proper bait to use in each instance and other facts of prime importance. By Radio we have heard what to take on our auto trips, and where to go. This saves the expense of sport journals.

One more instance of a public spirited move is recorded; this time it happened in Los Angeles. The Times of that city is doing all that it can to have receiving sets placed in the hands of every shut-in in the city. For this plan the name "Uncle John Radio Fund" was chosen; if you want to aid in the good work, send what you have to the newspaper. There can be no question now as to the great good these sets do for the afflicted. Tune in.

First Steps for Beginners in Radio

Chapter XI, Part II—Super Regeneration

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XII—Reflex Circuits.
Chapter XIII—Reflex Circuit Operation.
Chapter XIV—Headsets and Loud Talkers.
Chapter XV—Filament Batteries.
Chapter XVI—Plate Batteries.
Chapter XVII—Using Alternating Current on Tubes.
Chapter XVIII—Testing Radio Instruments.
Chapter XIX—Locating Trouble in the Set.
Chapter XX—Useful Information and Formulas.

THE construction of the one-tube super regenerative set offers no great difficulties; it is much simpler than the plain regenerative in operation. The set to be described is intended particularly for use with a loop aerial and will be found ideal for portable work or for one who does not want to erect an outdoor aerial.

The loop aerial need not be described in detail; an aerial of 12 turns mounted on 3-foot spreaders will serve the purpose nicely. It may be interesting to note that many are using with excellent results strips of copper ⅛ inch wide for constructing aerials. The metal strip makes a better appearance than wire.

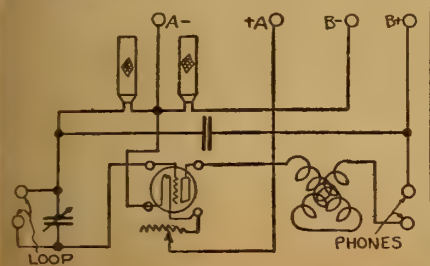

Figure 49—Diagramatic circuit for one tube super

The Assembled Receiver

In Figure 48 is given a top view of the assembled receiver, which shows the relative position of the various instruments, a very important factor in the operation of the outfit. At the left of the panel is mounted a .0005 variable condenser, preferably fitted with vernier control. At the right side of the panel is mounted a variometer which serves to tune the plate circuit to obtain regeneration. The filament rheostat is mounted in the center of the panel.

On the base, attached to the back of the panel, we have a tube socket in the center with the small fixed condenser at the rear.

The two honeycomb coils are mounted on a frame made from strip brass at the rear of the baseboard, so that they can be moved back and forth to control the coupling between them. If desired a two-coil honeycomb mount may be used for the purpose.

The instruments are wired according to the diagram shown in Figure 49, which gives the actual layout of the wiring. Binding posts are provided at the back of the board for connecting with batteries and aerial.

Any hard tube capable of standing 60 volts or more on the plate can be employed in this circuit, but a tube using six volts on the filament will give the best results. The small tubes using 1½ volts on the filament will work, but the larger plate currents possible with the larger tubes give louder signals.

Operation of the Set

As to the operation of the set—after checking the wiring and connecting the batteries, phones and aerial, light the tube filament. Slide the honeycomb coils towards each other on the brass strip; a high-pitched whistle will be heard in the receivers. Should the whistle not be heard, reverse the leads to one of the honeycomb coils; if this fails adjust the voltage of the B battery and filament brilliancy till the whistle is heard. This is the controlling or variation frequency generated by the honeycomb coils; it serves to check the regeneration of the tube and keep it from going into a howling state. The intensity of the whistle is reduced to a convenient amount by sliding the coils apart until the whistle does not annoy.

Now an attempt should be made to pick up a broadcasting station by varying the grid condenser and plate variometer. These two instruments act in the regular manner; resonance points between the two will be noted by a slight roar as in the usual regenerative receiver. After picking up a station and getting it as loud as possible by the adjustment of the plate variometer and the honeycomb coils, the instrument may again be adjusted to obtain the clearest and loudest reception. Proper adjustment of the coils can be obtained only by experiment, but when once found the adjustment can be fixed. A simple method is simply to tape the coils to the brass strip, if this method of mounting is used, or wedge the two-coil mount so that the coils will not jar out of position. The pitch of the whistle can be controlled by varying the capacity of the small fixed condenser until it is not bothersome and maximum signal strength is obtained.

When once properly adjusted this little receiver will be found very efficient, suited to one of moderate means who must get the most out of one tube. Audio frequency amplification may be added, but a filter is necessary to keep the oscillation of the tube from paralyzing the amplifier tube; this makes the set rather complicated.

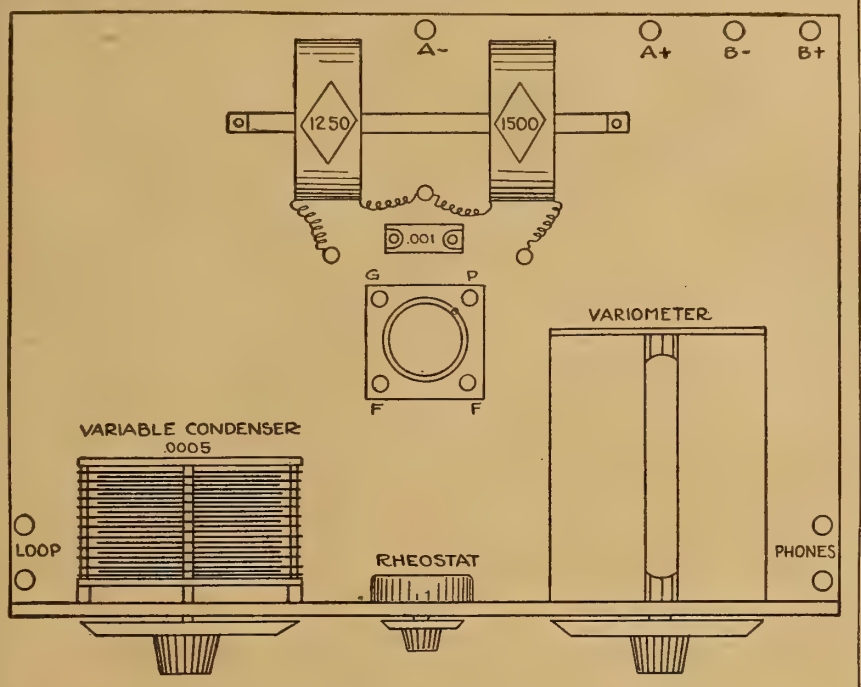

Figure 48—Layout of instruments for one tube super

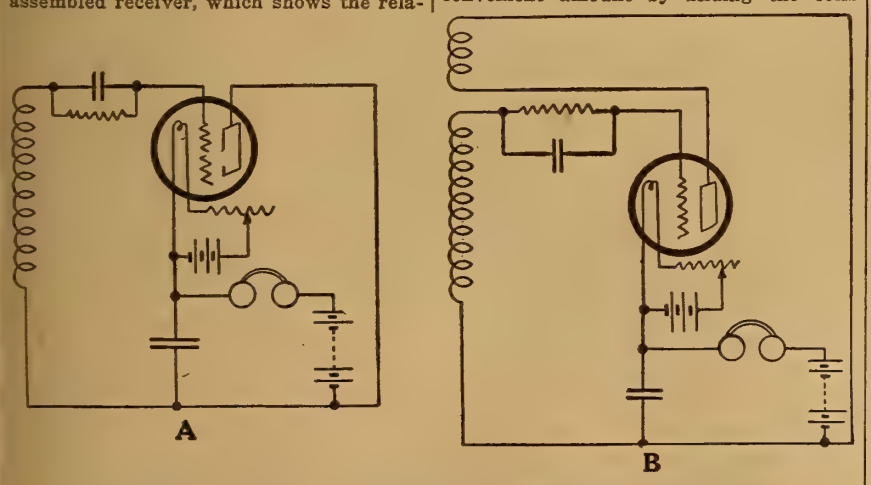

Figure 50—Analysis of Flewelling circuit to show principles of operation

The Flewelling Circuit

We come now to a consideration of the Flewelling circuit, which has received not a little attention during the last few months and has been refined down to a very simple device. Many descriptions have been published as to how to construct the sets, so we will confine ourselves to a discussion of its operation; this may assist those who have difficulty in operating the set.

The Flewelling circuit operates on the same principle as the Armstrong super in that a controlling frequency exists in the circuits for the purpose of checking over regeneration and howling. The method of obtaining this frequency is remarkable in its simplicity.

Considering the circuit without the tickler feedback as shown at A in Figure 50, we find the original De Forest ultra audion circuit using a condenser in the lead to the filament, which is also in the plate circuit. As we learned under regeneration, a condenser so situated will lead to a regenerative effect; thus the tube in such a circuit will be kept in oscillation. The frequency of these oscillations depends on the inductance and capacity in the grid circuit.

Regeneration of Set

It was also found that regeneration built up excessive negative charges on the grid, tending to block the tube, which was eliminated by connecting a grid leak across the condenser. When this leak was too small the tube would block for an instant and, when the charge finally leaked off, would operate again. This

(Continued on page 13)

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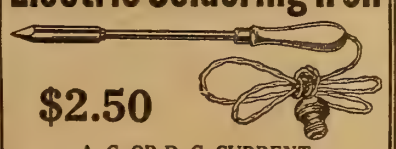

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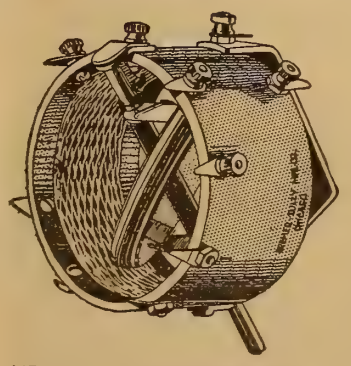

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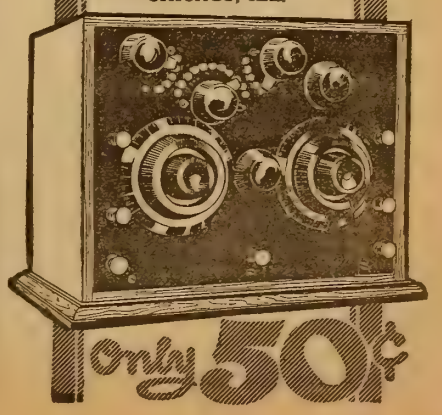

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Extra Coil Tunes High Wave Lengths

Oatmeal Box Provides Tube for Triple Mount

When the new wave lengths became effective I found that my three circuit set would not tune in above 485 meters; I also found that by loading the aerial circuit alone I did not raise the wave length sufficiently to catch the higher waves. I wound three coils of Number 22 dcc wire on an oatmeal box, two of the coils with 40 turns and the other with 30 turns. The center coil was connected in the aerial circuit; the other 40-turn was placed in the secondary circuit and the 30 turn coil in the plate circuit, as shown in the diagram. About ½ inch space was left between the coils.

I placed a .001 mfd variable condenser in the aerial circuit.

It aids in tuning and does not decrease the wave length. My aerial and lead in are 150 feet long. This coil does not add an extra adjustment and it may be constructed very cheaply as it requires only ¼ pound of wire. If the set is in a cabinet and the coil is mounted outside the primary coil may be connected between the ground post and the ground wire and the plate coil between one output post and the phones. Two extra binding posts must be provided for the secondary load. The addition of audio frequency amplification does not change the hook-up. With this loading coil connected I can easily tune in KSD on 546 meters.—Edwin Burnham, Ironton, Mo.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 W. Madison St., Chicago

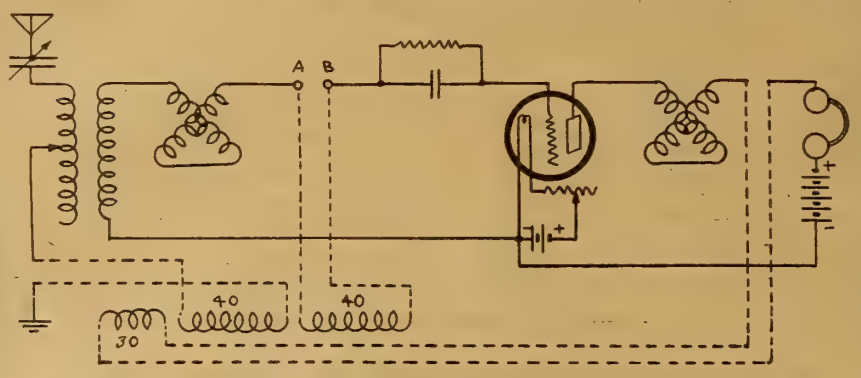
Locating the Aerial

When planning to erect an aerial be sure to estimate the distance to the nearest electric light or power wire and estimate as closely as possible whether any break in the aerial during a storm might make it possible for a wire to blow across the light or power wire and carry the high tension current into the house.

Soda Straws Make Spaghetti

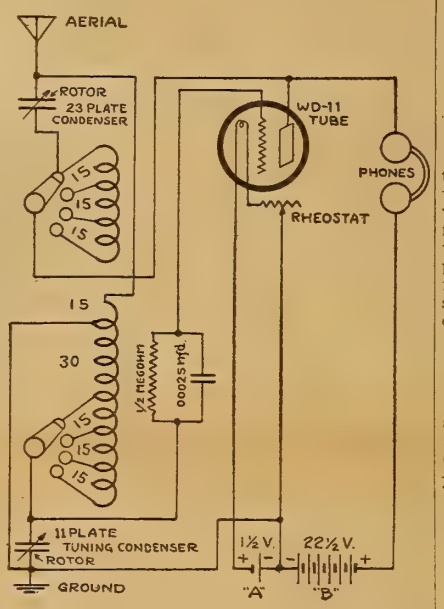
The price of spaghetti tubing is very high. I have found a very good substitute in soda-water straws. These straws are pliable; they may be easily obtained for a few cents a hundred straws. They are well waxed, which give them a very fine insulating quality.—H. Silverman, Brooklyn, N. Y.

LOAD DEVICE USED IN CIRCUIT



Improvised Reinartz Coil

Securing some data on the Reinartz tuner I constructed one of these some time ago and obtained very good results. As it was rather bothersome to make a form on which to wind the Reinartz coil I tried out a 3-inch tube and obtained results, I think, just as good as I did with the regular Reinartz coil.



The accompanying diagram is entirely self explanatory. The number of turns on the tube is just a little different from the Reinartz coil on account of the turns all being the same length with the tube.

This set using WD-11 tube picked up Schenectady, N. Y., Atlanta, Georgia, Ft. Worth, Texas and Davenport, Iowa, regularly. It may be possible some other amateur will welcome the data on winding the coil on a tube. Another point that may help some person is that a 22½-volt B battery will not always give sufficient voltage for the plate. I am using a UV 200 detector tube and have to use 27 volts on the plate to secure proper results. I am unable to pick up out of town stations at all on 22½ volts.—H. L. Shiner, Kansas City, Mo.

Renewing Knobs and Dials

Give the old knob a good polish, using a thin oil on a rag. Wipe the surface dry with a clean cloth. Go over the surface with a white-lead paint; allow it to remain for two or three minutes, then wipe the surface clean with a cloth. The white paint will remain in the depressions cut for the figures and scale. When this has set for an hour it is ready for use.—Robert L. Calbert, Jr., Nashville, Tenn.

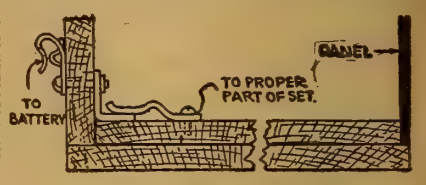
Crystal Detection

Carborundum crystals usually require a firm contact for good detecting, while galena crystals detect better the more delicate the adjustment.

Sliding Contacts for Connections on Back

In most sets there are at most four or five connections which would ordinarily be placed best at the back of the cabinet. I accomplish this in the manner indicated in the illustration. In an ordinary single-tube set, for instance, three connections to the battery are required, viz., A positive, A negative and B positive, the B negative going direct to the positive side of the A battery.

Three ordinary clips are bolted, each with a number 8 machine bolt, through the back of the cabinet, a piece of angle brass forming the inside; it is placed so that when the inside bottom of the cabinet is slid in it passes under the projection of the spring brass. Another strip of



spring brass is placed on the second bottom to make contact with these angle brass strips when the set is in place.

The set wiring is run to these second plates; therefore, when it becomes necessary to get into the set the front screws are removed and the whole inside part slides out. When it is put back the brass contacts close the three battery leads without any trouble.—L. R. Godden, Mitchell Field, N. Y.

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Difficult Tube Characteristics Explained

How to Analyze, Test and Estimate Them

By H. J. Marx

THE series of articles on "Characteristics of Vacuum Tubes" in the June 2, 9 and 16 issues of Radio Digest was a forerunner of a more technical discussion and description of vacuum tube factors that are generally unknown and rarely understood or appreciated. Their importance will be appreciated when the statement is made that these factors are the best criteria of the relative efficiency and method of operation of the tubes.

The subject as handled in the few textbooks available is always accompanied by intricate and well-advanced mathematical analysis. In addition, the most important points are surrounded by lengthy details and descriptions, making it difficult for the ordinary layman to comprehend. In this series, the characteristics, such as plate resistance and impedance, amplification constants and mutual inductance, will first be described and analyzed, then the method of testing them will be detailed. The values of the highly standardized tubes on the market will be given and sufficient instructions will be furnished so that the amateur may test or calculate the characteristics of his own tubes.

Making Your Own Tests

It is rare, however, that the amateur has available the necessary instruments to make these tests. If he has not, the knowledge of the method of testing and calculation of the values and their effect in operation will help to improve the operation of his Radio set and at the same time put him in a better position to discriminate in the selection of his vacuum tubes.

The characteristics are to be described separately. This will be followed by an analysis of the methods used in calculating and testing them.

Plate Resistance and Impedance

In all electrical circuits there is an action or condition that tends to resist the passage of current. Put in other words, it limits the amount of current that can pass through. It would correspond with the size of a water pipe. Naturally, the greater the pressure the greater the volume of water that passes through; likewise, the greater the voltage the greater the current which passes through. This factor is known as resistance.

Considering the vacuum tube—there is a plate circuit inside the tube. It consists of the movement of electrons from the filament to the plate. There is a direct current resistance to this flow, known as the dc or plate resistance. When dealing with an alternating current, the direct current resistance no longer holds true; so another value is introduced, known as alternating current resistance or plate impedance. This impedance varies with the changes in frequency. For amateur purposes an approximation is possible; this is satisfactory for frequencies up to the order of several hundred thousand cycles per second. The value of this knowledge of impedance is in the fact that best operation for amplification is obtained when the transformer impedance is balanced against the plate resistance. This explains why some tubes will not operate satisfactorily with most transformers. It is only a question of time before all apparatus will be accompanied by accurate statements of characteristic values in order that circuits may be more carefully balanced for maximum results.

Amplification Constant

The amplification constant (represented by the Greek letter Mu, μ) is one of the most important constants of the audion or three-electrode vacuum tube. This constant represents the maximum voltage amplification obtainable from the tube and is also instrumental in determining the current and power amplification. It is a function of the construction of the tube, depending on the mesh of the grid, diameter of the grid wire and the distance between grid and plate. Its value varies slightly with changes in the plate voltage, increasing as the plate voltage is raised. Therefore, when operating as a detector, the amplification constant of a tube is not as high as when used as an amplifier. If the amplification constant is 5, it must not be assumed that the volume will be 5 times as great; there are a number of factors which must be considered; but it furnishes an index of the possibilities of the tube.

Mutual Conductance

Inasmuch as every circuit has a resistance, it is easily understood that the resistance and the voltage pressure determine the amount of current that the circuit will conduct or permit to flow. Therefore the conductance of a circuit may be considered as an expression of its efficiency. This is the derivation of another tube characteristic known as mutual conductance, and it is a function of the amplification constant and plate resistance.

This is a very important characteristic and furnishes the degree of merit of the tube when functioning as amplifier, detector or oscillator. It is always desirable to have the mutual conductance as large as possible.

The mutual conductance is a measurement of the effect of the grid potential on the plate current.

(TO BE CONTINUED.)

FIRST STEPS IN RADIO

(Continued from page 11)

action gave rise to clicks in the telephone receiver. And therein lies the secret of the variation frequency of the Flewelling circuit. By properly adjusting the grid leak the tube blocks and frees itself at a high rate, giving rise to the well-known "super" whistle. It is this blocking or checking effect that permits high regeneration in the Flewelling circuit without the howling and screaming of the tube.

The connection from the positive of the B battery to the grid circuit is required to bias the grid; that is to obtain the proper grid potential for best operation. This positive potential acts so as to drain the negative charges from the grid and prevents the tube blocking at too high a frequency.

Having a variation frequency in the circuit, we have but to add a tickler feedback to obtain signal regeneration as in the regular Flewelling circuit shown at B, Figure 50. The operation of the set depends then on obtaining a proper variation frequency by a careful adjustment of the grid leak.

Varying Condition of Grid Leaks

As a rule the grid leaks on the market have the bad habit of changing their resistance with changes in humidity and temperature; we have a set that works beautifully except when visitors drop in. A method to overcome this defect to a great extent is to make use of a homemade leak consisting of lead pencil lines or celluloid or thin formica; when the proper adjustment is found, paint the leak with collodion to keep out moisture. Final adjustment of the set can be made by tapping the B battery for the lead to the grid. A set that functions very poorly can often be tuned perfectly by adjusting the positive biasing potential obtained from the B battery.

Thus we see that all a regenerative set needs to make it "soup" is a variation frequency that will check the regeneration before it gets too strong. Two methods are now in use, the Armstrong using a tuned frequency and the Flewelling using the blocking effect in the tube. There surely ought to be another method that is better and simpler; the announcement of that method will be the one great event of the coming year in Radio.

(TO BE CONTINUED.)

Erecting Antennae

It is often advisable to erect two antennae when both local and long distance reception is desired. One of these antennae designed for obtaining a high degree of selectivity, in differentiating between local signals, may be a single wire outdoor antenna approximately 30 feet in length and about 20 feet in height, or an indoor antenna using about the same length of lamp cord placed behind picture molding. For long distance reception a longer antenna is necessary; for this purpose a single wire about 150 feet in length stretched as high as possible will give satisfactory results. The use of two antennae provides a flexible arrangement for avoiding interference between local stations operating on nearly the same wave length, particularly when a regenerative receiver is used with the small antenna and, in addition, provides a larger antenna for use in long distance reception after the local stations have ceased operation.

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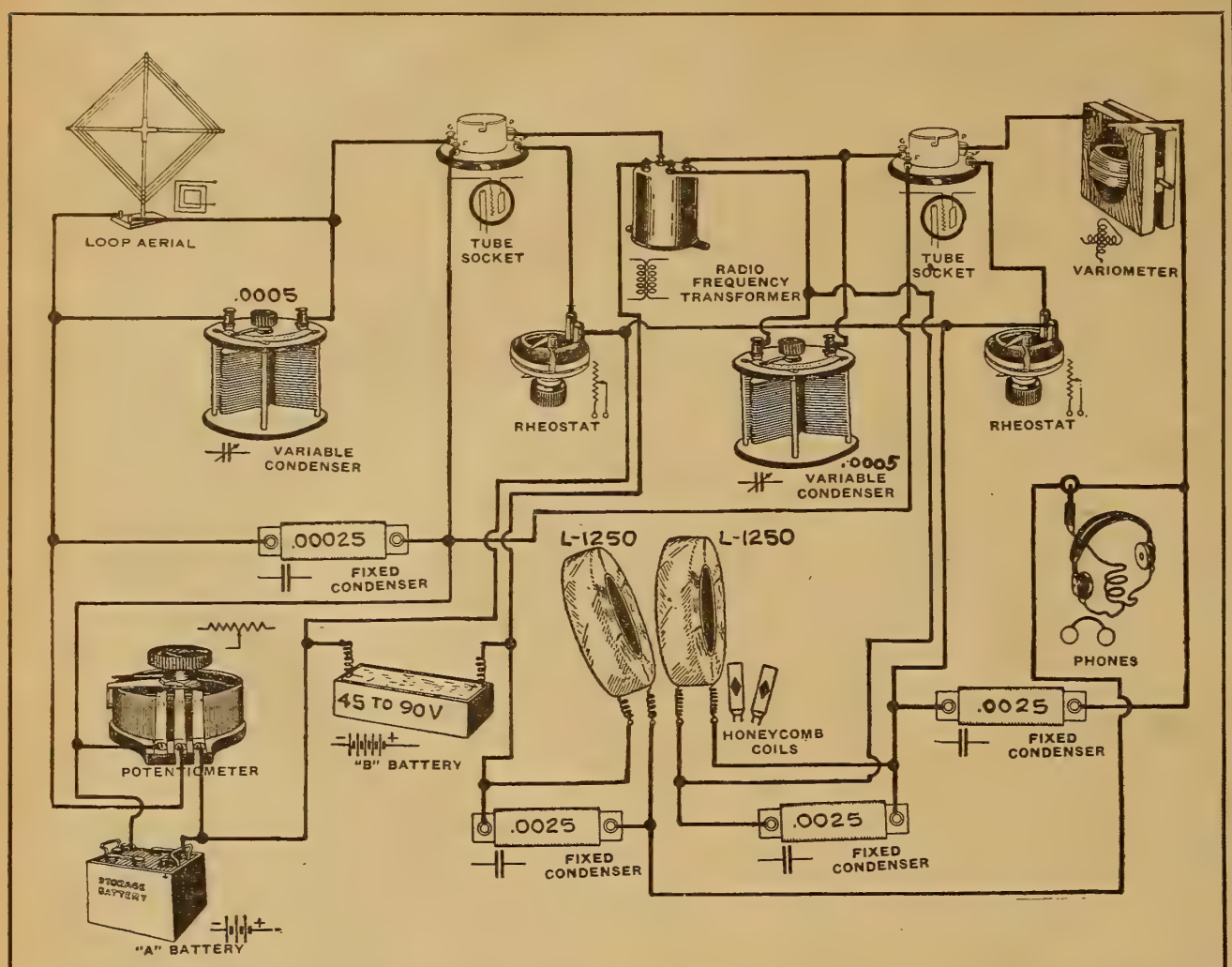

THERE is a constantly growing tendency on the part of fans to ask for Radio frequency stages added to the various popular circuits. Sometimes it works—more often it doesn't. Often it can work, but the fan isn't successful and becomes discouraged. Radio frequency is tricky; when you add it to a trick circuit the results are trickiness to the "n"th degree.

Here's one that's been tried; it works fine. The original is simply a single tube super; one stage of Radio frequency has been added.

It is advisable to use two amplifier tubes and a plate battery voltage of at least 67½. Two .0005 microfarad variable condensers used with a loop aerial control the wave length adjustment. A 400-ohm potentiometer takes care of the grid potential of the Radio frequency amplifier tube.

A good variometer takes care of the plate circuit control. Two 1,250-turn honeycomb coils inductively coupled by means of a two-coil mounting control the super action. Condensers are shunted across both of these coils.

The circuit is not very difficult to tune and is adaptable in relation to portability.

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

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The Reader's View

Dr. Pickard's Theory Wrong?

I am writing you in regard to an article in your paper some time ago giving Dr. Greenleaf W. Pickard's view about the radiation from regenerative receiving sets. I know nothing of Radio from a scientific viewpoint, but will say from experience in tuning I very much disagree with the professor. I would like to ask a question or two to prove my assertion.

If re-radiation is impossible, why can I at any time cause my neighbor about 100 feet away, who has a crystal set, to receive stations one after another in same rotation as I receive them? Have tried it several times with good results. Also, another boy about 400 feet away has reported same on a prearranged test. Neither have heard distant stations when I was not tuning. Also have tried it when signals were coming strong. They only hear when I cause my detector tube to squeal from too much current on the filament. My theory is that the signals are not strengthened, but are re-radiated or received by my set and re-broadcast by the same set. I have even heard others, when listening in, turn up rheostats, also hear other tubes squeal when there were none closer than six or seven blocks. I only wish that I could explain this in a scientific way, but cannot, so you may publish this theory in your words or mine. —B. W. Banyar, Independence, Mo.

Reinartz Set Good

I have built the Reinartz tuner as described in a previous issue of Radio Digest. I find it a very efficient set. Without amplification and before I purchased a phone condenser, I picked up KHJ, KVQ, CJCA, and others very clearly. My aerial is 75 feet long, 35 feet high, and has three strands of No. 14 copper wire. On the night I picked up CFCN so clearly and loudly that I could hear plainly with the phones at least a foot from my ears.—Leonard D. Johnson, Colville, Wn.

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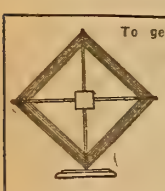

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Questions and Answers

Gravity Batteries

(4076) GSF, Brookfield, Ill.

A 1:55 on the morning of June 1, I sat at my Radio to see if I could pick up some distant station. The following conversation was the result but due to heavy static I could not receive it in full, at least I don't think I did: "9XN calling WM" repeated twice—"Your signals coming through, but due to heavy static cannot read you. Signed 9XN repeated twice. "We will repeat this experiment tomorrow night; stand by for us." Repeated twice.

From here on static was so heavy on my set I could not catch any more.

This is what I would like to know, if it is possible for you to tell me—what did I get mixed into and what two stations were working? I do not find either one in the list of stations that I have or in any of the Digests on hand.

While I am writing I wonder if it would be permissible for me to ask for some information about batteries. I am using a Reinartz circuit with a WD-12 Tube and have had wonderful results but the battery consumption is very heavy; I use dry cells of 1½ volts, 30 amperes on the B side and 90 volts for the A batteries or on the plates. Can you tell me if I can use Gravity batteries made as follows: blue vitriol, copper, zinc and water? The cells I had in mind are the ones commonly used in Morse Telegraphy or were used some years ago. Can you also tell me the voltage, ampereage and flow of the current produced, whether D. C. or A. C?

Any enlightenment you can offer on either subject will, I assure you, be greatly appreciated.

A.—Answering your inquiry we are of the opinion that the conversation quoted as having been received by Radio was from the University of Wisconsin, 9XM, as station 9XN is in Chicago. It has not been in operation recently. We are unable to inform you as to the other station because the call given is not correct; it was perhaps misunderstood by you.

In the matter of gravity batteries,—three or four connected in parallel may be used for the filament of the peanut tube. All batteries deliver direct current. The cells will test one volt each with a very low current due to high internal resistance which necessitates several cells connected in parallel for use with the tube.

Popping and Fading

(3589) FR, Eldorado, Kan.

I have a two-stage receiving set. The hook-up is of my own plan— 1 grid variometer, 1 varicoupler, 1 plate variometer, 1 fixed condenser, 1 phone condenser, Rheostats, jack and transformer. I have a 100-foot antenna, insulated lead-in wire from the antenna. The ground is a ¾-inch pipe driven 3 feet in the ground and a wire is soldered to it.

I would like for you to advise me as to why the signals come inland by and clearly from almost any station in the United States and disappear at intervals of one to two minutes. You can always hear a pop or crack which disappears. My antenna is 40 feet high.

A.—Noting your specifications and limitations experienced in reception, we believe there is a discrepancy as to a grid condenser and leak which units are not mentioned. Were it not for the action of popping in the phones we would be certain that the fading signals are occasioned by the phenomenon of "fading," which is caused by wave length variation (from little understood cause) at the transitting station. You will simply have to await the return of fading signals, knowing that "fading," as suggested, is the cause for which there is no remedy at this stage of development.

Grid Leak and Condenser

(3656) JH, Liberty, N. Y.

Can you inform me as to the right values of the grid leak and grid condenser when used with a WD-11 tube? Where can I get a 20-volt B battery?

A.—Answering your inquiry, we are advising that the grid condenser should be of .00025 mfd. value, and the grid leak of two megohms in a circuit using a WD-11 tube.

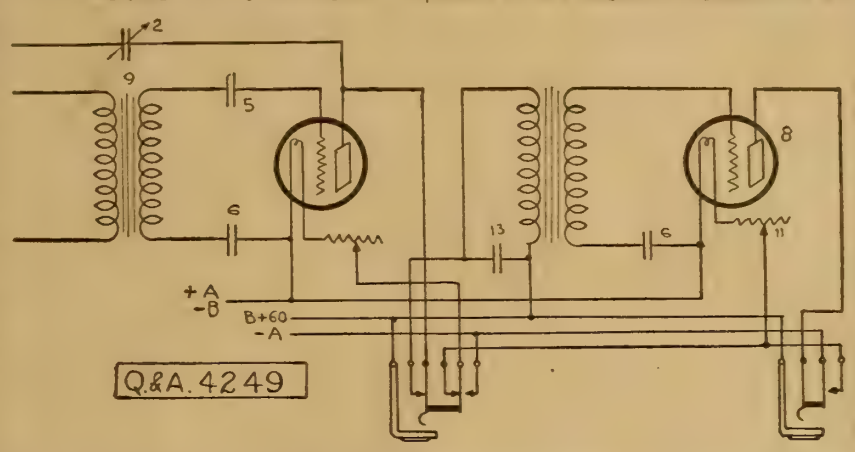
B batteries are not made in 20-volt units. A 22½-volt battery may be bought from any dealer.

Filament Control Jacks

(4249) CEC, Roseville, Ill.

Please show diagram for method of wiring two filament control jacks with the Ultra Reinartz Circuit.

A.—Complying with your request we herewith give diagram showing method of using filament control jacks with Reinartz circuit.



Rules for Radiophone

(3265) BB, Brooklyn, N. Y.

Why must a vacuum tube be evacuated?

Using a single circuit, with two stages audio frequency, what is considered a good distance (DX) to receive?

What are some good rules for a Radiophone owner to observe?

A.—We are pleased to answer your inquiries by advising that perhaps the thing of first importance to a "Radiophan" as to rules to be observed is conformity with all regulations legal and ethical, governing the art. From a personal standpoint, he should exercise care in the selection of electrically perfect apparatus, looking to the maximum satisfaction to be derived. Having proceeded to this point the next in order is a careful understanding of the characteristics of the set he is using, protection of tubes and batteries by means of a knowledge of their operation both theoretically and practically and, above all, intelligent purpose to discover his limitations through an application of the knowledge gained.

In the matter of the vacuum tube, you are advised that if it were not evacuated when the filament was lighted, the oxygen within would unite with the metal in the filament, oxidizing it and burning out the tube.

The range of circuit specified should be approximately fifteen hundred miles.

Rectifier

(3694) JDeC, Niagara Falls, N. Y.

In your Radio Digest, April 21 issue, Question and Answer 2956, you publish a diagram for a transformer, but you do not tell how much laminated iron is necessary or what size to use. Will you please let me know the size and dimensions in relation to building the rectifier for charging batteries?

A.—Answering your inquiry in the matter of a transformer, we inform you that ten pounds of silicon steel .018 thick are required. This is cut into 170 pieces 5¾ inches long and 170 pieces 2¾ inches long, in each instance 1¼ inches wide. These are stacked in according to the standard core assembly method, 85 pieces being used, making the core 1¼ by 1¼ and inside dimensions 1¾ by 4½ inches.

We are directing your attention to the fact that the polarity of the battery, as shown in the diagram in question, is incorrect and should be reversed. Negative A should be connected with the plate of tube.

Grid Potential

(3856) DBL, Baltimore, Md.

Referring to the Flewelling hook-up, please explain why the grid return with B- is from the A-terminal in the detector unit, whereas in the amplifier unit the grid return with the B- is from the A-negative terminal.

A.—Answering your inquiry with reference to the battery connections in the Flewelling circuit, we advise that negative B is connected with positive A in the detector unit to give the added six volts of the A batery to the B battery potential. In the amplifier the opposite method is used to obtain a negative charge on the grid which is essential for amplification.

Frying Noises

(3654) JO, Pennock, Minn.

Could you give me some information in regard to the cause of the frying noise in the receiver? When I turn the volume strong it comes in unsatisfactory.

In the daytime it works quietly and well most of the time, but in the evening it is bad. The signals come in strong and well, but this noise spoils it all. I have used regenerative, one and two steps of Radio amplification and, lately, the reflex, one and two tubes and a detector. Their work is fine. But they all have that noise in the evening. I have tried different A and B batteries; I know the connections are tight.

If it were not for that noise the reflex is the real thing. The noise came in on the Radio amplification also.

A.—We have noted carefully your difficulties as to reception, and are of the opinion that the source is extraneous to your set. Disconnect the antenna. Cessation of the noise proves that it is from some cause outside of the set, such as an electrical appliance in operation, telephone ringer, violet-ray machine or arc light in your vicinity. If this does not eliminate the disturbance, barring the possibility of static, you may look for some discrepancy in the set itself. We hardly believe that the condition cited is due to atmospheric conditions, particularly in your location, although these may exist.

Ultra-Audion

(4139) DKP, Ceres, Calif.

Kindly advise me through your Question and Answer column whether the ultra-audion hook-up described in the May 5 issue is regenerative or non-regenerative?

A.—The ultra-audion circuit appearing in the May 5 issue of the Radio Digest employs the feedback principle which makes it regenerative.

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Radio Illustrated

Colleta Ryan, musical comedy star and prima donna, keeps herself in trim by doing her "daily dozen" to music broadcast by stations in Chicago, where she is now playing at the Apollo Theater. She always has her portable set present when she's on the beach. The unit shown picks up local broadcasters sufficiently loud to operate the loud speaker
© Radio Digest

Alyce Mills of the "movies" is another beach Radiophan who won't desert her set to swim. Except for seeing herself at picture shows, Radio gives her most fun of all
See photo below
© U. & U.

Kewpie doll, razor case, cartridge fuse and cocoanut shell sets, prize winners in "freak" contest. The red cheeked kewpie is tuned by twisting her switch contact "arms" and wears a crystal detector-lavaliere about her neck

AUG 13 1923 ©CLB582800

Vacuum Tube Calculations; Picture Ultra Audion

Radio Digest

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IMPROVES PIANO MUSIC

Alice Brady (above) is well known to followers of the silversheet, but has an excellent Radio voice as a second talent. Listeners who tune in Eastern stations have heard her more than once. Virginia Huff (right) musical comedy girl, takes her Flewelling portable set abroad her sponson canoe when she rests away from the footlights. © Victor Georg.

TEST SHOWS RADIO AID TO HYPNOSIS

Youth in New York Experiment Put to Sleep by Means of Airphone in Brooklyn

NEW YORK.—An experiment designed to show that hypnotism can be practiced by Radio, and that the flow of blood in the subject's body can be arrested, making a bloodless operation possible, was performed here recently.

Operating from Station WHN in the Ridgewood section of Brooklyn, the hypnotist focused his powers on a youth seated before newspapermen.

Over the Radio he ordered the youth to become rigid. A newspaper man waved a match in front of the subject's eyes, insisting that he did not blink and therefore was completely under. The youth was restored, then put under again. His body was stretched across two chairs and a medical student sat on his stomach to prove that he was rigid.

Then the youth was put under for the third time, and over the Radio came a command that the blood leave his arm and flow into his body. A needle was thrust into the flesh of the subject. No blood appeared.

NEWSPAPER DONATES WGM TO UNIVERSITY

ATLANTA, GA.—Station WGM, formerly owned and operated by the Atlanta Constitution, has been donated by the newspaper to Georgia Institute of Technology located here. "Old Reliable," as it is called, will soon be operated and directed by the university. The institution has a special course in Radio and will use the WGM equipment in training students.

WGY MAKES USE OF NEW MICROPHONE

True Piano Quality, Even Low Notes, Put on Air Faithfully

Corrects Loud Speakers

Magneto Pick-Up Gives Tones in Proper Ratio—Good on Phonograph Also

SCHENECTADY, N. Y.—Transmission of true piano quality has been a real problem for the Radio engineer, but WGY engineers have solved it. The difficulty is similar to that which has confronted the maker of phonograph records. The blows of the hammers on a piano are distinguishable but the singing quality and the overtones which are relatively weak have not been reproduced through loud speakers or phones.

Engineers connected with the studio of WGY, the Schenectady broadcasting station of the General Electric Company, have devoted a great deal of time to the development of a device which will make the piano solo a real feature of a broadcasting program.

Description of Device

The device, in brief, consists of a magnetic system between the poles of which is pivoted a suitable coil system. The magnet is firmly fastened to the frame of the piano and the coil is anchored to the sound board. By means of this pick-up device all tones in the piano are faithfully converted into corresponding electric currents which control the Radio transmitter. When heard on the loud speaker the piano is no longer a tinkling sound. The listener in gets all the characteristics of this percussion type of instrument, the blow of the hammer, the singing tone and the overtones.

The piano pick-up is free from the familiar hiss of the carbon microphone as well as the objectionable blasting that takes place when an artist plays too loudly for the microphone.

(Continued on page 2)

© Radio Digest.

PARTS OFFER DRAWS FOREIGN RADIO FANS

INTEREST ABROAD PROVES AIRPHONE'S PROGRESS

Demand for Devices Comes from Old and Young Many Letters of Inquiry Reveal

SPECIAL REWARD OFFER

Coupon Number 11

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

No better evidence to the ever growing interest in things Radio is obtainable than the increasing number of inquiries and remittances in relation to the Radio Digest's special offer to furnish parts at low cost.

From all parts of the United States and Canada and even from distant foreign countries come letters bearing the scrawl of children, the halting, uncertain chirography of the aged, and the firm, forceful script of men of affairs.

The supply of parts is still sufficient, but the manner in which requests for them are made necessitates the repetition of the following instructions:

The numbers of the coupons sent to the office of the Radio Digest must be consecutive; they need not begin with No. 1, but they must run in order; you may send as many coupon series as you want; with these coupons name the parts you want and send the money. You will receive the parts forthwith.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 601 (.006 mfd.); Dubilier By-Laws Condenser (.1, .25, or 5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tip-Way" Plug; 1 Federal Panel Mount Socket; 1 Universal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No. 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts; Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer.

KGW Sends Forest Fire Talks

WASHINGTON, D. C.—Talks on forest fire prevention are being broadcast every two weeks from the Portland, Oregon office of the Forest Service through arrangement with the Portland Oregonian, Station KGW. These talks, according to estimates, reach from 10,000 to 15,000 people.

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Looking Ahead

Coming—Watch for This—a Series of Articles on Making a Neutrodyne Set—In an early issue H. J. Marx will begin a series of several articles telling how to make this latest of receivers. The outfit built by Mr. Marx and now being tested, is capable of doing wonders in the midst of summer. The set, how to make which will be told, uses a two-step neutrodyned Radio frequency, detector, two-step audio frequency circuit. Do you want a neutrodyne set? Read this series!

Multi-Tube Reflex Circuits by Thomas W. Benson Next Issue—Mr. Benson will tell Radio Beginners all about two and three tube reflex sets next week. This week's chapter he devotes to single tube reflex hook-ups. Turn to page eleven.

Difficult Tube Characteristics Explained by H. J. Marx—A continuation next week of the series Part II of which is found on page thirteen this issue.

A Vernier Variable Condenser from a Hard Rubber Dial—Read this kink along with others on page twelve of the August 18 number.

Simple Two Tube Hook-Up—A circuit needing but little apparatus, but as efficient as the best. See this hook-up diagram in the next number.

And Don't Forget the New Advance Programs, Part One of the Broadcasting Station Directory, the Picture Diagram, and Flewelling's Answers to Queries, all to be found in the August 18 issue.

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HEAR WDAP AS FAR IN DAY AS IN NIGHT

SHOW POWER AMPLIFIER MOST EFFICIENT

WDAP Men, on 2,100 Mile Auto Trip, Make Two Important Discoveries

CHICAGO.—Two phases of Radio operation were developed recently during a test of its apparatus by Station WDAP, the Chicago Board of Trade. The experiment showed that the power amplifier type of transmitter was most efficient, that is, its carrying capacity was greatest in relation to the output of one kilowatt. The test revealed also that daytime reception was almost as satisfactory as night reception.

The reception test was made during an automobile trip from Chicago to Dubuque, Waterloo, Crystal Springs, and Fort Dodge, Iowa; Sioux Falls, S. D.; Minneapolis, Minn., and return to Chicago, a distance of about 1,200 miles. L. B. Mitchell, Radio operator for the Board of Trade, and Thorne Donnelley of WDAP received the messages, market quotations and time signals, by means of a three tube regenerative set. The set weighed twelve pounds and the batteries, six pounds. The antenna was strung in trees en route and from hotel windows.

Although the recorded transmission range of WDAP is 300 miles, the test showed a daytime capacity of 600 miles, it was reported. Changes in radiation were announced by means of long distance telephone from the station to the autoists. The average radiation of WDAP is ten amperes but in the test it was raised as high as fourteen and lowered to six. The minimum radiation served as well as the maximum. The latter was shown by means of a test in Sioux City, about 390 miles from Chicago.

AIDS PIANO MUSIC

(Continued from page 1)

When the carbon or condenser microphone is used to pick-up a vocal solo with piano accompaniment the problem is to place the microphone in such a position that it picks up both voice and instrument in their proper ratio. The position of the microphone must be changed for each artist. The Radiophan has probably noticed that as the singer increases the volume the accompaniment fades out, in other words the soloist "paralyzes" the microphone. When the piano magneto-microphone is used the intensity of the piano may be adjusted electrically in the control room, even while the selection is being rendered, as the voice is recorded on the customary carbon or condenser microphone.

In the grand piano at WGY there are three of these devices, one in the extreme treble, one in the middle register and one in the bass. These three outputs can be readily balanced in the control room for the best results on receiving sets without tampering in any way with the instrument.

Overcomes Fault of Loud Speakers

Another feature of the magneto-microphone is that it allows WGY to correct for the shortcomings of the present loud speakers. All loud speakers subdue the sounds of lower frequencies, from approximately middle C on the piano down. To give good piano music for users of the loud speaker it would be necessary for the transmitting station to distort the music from the instrument, making the lower section of the piano several times as loud as the treble. Some stations have actually tried to regrade their pianos to improve them for broadcasting. This means that the music, as heard by the musician at the keyboard, is distorted and the good musician, even though convinced that his Radio audience is getting perfect tones, cannot do his best work on a regraded piano.

The magneto-microphone may also be used in broadcasting phonograph music where the federal license of the station permits the use of recorded music. When the carbon microphone is used the mechanical energy of the phonograph is converted into sound energy in the usual way and is picked up by the microphone. With the magneto-microphone the needle is attached to the coil and the mechanical energy is converted directly into electrical energy without recourse to any sound whatever, thus giving truer reproduction.

Open Plant to Handle Lake Shipping Messages

CLEVELAND, O.—The Inter-City Radio & Telegraph company has been opened at Hotel Cleveland to handle the Radio business of the lake shipping interests. The new station, WHT, will receive messages from lake ships and wire them to the proper offices.

This work was formerly done by the navy station at the foot of E. 9th street, but no appropriation was granted to continue the work, and the new station was organized by the co-operation of 125 ship owners.

DANCE IN WILDS TO JAZZ ETHER MUSIC

WOLVES HOWL AS TRADERS LISTEN IN TO CFCN

White Inhabitants, Isolated from Civilization, Get Entertainment Through Air—Indians Mystified

CALGARY, ALTA.—In a rude little shack located in an isolated stretch of virgin territory in the wilds of Northern Canada where few white men have had the hardihood to penetrate; with vicious timber wolves howling their song of starvation and death close by; and the Indians who know naught of cities or the refinements of civilization looking on in awed amazement, a few whites dance to jazz music.

The jazz, the very latest on the music mart, comes silently and mysteriously out of the night. The Indians know not from where, but to the whites it is simple. At least they, with their blasé acceptance of all the truly marvelous scientific discoveries of a mechanical age, consider it simple.

Radio Supplies Entertainment

The answer, of course, is the Radiophone, the omnipotent, the ever-present, the ever- entertaining, carrying news bulletins, jazz, classical music, educational information and emergency calls to all the far corners of the earth from the centers of population.

Far from the maddening crowd and the busy roar of cities; cut off from the outside world by the great white snows; located in a shack thousands of miles inland in a God-forsaken spot unknown but to a few whites and some Redmen, a shack illuminated by the startling brilliancy of the northern lights, F. L. Connor, factor of a fur trading post and Alex J. Williams, mail stage driver, intrepid forerunners of a vast civilization to come, nightly hear jazz music and news bulletins from Calgary, "The Metropolis of Alberta," and other cities in the "outside".

Indians Mystified

In a letter to W. W. Grant, owner of CFCN, the station of W. W. Grant Radio Ltd., at Calgary, F. L. Connor, trading post factor at Sturgeon Lake, Calais Post Office, Alberta, says:

"I have seen some peculiar situations during the late war but I must confess that the experience of listening to Calgary this evening was in a class by itself.

"At a short distance from the log house we stay in could be heard the brush wolves howling and the red glow of fires in front of the Indian tepees could be plainly seen, while inside we were listening to the latest jazz from the Plaza Cabaret at Calgary.

"We called some of the Indians in to listen on the set, and while they enjoyed the music immensely, they could not credit our explanation of how it was producted and went home firmly convinced that we were all 'Wi-ta-koo,' which means crazy."

Wired Radio Experiments Make Progress in Germany

BERLIN, GERMANY. — Experimental work in Wired-Radio is progressing here. Recently communication was effected between this city and Stolp on the Baltic coast over a 400-kilometer line. This high frequency telephone line has been turned over to the Federal Post authorities by the firm of A. G. Lorenz. Three calls at a time were put through successfully; one on the normal wave length, another on a 45-kilometer wave, and a third on a wave of 25 kilometers. Instead of tube transmitters, a special high frequency generator was used.

Takes Radio Post at U. of Wis.

CHICAGO.—R. V. Ray, a graduate of the course in electrical engineering at the University of Illinois and a commercial Radio operator of several years' experiece, has accepted the position of chief operator of the University of Wisconsin station, WHA, and instructor in Radio with the physics department.

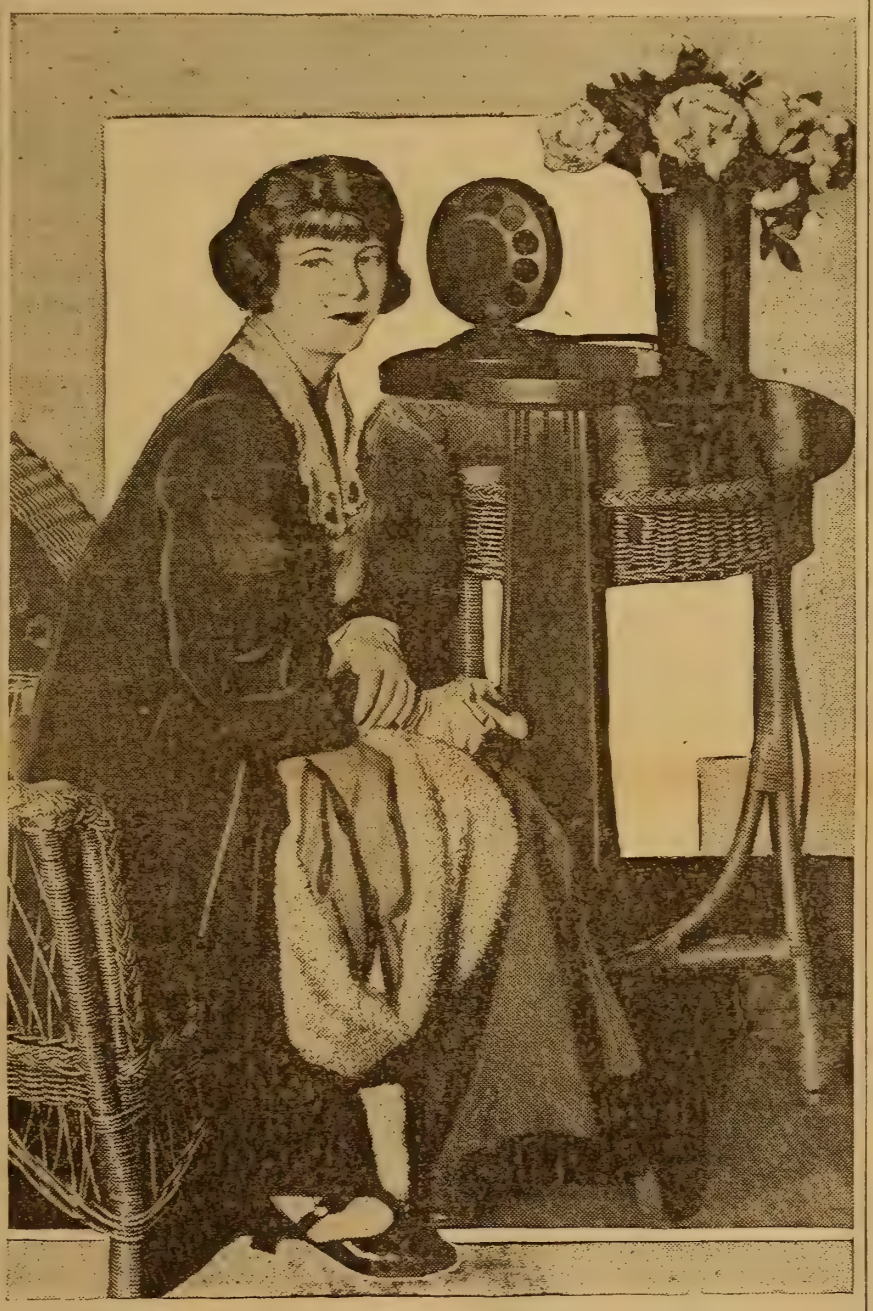
ALABAMANS TAKE UP RADIO FOR MARKETS

BIRMINGHAM, ALA.—Many of the small towns and even rural sections of Alabama are now using Radio. Farmers and merchants in the smaller places are receiving market reports daily from the air. At the little town of Jasper the Bluebird Drug Company has a receiving set. With the outfit they received the results of the Willard-Firpo fight for the entertainment of their friends and customers.

STATION WMH, EARLY ON THE AIR, REOPENS

CINCINNATI, O.—Station WMH of the Precision Equipment Company here, has resumed its Radio programs. This station was one of the first in America to broadcast. Powell Crosley, Jr., president of the company, has arranged with the manager to give daily programs at noon and at four in the afternoon on Tuesday and Friday. There will be no broadcasting on Saturday and Sunday.

MAE MARSH TELLS OF MOVIES



Mae Marsh doesn't devote all of her time to the screen. No sir! WOR, Newark, fans will testify to this, for they heard her tell all about the movies. Her first picture paid her the "fabulous" salary of three dollars a day. The salary then rose to five in the second, but in her third, as she put it, "for some unknown reason it dropped back to three."

Alabama Radio Nabs Auto Thieves

BIRMINGHAM, ALA.—Since automobile thieves have become so numerous here, Chief of Police Fred A. McDuff has resorted to the use of Radio as a means of locating the thieves and bringing them to justice.

Each day Chief McDuff furnishes Station WSY with the numbers and a brief description of the cars stolen, and this information is then put on the air. By this means several stolen automobiles have already been found and returned to their owners.

AIR SLEUTH HUNTS ESCAPED CONVICTS

TRAILS FELONS FLEEING PHILADELPHIA PRISON

Station WOO Warns Ships and Coast Towns to Watch for Fugitives Aboard Launch

PHILADELPHIA. — Radio is being used by the police officials of this city as one of the most important means of warning people of the escape of six desperate convicts from the Eastern Penitentiary, this city. The message has been so effective that coast guards, police in every small town in a half dozen eastern states around Pennsylvania, and ships and revenue cutters in the Chesapeake Bay and the Atlantic Ocean are on the lookout, and their capture is expected at any time.

The men escaped over a high stone wall by the means of a rope and ladder, which had been concealed in a large cedar chest. This chest was made by one of the escaped men, who was an expert cabinet maker. After gaining their way to the street, the six men commandeered an auto truck and got away. They later abandoned the truck and seized a high powered automobile, taking the driver with them. They left him on a road in Maryland. It is believed that at this point the party broke up, two men going one way, the other four going another. The four men seized a thirty-foot power boat at Pocomoke City, and put out on the Chesapeake Bay. There was enough fuel in the boat to get the men to Bermuda, but it is believed they were making for Norfolk to join the rum fleet lying off that place.

Station WOO to Aid

Station WOO, Wanamaker's here, which regularly broadcasts police reports, sent out the following message, dictated by Captain Souder, chief of the detectives in Philadelphia:

"Regarding the six convicts who escaped from the Eastern Penitentiary on July 14, we have received information that four suspicious characters stole a dory at Pocomoke City, Md. This boat is a pleasure craft with the deck covered with an awning and the name 'Sunbeam' painted on the side.

"We believe these men to be some of the escaped prisoners. Anyone having information with regard to the Sunbeam and crew will communicate with the nearest police authorities and instruct them to notify the Detective Bureau in Philadelphia at once."

CANADA REMOVES TAX FROM AUTO RADIO SET

Protests of American Autoists Bring Relief from Tariff

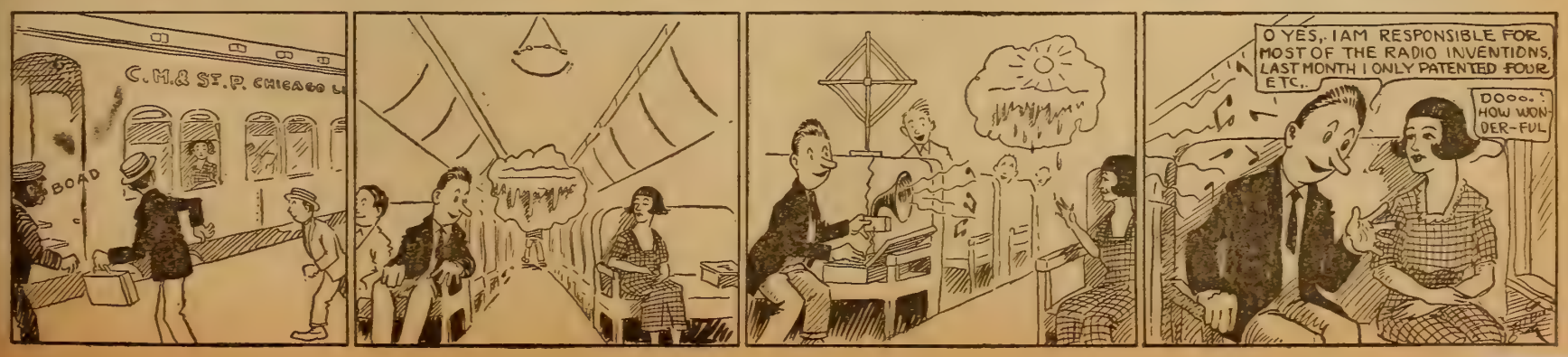
CLEVELAND.—Radio equipment on cars operated by American tourists can now be taken into Canada without payment of the former special duty, between the state departments of the United States and Canada at the instance of the American Automobile Association.

The question came up as the result of a trip to Toronto made by a member of the Cleveland Motor Club. The Toronto authorities permitted the American citizen to drive his car into Canada under the reciprocal arrangement that exists but held that the Radio outfit attached to his car was not a part of the automobile and required him to give a cash bond of $70.

Officials of the motor club took this matter up with the division of customs of the U. S. Treasury Department and with the Department of Customs and Excises of the Canadian government and as a result automobile reciprocity was extended to cover Radio equipment when attached to a car.

The most northerly Radio station in Canada is at Norway House, at the northern end of Lake Winnipeg.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Hot Stuff! It Even Melts Ice



GAY PAREE LISTENS TO BOULEVARD SET

CROWDS GATHER TO HEAR PUBLIC BROADCASTS

Fourteen Amplifiers in Front of Newspaper Office; Traffic Noise No Hindrance

By Carl H. Butman

PARIS.—Le Matin, the well-known Parisian Daily, is operating a concert Radio receiving set in front of its office here, where crowds gather to listen to news, concerts and statistics from fourteen amplifying horns. The amplifiers are sufficiently loud to be heard over the terrific traffic noises.

The public listening in station was installed by the Societé Francais Radio Electrique which broadcasts two concerts daily on 1780 meters. Other broadcasting is done by the Eiffel Tower on 2600 meters, and the Superior School of the Telegraph and Telephone Service of the Government on 450 meters.

No provision for a royalty to broadcasters has been made in France, beyond the payment of an annual fee of ten francs to the French Postal Service by owners of receiving sets. The Eiffel Tower programs are sent out for the general public, and the Superior School broadcasts are carried on in the interest of education and experimentation.

Sells Sets to Support Station

The Societé Francais Radio Electrique, however, states that it obtains its remuneration by the sale of the "Radiola" receiving sets adapted to the broadcasting system used by the Societé, explaining that in order to receive its concerts properly it is essential that a Radiola set be used. The assertions of the company are borne out by private set owners who say that other receiving sets are unsuitable for the company's broadcasts, concerts being heard very indistinctly with other sets, if at all.

Listening-in is becoming popular in France, although not as extensively as in the United States. Anyone may own a receiving set, but transmitting outfits must be licensed by the French government.

Most of the French broadcasts are on long wave lengths, except those of the Superior School. However, the French Military authorities are experimenting in broadcasting on waves as low as 45 meters.

Illinois Tri-City Fans Start Research League

ROCK ISLAND, ILL.—An organization called the General Radio Research league has been formed by experts and enthusiasts of Rock Island, Moline and Davenport, Iowa, for the purpose of promoting a more thorough knowledge of Radio in all its branches. The organization expects to establish headquarters fully equipped with a large transmitting and receiving station and supplied with all the latest literature on the subject.

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WD-11, WD-12, UV-199, UV-201-A, C-301-A ..... $3.50 each
UV-200, C-300, AP Detectors ..... 2.75 each
UV-201, C-301, AP Amplifiers ..... 3.00 each
DV-6, DV-6-A ..... 3.50 each
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FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the ones considered most informative for all and answers them in this column.)

Effect of .006 Condenser.
(Submitted by J. E. E., New York)

Question. I am securing excellent results from the Flewelling Super circuit, but find that the .006 condenser has no effect in the circuit. Why?

Answer. If you find that the .006 condenser has no effect in the circuit, then you may be very sure that you are not getting the correct action in your set and are, therefore, not securing maximum results, even though you seem to be pleased with what you are doing now. Your trouble is very probably due to not knowing what the set sounds like when it is working correctly. Place the .006 condenser in the circuit, as has been shown, and with the set not connected to any antenna or ground, adjust the tuning controls and the variable grid leak until you hear the small shrill whistle that we have spoken about so many times. When this is heard just study what effect on the whistle the various controls have and keep these effects in the action when you try an antenna or ground on the set. Note that in using the single condenser Super without antenna or ground, it is necessary to connect post "A" to post "B" in order to secure any effect from the tuning condenser.

Single vs. Three Condensers.
(Submitted by J. E. J., Oak Hill, Ohio)

Question. Is the circuit using the single condenser the same as the one previously shown, which uses three condensers? Will a varicoupler work as well as honeycomb coils? I have heard that this circuit is noisy in reception. Is this so?

Answer. The circuit using but one condenser is of course different from that using three condensers, but the action and the results are the same. It is simply an improvement and simplification of the original three condenser Super. There is no need to build the three condenser set if you have the single condenser layout.

Yes, a variocoupler will work about as well, especially if the rotor, which would be used as the tickler, is rewound so that it will have 100 to 130 turns upon it. This can easily be done by using smaller wire to enable you to get the larger number of turns in the same space.

The Flewelling set is noisy to some extent when tuning in a station, but after the station is correctly tuned all noises cease and reception is as clear as desired.

U. S. PUSHES RADIO MONOPOLY PROBE

But Trade Commission's Report Will Be Delayed Until Congress Meets

WASHINGTON, D. C.—Experts of the Federal Trade Commission who are investigating the alleged Radio monopoly as the result of the congressional resolution, report progress.

It was originally intended to complete the field work of the investigation by June 30. The commission is not speeding the investigation because it will not make public its results until Congress convenes in December. It is expected that the field work will be completed soon. The data will be assembled in the offices of the commission, then the whole report will be laid before the commission before it is sent to Congress.

Asks Radio Ordinance

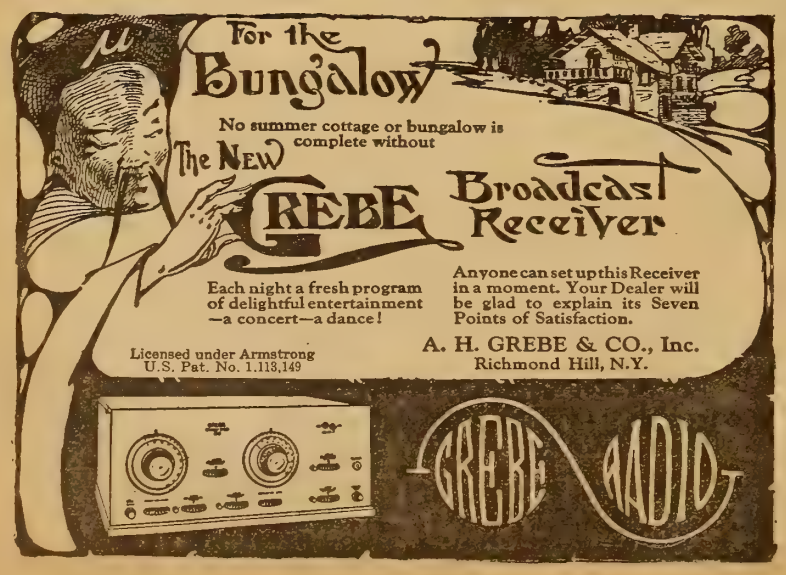
ELYRIA, O.—The Elyria Radio club is preparing an ordinance for the city council which will regulate the installation of Radio outfits in that city.

Power Amplifying Transformers

We can furnish tapped wound transformers in sets of two for experimental amplifiers. These transformers can be used on second and third stages without distortion in circuits similar to the so-called "push-pull" circuits.

Transformers are enclosed in heavy drawn steel case. Price $12.50 per set of two, at your dealers or sent direct upon receipt of price and dealer's name. Every transformer guaranteed against defect. Send today.

Modern Electric Mfg. Co.
Toledo, Ohio



Gen. Gouraud's Private Car Is Radio Equipped

Listens in to Programs as He Crosses Country

CHICAGO.—A Radio outfit is installed in the private car Berwick, in which General Henri J. E. Gouraud, the "Lion of the Argonne," and his party are making a tour of the United States. The outfit has enabled the famous French general who was the guest for six weeks of the Rainbow Division Veterans, to get greetings from cities as his train approached them. Pittsburgh, KDKA, was the first city picked up by the general's party. The private car Berwick was then in the Union Station in Washington.

Passenger Train Carries Set

CLEVELAND.—The B. & O. has recently introduced Radio-equipped trains. Trains Nos. 57 and 58, running between Cincinnati and Louisville are now carrying Radio receiving sets.

LANDLORDS?
Don't worry the landlord. Use a
RITTER PORTABLE LOOP
and no questions are asked. Price $1. By Mail 10c extra. $1
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ELECTRIC SOLDERING IRON
EVERY RADIO FAN has been looking for this iron for both radio and home use. Operates on A. C. or D. C. current. $2.28
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A Fixed Resistance Leak Combination—4 in ONE

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Price Complete 65c
Furnished in any value of Resistance from ½ to 10 Megohms.
The only Resistance Leak using no carbon, graphite or lamp black—and guaranteed to be **permanently constant.**
Separate Condenser and Mountings, 40c. Separate Leaks with Safe-T Handle, 30c.
At your dealers, otherwise send purchase price and you will be supplied postpaid.
Chas. Freshman Co. Inc.
Radio Condenser Products
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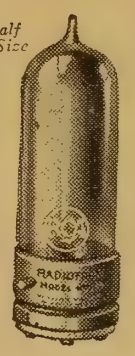
One Half Actual Size
Radiotron UV-199
The little tube of big performance $6.50

One Half Actual Size
Radiotron UV-201-A
The super-amplifier tube $6.50

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Radiotron WD-12
The standard base dry cell tube $6.50

Radiotron WD-11
The ideal dry battery detector $6.50

Radiotron WD-200
The long distance detector $5.00

For quality of reception and length of service, every man wants a RADIOTRON. Experienced amateurs and broadcast listeners know the sensitivity and dependable performance of these tubes. UV-199 for portable sets because it operates on flashlight batteries—WD-11 and WD-12, the dry cell tubes, for use everywhere—especially on farms and at the summer bungalow—UV-200 and UV-201-A for use with a storage battery. There is a Radiotron for every need.

Look for the RCA trade mark, and the name RADIOTRON. Each is a guarantee of satisfaction.

At the Nearest R C A Dealer

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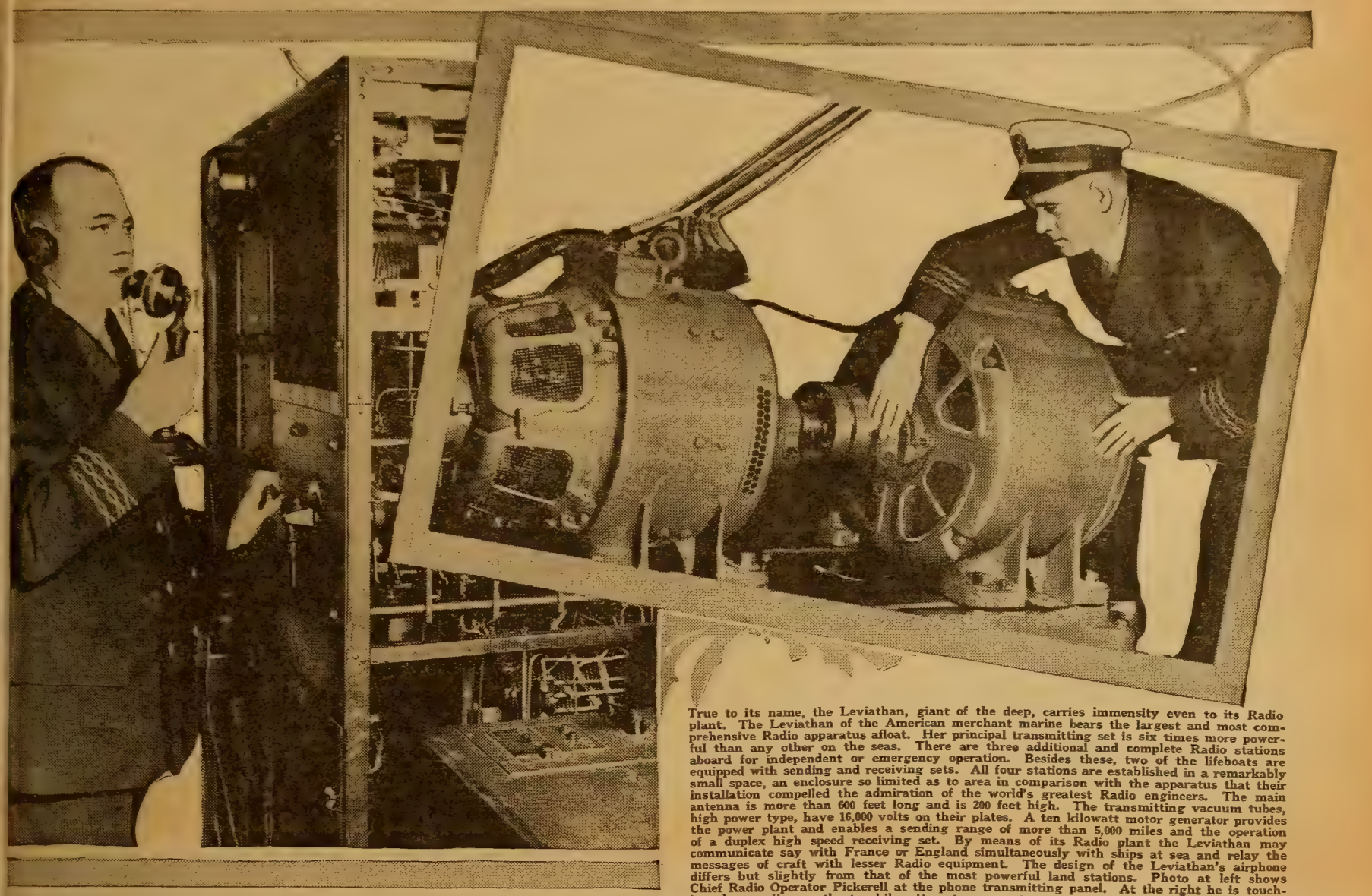
Sales Department, Suite 3002
233 Broadway, New York
District Sales Offices
10 South La Salle St., Chicago, Ill.
433 California St., San Francisco, Cal.

LEVIATHAN, KING OF OCEAN RADIO



True to its name, the Leviathan, giant of the deep, carries immensity even to its Radio plant. The Leviathan of the American merchant marine bears the largest and most comprehensive Radio apparatus afloat. Her principal transmitting set is six times more powerful than any other on the seas. There are three additional and complete Radio stations aboard for independent or emergency operation. Besides these, two of the lifeboats are equipped with sending and receiving sets. All four stations are established in a remarkably small space, an enclosure so limited as to area in comparison with the apparatus that their installation compelled the admiration of the world's greatest Radio engineers. The main antenna is more than 600 feet long and is 200 feet high. The transmitting vacuum tubes, high power type, have 16,000 volts on their plates. A ten kilowatt motor generator provides the power plant and enables a sending range of more than 5,000 miles and the operation of a duplex high speed receiving set. By means of its Radio plant the Leviathan may communicate say with France or England simultaneously with ships at sea and relay the messages of craft with lesser Radio equipment. The design of the Leviathan's airphone differs but slightly from that of the most powerful land stations. Photo at left shows Chief Radio Operator Pickerell at the phone transmitting panel. At the right he is touching the coupling on the ten kilowatt motor generator

© K. & H.

RECEIVING RECORDS? SEND 'EM IN—

(The following extracts are from letters of Radiophans, who have been doing good distance work. Readers submitting letters for publication should describe or diagram their sets.—DX Record Editor)

"On my set, which is a one-tube regenerative tuner, I have heard the following stations:

"CFCA, CKCE, Toronto, Can.; CKAC, CKCS, Montreal, Can.; KDKA, WCAE, Pittsburgh; KSD, St. Louis; KYW, WDAP, Chicago; WBZ, Springfield, Mass.; WDAF, Kansas City; WEAF, WJZ, New York; WGR, Buffalo; WGY, Schenectady; WHAM, Rochester; WHAS, Louisville; WHAZ, Troy; WIK, McKeesport, Pa.; WJAX, WHK, Cleveland; WLW, Cincinnati; WMAK, Lockport, N. Y.; WMC, Memphis, Tenn.; WOAW, Omaha; WOR, Newark, N. J.; WDAR, WIP, WFI, Philadelphia, Pa.; WWJ, Detroit.

"I think this is probably a pretty good record for one tube."—W. Mogan, 268 Carlton St., Toronto, Canada.

"I heard WFAA station of the Dallas News and Journal at Dallas, Texas, a distance of 950 miles.

"I use one WD-12 vacuum tube."—F. J. Williams, Box 703, Tampa, Fla.

"The following stations have been picked up with my one-tube portable set, type AD, Se-Ar-De:

"CFCN, 590; KPO, 705; KFI, 975; KHJ, 975."—S. S. At[illegible]od, Esperance, Wash.

"My cousin and I have been using the Reinartz hook-up for four months. We find it very good. We are using the one-tube set as was described in the RADIO DIGEST several months ago. I am sending the list of 125 stations we have heard:

CHXC, CKAC, KDKA, KQV, KSD, KWH, KYW, NAA, PWX, WAAB, WBAA, WBAH, WBAN, WBAP, WBAV, WBAY, WBU, WBZ, WCAE, WCAP, WCAU, WCAV, WCAX, WCBD, WCX, WDAF, WDAJ, WDAP, WDAR, WDZ, WEAB, WEAE, WEAF, WEAK, WEAN, WEAO, WEAR, WEAS, WEB, WFAA, WFI, WGAZ, WGI, WGM, WGR, WGY, WHAG, WHAK, WHAM, WHAS, WHAY, WHAZ, WHB, WHK, WIP, WJAS, WJAX, WJAZ, WJX, WJY, WJZ, WKAV, WKAY, WLAC, WLAG, WLAK, WLW, WMAC, WMAK, WMC, WOAW, WOC, WOO, WOR, WOS, WOV, WPAB, WPAL, WQAK, WQAO, WRW, WSB, WSY, WTAC, WWJ, WPAD, WSAI, WHN, WMAQ, WHAV, WKAW, WMAF, WQAA, WAAW, WIAB, WABE, WEAP, WDT. We are 125 miles east of Pittsburgh."—Raymond M. Bell, Lewistown, Pa.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00				11:30- 1:30	11:00- 1:00	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00		10:00-12:00		10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00		8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	345		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	390		10:00- 2:00		10:00- 2:00		10:00- 2:00	9:00-12:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WDT, New York, N. Y.	405			5:00- 5:50		9:00-11:00		
WEAF, New York, N. Y.	492		5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30		5:30- 6:30
WGI, Medford, Mass.	360		6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30		7:30- 8:30		7:30- 8:30		
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30					
WJY, New York, N. Y.	405				5:30- 9:30	5:30- 9:30		1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360		9:25-10:55				9:25-10:55	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas.	385		9:30-10:30		7:30- 8:30			9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00				5:45- 9:00		
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSAI, Cincinnati, O.	309		7:00- 9:00		7:00- 9:00		9:00-11:00	
WSB, Atlanta, Ga.	429	7:00-12:00	7:00-12:00	7:00-12:00	7:00-12:00	7:00 12:00	7:00-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

NEW STATION USES 15 AMPLIFICATION UNITS

WMAF, Fairhaven, Mass., Upsets Theory as to Distortion

NEW BEDFORD, Mass.—Another powerful broadcasting station has just come in for the delectation of Radiophans in WMAF, Col. Edward H. R. Green's new 500-watt transmitting station at Round Hills, just outside of Fairhaven. The station is connected with the WEAF studio in New York by telephone, so that the two stations may broadcast simultaneously, WMAF on 360 meters and WEAF on 492 meters.

The transmitter at the Green station is similar to that used at WEAF, WOO, WOR and many other prominent stations. The set employs two 250-watt oscillator tubes and two of the same size for modulators, connected in a constant current or Heising modulation circuit.

There are fifteen stages of amplification in the land line from New York, five at New York, six at three intermediate points in twos and four stages at Round Hills. This represents a tremendous amplification that until recently was considered impossible without accompanying distortion of a very disturbing nature. The WMAF antenna is supported by two steel towers 143 feet high. The four-wire flat top aerial is 115 feet long and has a vertical lead-in 140 feet long.

WRC, Call of New Station to Operate in Washington

WASHINGTON.—WRC is the call assigned to the Washington Radio Corporation station of this city. Officials of the corporation are planning to open the station early in August with due ceremonies and an excellent program, details of which are being arranged by the program manager, Ralph Edmunds, formerly identified with several opera companies and moving picture interests. His contact with musicians and actors, it is believed, will serve Mr. Edmunds excellently in preparing and executing exceptional broadcast programs. WRC is a duplicate of the large New York station, WJY-WJZ, on Aeolian Hall. At the outset, only about one-half kilowatt of power will be used. All parts of the transmitter are in duplicate, to provide for breakdowns.

NEW UNDERGROUND LIFE SAVING TESTS

CARRY ON EXPERIMENTS IN COAL FIELD

Bureau of Mines Assigns Engineer to Further Efforts to Rescue Imperilled Workers

WASHINGTON.—In connection with its efforts to keep apace with all safety and rescue developments, the Bureau of Mines is planning to continue its investigations with Radio communication underground. The development of Radio has been rapid and officials of the bureau feel that any application to mine rescue work must not be neglected.

J. J. Jakowsky, mechanical engineer, has been designated to undertake certain experiments in Radio communication at the Bureau's experimental coal mine at Bruceton, Pa. Mr. Jakowsky was attached to the Signal Corps during the war, where he had considerable experience with Radio work. The co-operation of the Radio Supervisor at Pittsburgh in the new Radio experiments has been promised by the Department of Commerce.

Earlier Experiments in Mine

Some months ago preliminary Radio experiments in sending and receiving underground at the Bruceton mine were conducted with partial success. In reporting the matter the bureau stated that the experiments consisted in receiving signals from without the mine by means of a receiver located inside the mine, and in sending and receiving messages underground through the strata. It was found that with a receiving instrument set at a point 100 feet underground, signals from Station KDKA, East Pittsburgh, Pa., could be heard distinctly, at a distance of about eighteen miles from the experimental mine. In sending waves underground, a 20-watt transmitter was used in such a manner as to send out continuous waves of 200 to 300 meters length. On account of the limited time no attempt was made to modify the apparatus in such a manner as to produce waves of greater length. It was found that signals could be heard distinctly through fifty feet of coal strata, but that the audibility fell off rapidly as this distance was increased.

Find Vertical Antenna Best

In all experiments a vertical antenna was found to give the better results. The horizontal antenna gave practically no reception. A loop of a single turn was used with fair results. All these experiments were tried with a wave length of 200 to 300 meters, except the reception from KDKA, which was 360 meters.

In conclusion the report stated:

"The present preliminary experiments, while unsuccessful in indicating any practical method of using Radio waves for underground communications, nevertheless indicate clearly that electromagnetic waves may be made to travel through solid strata. The absorption or loss of intensity with distance is very great for the short wave lengths used in these experiments. Longer wave lengths are known to suffer less absorption and may possibly be found practically effective under certain conditions."

DYING MAN LISTENS IN TO RADIO SERMON

SCHENECTADY, N. Y.—An aged resident of Trumansburg, N. Y., on his deathbed, listened in with members of his family to a Radio sermon recently delivered by Rev. G. A. Bierdemann, pastor of the Trinity Evangelical Lutheran Church of Albany, N. Y. The sermon was broadcast from WGY, the station here of the General Electric Company. The dying man enjoyed every word of the broadcast.

Use Remote Control to Broadcast Organ Tunes

Instrument and Huge Choir Heard Clearly In Los Angeles Test

LOS ANGELES, CALIF.—For the first time in Los Angeles an organ recital and choir of 130 voices were picked up by remote control panels and broadcast recently with clear beauty to the listeners in of Radioland by KHJ, the Los Angeles Times.

Commencing at 9:30 a. m., KHJ sent out organ music for half an hour, transmitting the splendid tones of the new $50,000 organ in the First Methodist Episcopal church, of which the Rev. Elmer E. Helms is pastor. Prof. Arthur Blakeley, noted organist, presided at the console of the Ewart Watchorn Memorial organ.

Lightning Bolt Hits WGI; Antenna Tower Untouched

MEDFORD, MASS.—If any further evidence were necessary to prove the safety of Radio, there was plenty of it furnished here recently during a severe electrical storm. Lightning entered the Amrad broadcasting station, WGI, during the worst of the storm which was very severe locally. Investigation showed that it was attracted by the electric light wires. These were completely demolished and service was paralyzed. However the 320-foot steel antenna tower used in connection with the broadcasting was not touched, nor the powerful broadcasting apparatus, thereby proving that a Radio antenna and a receiving or transmitting set does not attract lightning in any way.

Bars Church Set as Too Modern

NEW YORK.—Bishop William T. Manning recently ordered removed from the high altar of the Cathedral of St. John the Divine, a $9,000 Radio receiver and a system of amplifiers, declaring the installation was "carrying modernism a bit far." He made no objection to the system as a whole.

DEBATE BY GEORGIA LAWMAKERS ON AIR

Listeners in Southeast Hear Session Through "Old Reliable," Station WGM

ATLANTA, GA.—Station WGM of the Atlanta Constitution here, recently broadcast for the first time a full morning session of the Georgia house of representatives.

The broadcasting of the capitol sessions by WGM constitutes the opening of a new field of service for Radiophone broadcasting stations. It means that the entire southeastern part of the United States is covered by the doings of the legislators in their sessions.

The session featured debate on bills providing for investigation of the highway department and for increased state revenues.

Station WGM broadcasts the sessions regularly now as a part of its regular service to Georgia listeners in.

WSAT to Again Transmit Concerts Over Panhandle

PLAINVIEW, TEX.—Station WSAT of this city will resume the sending out of entertainment programs soon with a much larger and better set. The Plainview Electric Company, which owns and operates the station, will be assisted by the Chamber of Commerce in arranging programs, which will also give reports on Panhandle road conditions, crop reports from this section and Plainview news items.

The new broadcasting set uses a 300-meter wave length. Its aerial is one of the highest structures in West Texas. The broadcasting room is located in the municipal auditorium and a short extension to the stage will enable the operator to broadcast all programs given in the auditorium.

GERMANS FLASH 51,139 WORDS IN SINGLE DAY

Bulk to U. S.; Operators Set New Record

NAUEN, GERMANY.—German Radio stations flashed 51,139 words abroad in one day recently, surpassing all previous records. 35,420 words went to the United States while most of the remainder was sent to Spain, Italy, Russia and Egypt. The bulk of the traffic was handled here and at the Eilwesen station.

Extensive changes now in progress on POZ, the plant here, with the object of increasing the power and flexibility. Separate antennae are being constructed for the American, Asiatic, African and the two European services. Special preparations are being made for the new Buenos Ayres service, which is to be opened for public communication in the course of a few months. POZ will work with the station at Monte Grande, near Buenos Ayres, which is to be maintained and operated by a combination of English, French, German and American Radio companies.

YOU DON'T NEED Tubes to get out of town. Even in the summer I hear Omaha, Kansas City, Fort Worth and Davenport on my crystal set without amplification. Works over 1,000 miles in winter. Send self-addressed envelope for further information or $1.00 for complete copyrighted drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED.
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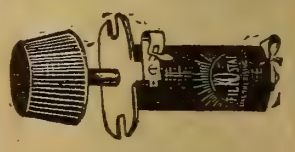

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Two-Stage Amplifying Unit for use with the Melco-400, also regularly costing $35, now only.... $17.50

The **Melco Type 400 Radio Receiver** covers all broadcasting ranges thoroughly from 165 to 600 meters and assures a great degree of selectivity on the average small outdoor aerial. The **Melco** is the ideal summer set because it is least affected by electrical disturbances. Sold with our absolute money-back guarantee.

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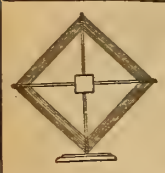

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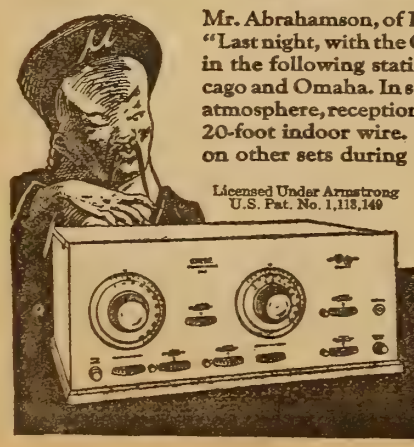

Mr. Abrahamson, of Detroit Elec. Co., writes on July 7:—"Last night, with the Grebe Broadcast Receiver, we tuned in the following stations: N. Y. City, Schenectady, Chicago and Omaha. In spite of high temperature and heavy atmosphere, reception was exceptionally clear, using only 20-foot indoor wire. Unable to receive any results at all on other sets during the same time."

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PANELS—3/16" Thick

	Hard Rubber	Bakelite		Hard Rubber	Bakelite
7x10	$0.95	$1.35	7x18	$1.65	$2.45
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The Week's Advance Broadcast Programs

Tuesday, August 7

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Light Cavalry," Star Orchestra; Margaret Sloan, soprano; "Annie Laurie," "Serenade," W. Woods, cornet; "La Czarine," "Spring Song," "The Merry Widow," March from "Aida," orchestra.

KDKA (Eastern, 326), 7:20 P. M., Musical program, "Triumphal March," "The Hunters," "Neapolitan Street Song," "The Ballad" "We'll Keep Old Glory Flying," "Bridal Chorus from the Opera the Rose Maiden," "All the World Is Sunshine," "Stars of the Summer Night," "Laughing Song," "Indian Love Song," "Until I Awake," "Kashmira Love Song," Myrtle Brown, soprano, Clarence Wylam baritone, Juliet Bartlett and Grace Holloway, accompanists, assisted by Sebastian Sapienza, clarinet.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert featuring Sherdina B. Aston; 2:30-3:30, Matinee musicale, arranged by Sherdina B. Aston, Marimba; 6:45-7:30, Children's hour, Uncle John; 8:00-10.00, Program, arranged by Alhambra Chamber of Commerce.

KPO (Pacific, 423), 8:00-10.00 P. M., Musical program, arranged by Lela Gordon Saling, soprano.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Musical program, May Goldberg, soprano, Harriet Weeber, accompanist, Mark Love, baritone; Dorothy Lois Nolan, Cope Harvey's Orchestra at College Inn; Herbie Mintz, pianist.

WDAR (Eastern, Daylight Savings, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Children's hour, short talk and music test; 4:30-5:55, Short talk, Affairs of the Heart, Betsy Logan; 5:55, Baseball scores.

WFAA (Central, 476), 8:30-9:30 P. M., Band from Garland, Texas, in concert with L. R. Vidier, director; 11:00-12:00, Orchestra and musicians in vocal and instrumental groupings from Garland, Texas.

WFI (Eastern, Daylight Savings, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; 6:30, Final baseball scores; dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Boy Scout Radio Corps, under direction of a Philadelphia troop; 8:30, Concert; 10:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 4:00-5:30, Catherine Stang, violinist; Martha Gomph, harpist; Tea time music, Hotel Statler's Palm Room; 6:35-8:45, Digest of the day's news; topics of scientific interest; 11:45, Weather.

WGY (Eastern, 380), 7:45 P. M., Musical Program, "Bohemian Girl" Balfe Band; Reading, "The Boon of the Summer Camp," Henry W. Wack; "Lassus Trombone," "Twilight Echoes," Band selections; "Angel's Serenade," Hepzibah C. James, soprano, Carleton James, accompanist; "The Rey Waltes on Scotch Melodies," Band; "Elegie," Hepzibah C. James, soprano; "Sunny South," "The Fuzzy Wuzzy Bird," Band selections; "I've Something Sweet to Tell You," Hepzibah C. James, soprano; "Hunting Scene," "Home, Sweet Home, the World Over," Band selections.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00, Concert, Al Gorman's Orchestra; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Artist recital; 6:00, Dinner dance music, Dick Regan's WIP Little Symphony Orchestra, final baseball scores; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talk and song recital; 9:00, Dance music.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News.

WLW (Eastern, 309), 10:00 P. M., Musical program, "Kentucky Babe," Deidel, "Twilight Is Lovelight," arranged from Rubenstein's Melody, Maud Davis, soprano, Norma Hetsch, alto, A. C. Keffen, tenor, Fred Otto, bass; Violin solos, Stanley Davis accompanied by William Griebel; Songs, L. & N. Quartet, "Good Night, Beloved," Ciro Tinsuti; Reading, Mrs. Wm. Griebel, "The Last Conversation of Sally in the Hollow"; Entertainment by Circle Orchestra, latest dance selections.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M. Glenn Dillard Gunn School of Music; 9:00, La Salle Roof Garden Orchestra direction E. E. Sheets, Jr.; 9:15, Lillian Moyer, soprano.

WMC (Central, 500) 8:30 P. M., Musical program, Burks Norelty Orchestra; 11:00, Midnight Frolics.

WOC (Central, 484), 3:30 P. M., Educational talk, A. G. Hinrichs; 5:45, Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band: 7:00, Concert; News Orchestra; Schmeman's Band.

Wednesday, August 8

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Faust," Star Orchestra; "The Star," Lois Erie Watson, contralto; "Chanson Arabe," Manny Roth, violinist; "Cavalleria Rusticana," orchestra; "Three Fishers," Miss Watson; "Luna," orchestra; "Alice Where Art Thou," Manny Roth; "One Fleeting Hour," orchestra; "The Call of the Maytime," Miss Watson; "Moment Musical," orchestra.

KDKA (Eastern, 326), 7:30 P. M., Concert, Little Symphony Orchestra under direction Victor Saudek, assisted by George Kirk, baritone; Orchestra numbers: Overture, "Fingal's Cave," "Mendelssohn Concert Waltz," "Summer Evening," "The Firefly," "Serenade," "The Last Chord," "Scenes from the Merry Widow," "The Masked Ball"; Baritone solos, "The Evening Star," "The Toreador Song," The Armorer Song."

KHJ (Pacific, 495), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's hour, Uncle John; 8:00-10:00, May Robison, pianist, and Altheda Oliver, mezzo-soprano.

KSD (Central, 546), 8:00 P. M., Music from St. Louis Fashion Show, Municipal Theater.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Musical program by Lia Eckes, dramatic soprano, Genevieve Byrne, pianist, K. S. Sheppard, tenor, C. W. Foster, baritone, Mrs. C. Bradley, accompanist; Cope Harvey's Orchestra at College Inn, Hotel Sherman; "Open the Gates of the Temple," "The Voice in the Wilderness," "Concert Etude," "The Two Larks," "O Mio Fernado," "My Ain Folk," Popular dance Selections, Cope Harvey's Orchestra; "My Mother," "Whispering Hope," "Take Joy Home," "A Dream," "Love's Dream," "Butterfly Etude," "Oh Promise Me." Under the Beech Tree."

PWX (Eastern, 400), 900:-11:30 P. M., Concert, General Staff Band of the Cuban Army.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Popular selections, Arcadia Cafe Concert Orchestra; 4:30-5:55, Recital:5:55, Baseball scores:8:00-1:00 A. M., dance music, Arcadia Cafe Dance Orchestra, Howard Lanin, director; special studio features.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert, Loretta Kerk, pianist; 6:30, Final baseball scores; dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M. Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 4:00-5:30, Catherine Stang, violinist, Martha Gomph, harpist; Tea time music, Hotel Statler's palm room; 6:35-8:45, Digest of the day's news; 9:00-11:45, Concerts; 11:45, weather.

WHAS (Central, 400), 400-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00, Concert, Mrs. Jane W. Murrell, Mrs. J. P. Ferguson, Anna Blankenbaker, Mary Aubrey, Victoria Meagher, Marie Koehler, Mary Gordon, sopranos; Mrs. Shirley Graves, Josephine Miller, contraltos, Ruth Millet, Dorothy Miller, Lucille Schneider, pianists; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Concert, WHK Trio; Babson's Radio Release; Automobile Road Report.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 4:00, Piano solos; 6:00, Dance music, final baseball scores; 7:00-7:30, Bedtime stories, Uncle WIP.

WLW (Eastern, 309), 8:00 P. M., Selections by Aichele Novelty Dance Orchestra; Violin solos, Rubin Phillips; Soprano solos, Mrs. Agnes Soeller, accompanied by her daughter, Elsa, "The Lost Chord," "He Was a Prince"; Talk by T. C. O'Donnell, Editor Writer's Digest; Piano solos, Larry Hess, "Hungarian Rhapsody," "Nola"; Soprano solos, Elizabeth Hess, Larry Hess, accompanist, "Spring Awakening," "Prince Charming"; Selections by Aichele Novelty Dance Orchestra.

WMAQ (Central, Daylight Saving, 448), 5:30 P. M., Cosmopolitan School of Music; 7:00, Georgene Faulkner, the Story Lady, stories for children; Mrs. Amanda Burhop, pianist; 9:00, LaSalle Roof Garden Orchestra, direction E. E. Sheets, Jr.; 9:15, Evelyn Kahn, soprano; Granville English, tenor.

WOC (Central, 484), 3:30 P. M., Educational talk, Clyde C. Kern; 8:00, Recital, Erwin Swindell, organist; 10:00, Musical program, Martin Lerch, tenor, Louis Wareham, baritone, W. C. Kissinger, violinist, Dr. Penrose, pianist.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M. Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt, trumpets; 7:30-7:45, Baseball scores and police reports.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00, News Orchestra; Schmeman's Band.

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

Thursday, August 9

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Egyptian," Star Orchestra; "The Fairy Lute," Jean McLean, soprano; "Melody in F," Jacques Stern, cellist; "Graceful Dance," orchestra; "Good Morning Brother Sunshine," Miss McLean; "Only a Year Ago," orchestra; "Air," Mr. Sterin; "I Wonder Why," Miss McLean; Selection from "The Chocolate Soldier," orchestra.

KDKA (Eastern, 326), 7:20 P. M., Musical program, soprano solo, "Ah, Love but a Day," "Miserere," "Fylbelin," "Flow, Gently, Sweet Afton," "Thou Art Weary," "Gypsy Song," "Una Furtina Lagrima," "The Little Irish Girl," "The Lilac Tree," "Hungarian Rhapsody," "Old Folks at Home," "Caprice Viennois."

KHJ (Pacific, 395), 12:30-1:15 P. M., Musical program; 2:30-3:30, Matinee musicale; 6:45-730, Children's hour, Uncle John; 800-10:00, De Luxe program.

KPO (Pacific, 423), 8:00-9:00 P. M., Organ recital, Gladys Salisbury; 9:00-10:00 P. M., Concert, Prof. Lopa's Royal Hawaiian Orchestra.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Herbie Mintz, pianist, Cope Harvey's Orchestra at College Inn, Hotel Sherman.

WDAR (Eastern, Daylight Saving, 395), 12:00-12.54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Short talk

(Continued on page 9)

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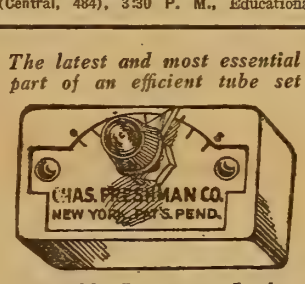

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Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
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Dubuque, WQAK
Fort Dodge, KFEB, WEAB
Gladbrook, KFIK
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Lamoni, KFFV
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Paterson, WBAN
Trenton, WMAL, WOAX

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Wahpeton, WMAW

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Cincinnati, WAAD, WHAG, WIZ, WLW, WMH, WSAI
Cleveland, KDPM, WHK, WJAX
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Fairfield, WL2
Granville, WJD
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Yankton, WNAX

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Lawrenceburg, WOAN
Memphis, WMC

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Austin, WCM, WNAS
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College Station, WTAW
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El Paso, WDAH, WPAT
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Utah:
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Spokane, KFDC, KFIO, KFZ
Tacoma, BE1, KFBG, KFEJ, KGB, KMO
Walla Walla, KFCF
Wenatchee, KDZI, KZV
Yakima, KFIQ

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Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

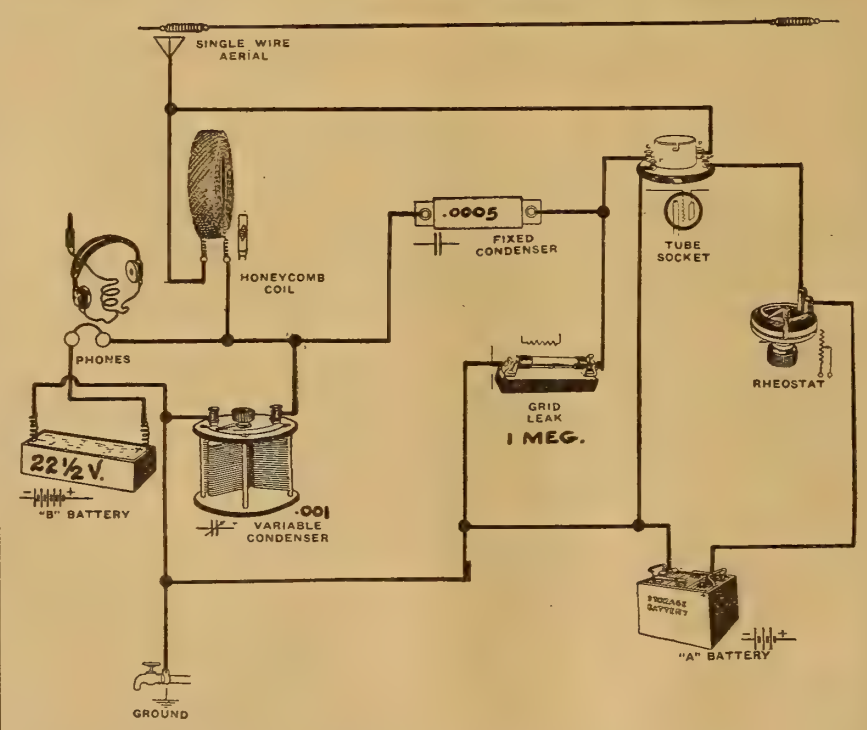
Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

FOR WIDE WAVE LENGTH RANGE



THIS simplex diagram presents an extremely efficient circuit; it is not only simple to construct, but covers a wide range of wave length. The cost of necessary apparatus is low; an assortment of honeycomb coils, including 35, 50, 75 and 100, will supply even the unusual demands of the ordinary fan. The device resembles somewhat the well-known ultra-audion; its operation is very similar. Tuning is confined to the variable condenser, which should be of the vernier adjustment type.

A detector tube can be used with 22½ volts on the plate, but if an amplifier tube is used it probably would be advisable to increase the plate voltage.

The rheostat used depends on the type of tube, likewise the voltage of the A battery.

The Reader's View

Results with "Nacireman"

In one of your recent issues you published "Nacireman" latest easy super hook-up RD-87. This hook-up has been tested satisfactorily, results with the following minor changes: It was found that a Cunningham No. 301 with 45 volts on the plate gave better results than a WD-11, NV No. 199 or No. 201-A with higher or lower voltages on the plate. It was also found that an aerial of No. 14-gauge insulated wire 25 feet long made in circular form around the four sides of an enclosed porch and insulated from the building gave much better results than your idea of a piece of wire under the carpet or on the picture moulding.

In addition to using a No. 301-A Cunningham tube, I am using a Cutler-Hammer 30-ohm rheostat and potentiometer, a Baldwin split variometer for inductance and two 23-plate variable condensers without vernier I have found the rheostat to be very critical, but when properly adjusted the volume on stations up to 12 miles is the equivalent of a detector and one step of audio.

It is my opinion that the C-2 condenser for tuning the 750-turn soup coil can be replaced satisfactorily by a .0005 fixed mica condenser. Very great care must be taken in the wiring; avoid parallel leads and crowding on account of body capacity effect.

Your description of this hook-up says nothing about distance. For your information, with the above-described hook-up I have been able to pick up stations WIP and WFI in Philadelphia, which are about 90 miles (air line) from my location.

For the fan who is interested in a non-power loud speaker for home use, this hook-up, in my opinion, with two steps of audio frequency, certainly should give very satisfactory results. If convenient I would be glad to see in some future issue of The Radio Digest what you consider the proper manner of applying amplification to the RD-87.—E. P. Parker, New York City.

ADVANCE PROGRAMS

(Continued from page 7)

Betsy Logan; musical features; 4:30-5:55, Recital; 5:55, Baseball scores.

WFAA (Central, 476), 8:30-9:30 P. M., Masonic service program under direction of Grand Lodge of Texas Masonic Service Committee.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital; 6:30, dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; Final baseball scores; 7:00-7:30, Children's Own Half Hour, stories by Cousin Sue; 8:30, Concert and dance music.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 4:00-5:30, Catherine Stang, violinist; Martha Gomph, harpist; Tea time music, Palm Room, Hotel Statler; 6:35-8:45, Digest of the day's news, Boy Scout Radiograms, Employment Bulletin; 11:45, Weather.

WGY (Eastern, 380) 7:45 P. M., Musical Program "My Own," "When You Lose Your Heart to Someone," "Mose," "Remember the Waltz," Charles Fisher and Frank Gorman, Abe Olman, accompanist and composer; Camp Fire Girls' Program, "Walking Song," Talk, "Camp Fire Ideals," "The Camp Fire Watchword," "The Desires and Law of the Fire," "Boat Song," "Credo of the Camp Fire," "Haunt of the Witches," contralto solo, "Ode to the Fire," song, "Mystic Fire," Camp Fire Girls; "A Story of the Seven Crafts," "The Star," soprano solo; "Mammy's Moon," "Lay Me to Sleep," Camp Fire girls.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00, Concert, arranged by Mrs. John E. Harmon, Jr.; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Song recital; 6:45, Final baseball scores; 8:20, Dance music, Ace Brigode and his Ten Virginians, Hotel Walton Roof; 9:00, Organ recital, Karl Bonawitz.

WJAX (Eastern, 390), 8:00 P. M., Concert, Cleveland Yacht Club Boys' Band.

WLW (Eastern, 309), 10:00 P. M., Program by Wurlitzer Concert Company, Direction William H. Duning, "Shipmates," "Old Bass Viol," Gordon Osterhaut, baritone; "Souvenir," "Old Refrain," Henry Risch, blind violinist; Reading, Gordon Osterhaut, "Down by Bingham's Grocery Store"; Selections, Mattie Lee Risch, blind soprano; Sinclair Dance Orchestra, latest dance selections.

WMAQ (Central, Daylight Saving, 448), 9:00 P. M., La Salle Roof Garden Orchestra, direction E. E. Sheets, Jr.; 9:15, Faye W. Gettrust, soprano.

WMC (Central, 500), 8:30 P. M., Musical program, Chisca Philharmonic Orchestra, Miss Clara Ahern, director.

WOC (Central, 484), 3:30 P. M., Educational talk, Karl G. Stephan; 5:45, Chimes concert; 6:30, Sandman's visit.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker's Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt, trumpets; 7:30-7:45, Sport results and police reports.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00, Concert, News Orchestra; Schmeman's Band.

Friday, August 10

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "A Day in Venice," Star Orchestra; Rupert Lucas, baritone; "Nocturne in E Flat," Harry Adaskin, violinist; "Pleading," "Pizzicato Polka," orchestra; "Prelude to the Deluge," Mr. Adaskin; "Espana," "Serenade D'Amour," orchestra.

KDKA (Eastern, 326) 7:20 P. M., Concert by the KDKA String Ensemble.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's hour, Uncle John; 8:00-10:00, Program by Letter Carriers' Band of Los Angeles.

KSD (Central, 546), 8:00 P. M., Concert, Concordia Gymnastic Society Band.

KYW (Central, Daylight Saving, 345), 10:00-11:30 P. M., Musical program, Herbie Mintz and Harry Geise, pianists; Cope Harvey's Orchestra at College Inn; Diana Shanks, pianist and Cele Shanks, pianist; Diana Shanks will play "Florence," "Sparks," "Grand Valse"; Cele Shanks will play: "Hungarian," "Witches Dance," "Contrabandist"; Diana and Cele Shanks will play on two pianos: "Barber of Seville."

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical selections, Arcadia Cafe Concert Orchestra; short talk by Betsy Logan; 4:30-5:55, Musical program; 5:55, Baseball scores; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00-1:00 A. M., Short talks; Artist recital; dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; playlet by the Groonough players; songs by Harry Glyn. **No Saturday or Sunday Programs.**

WFAA (Central, 476), 8:30-9:30 P. M., Mrs. V. O. Bosser, violinist, Mrs. Eugene Duggan, singer.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Address; 3:15, Musical selections; 6:30, Final baseball scores; dinner music, Meyer Davis Bellevue Stratford Orchestra. **No Saturday or Sunday Proram.**

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 4:00-5:30, Catherine Stang, violinist; Martha Gomph, harpist; Tea time music, Palm Room, Hotel Statler; 6:35-8:45, Digest of the day's news; Road reports; 9:00-11:45, Concert; 11:45, Weather.

WGY (Eastern, 380), 7:45 P. M., Musical program and three one-act plays by WYG Student Players; Comedy, "A Marriage Proposal"; Domestic tragedy, "The Holdup;" Comedy, "The Best Man;" "2nd Sonata in G Minor-Op. 22," Anninna McCrory Evans, pianist; 10:30, Fox Trot, "Holding Hands," Reuthing's Imperial Orchestra; Fox trot, "Tillie," orchestra; "Drifting Dreamland," Arthur Gunn, baritone; "Why Don't My Dreams Come True," "Grand Daddy," "Take a Look at Molly," orchestra; "Climb on Top of Your Trouble," Arthur Gunn; "Sun Kist Rose," "Sometime," orchestra, "Sunset Valley," Arthur Gunn; "I'd Rather Fox Trot than Waltz," "Oh! You Little Sun-in-your-Gun," orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00, Musical program, Charles Jackson's Novelty Orchestra, Margaret Edwards, soprano; Reading, Eugenia Baumgardner.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45, Radio Baseball Dope by Monte Cross, Old-time baseball star; 7:00-7:30, Bedtime stories, Uncle Wip. **No Saturday or Sunday Programs.**

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Chimes; 9:00, LaSalle Roof Garden Orchestra direction E. E. Sheetz, Jr.; 9:15, F. W. Agard, tenor, Robert Cowgle, pianist.

WMC (Central, 500), 8:30 P. M., Musical program, Alaskan Garden Orchestra, Joe Bennett, director; 11:00 P. M., Midnight Frolics.

WOC (Central, 484), 3:30 P. M., Educational talk, C. E. Wilent; 5:45, Chimes concert, 6:30, Sandman.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; trumpets; 7:30-7:45, Sport results and police reports; 7:45-8:30, Dinner music, Adelphia Hotel Roof Garden Orchestra, A. Candelori, director; 8:30, Address and song recital; 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra, Walter Miller, director; 11:10, Dance music, Hotel Adelphia Roof Garden Orchestra. **No Saturday or Sunday programs.**

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:00, Concert, News Orchestra; Schmeman's Band.

Saturday, August 11

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Mignonette," Star Orchestra; Ina Lockart, contralto; "Romance Sans Paroles," Jacques Sterin, cellist; "Prelude," "Berceuse," orchestra; "Chanson Triste," Mr. Sterin; "The Geish," orchestra.

KDKA (Eastern, 326), 7:20 P. M., Concert under direction T. J. Vastine, selection: "The Lost Continent," Suit in four parts consisting of "Nocturn and Morning Hymn of Praise," "A Court Function," "I Love Thee," "The Destruction of Atlantis," "Espanola," selection from Rigoletto; Clarinet solo, "Potpourri Musical Joker"; Cornet duet 'Al and Pal," "Pas Das Fleurs."

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's hour, Uncle John; 8:00-10:00, De Luxe program.

KPO (Pacific, 423), 8:00-10:30 P. M., Concert, Art Weidner's Fairmount Hotel Dance Orchestra.

KSD (Central, 546), 8:00 P. M., Concert, Missouri Theater talent.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Harry Geise, pianist; Cope Harvey's Orchestra at College Inn, Hotel Sherman.

PWX (Eastern, 400), 9:00-11:30 P. M., Musical program, Maria Fantoli, soprano; Gustavo Carrasco, tenor.

WFAA (Central, 476), 8:30-9:30 P. M., Bon Veda Mixed Quartet in recital, George Ashley Brewster, director and accompanists; 11:00-12:00, Piano recital, William A. Sutherland, Jr.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 4:00-5:30, Catherine Stang, violinist, Martha Gomph, harpist; Tea time music, Palm Room, Hotel Statler; 6:35-8:45, Digest of the day's news; 11:45, Weather.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; 7:30-9:00, Concert, Henry M. Shilling's Orchestra; Reading, "An Interesting Historical Episode."

WMAQ (Central, Daylight Saving, 448), 7:00 P. M., Music from the Chicago Theater; 9:00, LaSalle Roof Garden Orchestra, direction E. E. Sheetz, Jr.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45, Chimes concert; 6:30, Sandman; 9:30-10:00, Dance program, P.S.C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30, Concert, Schmeman's Band.

Sunday, August 12

KPO (Pacific, 423), 8:30-10:00 P. M., Concert, Rudy Seiger's Fairmount Hotel Concert Orchestra.

KYW (Central, Daylight Saving, 345), 10:00 A. M., Sunday morning service broadcast from St. Chrysostom's Church, Rev Dr Norman Hutton, rector, 5:00-8:00 P. M., Classical and semi-classical selections by Sisson Trio, broadcast from dining room of Sisson Hotel.

WFAA (Central, 476), 9:30 A. M., Sacred music recital; 10:00-11:00, Paul E. Ashley's Texans Orchestra; 2:30-3:30 P. M., Radio Chapel Bible class, half hour of bible study, half hour of Gospel songs.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 3:00, Vesper service; 4:00-5:30, Catherine Stang, violinist, Martha Gomph, harpist; Tea time music, Palm Room, Hotel Statler; 6:00-6:30, George Albert Bouchard, organist; 11:45, Weather.

WGY (Eastern, 380), 10:00 A. M., "Sarabande," Edward Rice, violinist, Doris Francis, organist; Doxology, call to worship; Invocation and Lord's Prayer; Reading, Gloria; Scripture Lesson; Hymn, "Through the Night of Doubt and Sorrow"; Prayer; Offertory, violin solo with organ; Hymn, "Jerusalem the Golden"; Sermon, John W. Langdale, D. D.; Prayer and benediction; Silent prayer; Postlude, "Meditation," violin solo with organ.

WHAS (Central, 400, 9:57 A. M., Organ music; 10:00, Church services, Methodist Temple, Rev. Dr. Wilfred Clark Phelps, substitute pastor; Temple Choir, Mrs. Jane Graves, organist; 4:00-5:00 P. M., Concert under direction of Hazel McClellan.

WHK (Eastern, 360), 8:00 P. M., Operatic selections and vocal music, WHK Orchestra and soloists.

WMC (Central, 500), 11:00 A. M., Services from St. Johns Methodist Church.

WWJ (Eastern, 517), 2:00 P. M., News Orchestra 3:00, Concert, Schmeman's Band; 7:30 P. M., Church Services, St. Paul's Cathedral.

Monday, August 13

KPO (Pacific, 423), 8:00-9:00 P. M., Organ music; 9:00-10:00 P. M., Musical program, Adelaide Paxton, violinist; Ruth Friedlander, pianist; Giuseppe Carcione, tenor; Mrs. S. Y. Frazer, soprano.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical features; 4:30-5:55, Concert; short talk, Affairs of the Heart by Betsy Logan; 5:55, Baseball scores.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert by Philadelphia artists, Loretta Kerk, pianist; 6:30, Final baseball scores; dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist, Hotel Statler; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 4:00-5:30, Catherine Stang, violinist; Martha Gomph, harpist; Tea time music, Palm Room, Hotel Statler; 6:35-8:45, Digest of the day's news; 9:00-11:45, Concert, 11:45, Weather.

WGY (Eastern, 380), 7:45 P. M., "The Gallant Salamander," Roland James, baritone, David J. Woolcock, accompanist; "The Lost Watch," Carey Booth, tenor; Reading, "Something of Interest to All" (Courtesy Youth's Companion); "Will-o'-the-Wisp," Roland James; "Castanettes," Mrs. Van Veachton Rogers, pianist; "Open the Gates of the Temple," Carey Booth and David Woolcock; "The Lord Worketh Wonders," Roland James; "War March of the Priests," Mrs. Rogers; "Vale," Carey Booth; "The Moon Hath Raised Her Lamp Above," Carey Booth and Roland James.

WHAS (Central, 400), 4:00-5:00 P. M., Concert Mary Anderson Theater Orchestra.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45, Radio Baseball Dope, Monte Cross, old-time baseball stars; 7:00-7:30, Bedtime stories, Uncle Wip.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports; 7:45, Dinner music, Hotel Adelphia Roof Garden Concert Orchestra, A. Candelori, director; 8:30, Selections, WOO Orchestra, Robert E. Golden, director; song recital, artists to be announced by Radio; 9:30, Organ recital, Mary E. Vogt.

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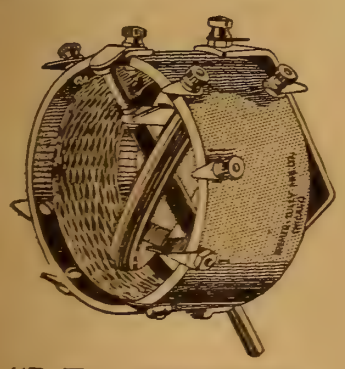

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly.....$5.00 | Foreign.....$6.00
Single Copies, 10 Cents

Vol. VI Chicago, Saturday, August 11, 1923 No. 5

Cool Waves from the North Pole

The Top of the Earth Heard From

RADIOPHANS and polar exploration fans and everybody who is interested in outdoor adventure of any sort are having a good time this summer. Heretofore, when an arctic explorer reached a point beyond the last telegraph station to the northward he and his party faded into oblivion until their return, which might be in one year or in three, or never.

Now, with Donald MacMillan's good ship Bowdoin equipped with the best Radio transmitting and receiving apparatus in the world, and with Donald Mix to run it, the quietest stay-at-home has his fill of vicarious travel. Those who live in the hottest cities may keep their minds cool as they voyage along with the Bowdoin.

Romance grows not less, with the progress of invention, but more, and its thrills become more accessible.

Delving Into the Mysteries

When the Set You Have Built Works, It Thrills

ONE of the principal reasons why Radio has taken such strong hold on the public is the fact that the new science allows one to experiment to his heart's content—to delve into the unknown where mysterious phenomena abound. No other field thus far discovered presents such an opportunity for research to the person who has had but little training and practice as to the fundamentals.

We continually hear of persons who, without previous knowledge of the science, construct their own Radio sets. Thousands of men and women of almost every age spend hours day and night, winding coils, tearing down their sets and rebuilding them, changing various units, and applying various "kinks" as they come to mind. The concert or lecture brought to their ears is really secondary. It is the mysterious working of the apparatus which fascinates the experimenter, and gives him the biggest thrill.

While the construction of a Radio receiver according to some circuit or diagram requires but little technical knowledge on the part of the builder he must at least follow the plans carefully, in a painstaking manner. This is especially true of the more complicated circuits featuring super regeneration or the use of many tubes.

Missing Man Found

By-products of Broadcasting Are Important

THE value of the Radio broadcasting station in its relation to locating missing persons and articles was recently fully demonstrated when Herbert Weber was located within a day after his description had been put upon the air. This marks one of the first recoveries of a person by Radio although thousands of messages and descriptions have been sent to all parts of the world by Radio.

Herbert Weber was deaf and dumb and his wife could not locate him. He had wandered away, and so the wife turned to the new agency, Radio, to help her in her search. She gave a full description of him and it was broadcast after church services on Sunday from a local broadcasting station. A listener in at a distant city heard this message of distress and began a search for the missing man. It was not until the next afternoon that the deaf and dumb man was found wandering along a country road. The searcher approached him and wrote on a paper the message he had heard on his Radio receiving set. The man wrote back that he was the missing one and within a short time he was safely home.

This broadcast of the description of the missing man and his recovery by Radio shows that the power of this marvelous instrument seems almost unlimited in its scope. Police departments use it, individuals avail themselves of the opportunity to broadcast messages and institutions are ever eager to make their messages reach into distant fields through the Radio. Personal messages from some of the broadcasting stations are not yet permitted, but it will be only a short time before every home will be equipped with all the necessary apparatus.

RADIO INDIGEST

"Radio"

Flinging free from the guardian wires, into the blue alone,
The human voice goes souring forth, the simple spoken tone,
Bridging the breadth of the sea's expanse, the mountains' cloud-capped height,
Over the fertile prairies broad, the forest's fragrant night.
Calling across from land to land the greetings of friendship go,
With the intimate touch of the spoken word, its warm and human glow.
Before this Wonder the distance shrinks and a listening world draws close,
Its petty envies and hates forgot as the sense of Brotherhood grows.
Before this Wonder the past gleams pale, but the future with promise bright
For the spoken word on the Radio heralds a New Dawn's light.

—GRACE ISABEL COLBRON.

INDI-GEST KINKS?
SEND A DOLLAR—

THERE are many little Indi-Gest kinks worked out in the home that would hamper your fellow Radio-knut and cause him much worry. Indi-Gest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.

INDI-GEST KINKS DEPARTMENT

INDI-GEST KINKS

This Is Re-Markable

Dear Indi: Here's one for the w.k. Indi-Gest Kinks Dept. Am sending the dollar in marks, shipping them on the only boat big enough to carry them across the briny pond, the Leviathan. This is the kink:

To shield a set properly so as to avoid all body capacity, solder all switch contacts and lever busings, binding posts and connections to all other apparatus, onto a piece of thin gauge aluminum the same area as, and behind, the insulating panel. This will stop all body capacity, howling, tube noises, and even the broadcasters themselves.

P. S. I believe I forgot to enclose the dollar, but mailed the letter before finding out. Excuse me. S. W.

Try to Hum This One

Dear Indi: By bringing the lead-in from my antenna down so as to lay across the house lighting current supply wires, a very nice alternating current hum can be obtained. Enclosed is a negative dollar for this kink. POLLY W.

This Works. We've Tried It

Dear Indi: Here is a kink which I am sure many Radio-knuts bothered with damped wave reception will appreciate. As there are a number of operators here sending damp waves my grid leak was leaking so badly that my parts were always wet. To avoid this, have a few lengths of rubber tubing waxed to the tops of your vacuum tubes. After breaking the tips off, the tubes will draw all the dampness out and deposit it in the tube bases. Then get new tubes. CAPACITY JACK.

P. S. While inclosing the $1 I noticed it had No. 13 on it so didn't send it. C. J.

THE NEW WIDOW

I'm a widow: not grass or the crepe and weed kind,
I am lonesome and weary in body and mind;
How I miss my late husband's affectionate hug,
Since the day he was stung by that Radio bug.

My late husband is late in all the word implies,
He is late in retiring, he is late to arise,
He is late to his work, he is late getting home,
He is late sitting down 'neath the dining room dome.

What I say after dinner, the man never hears,
For 'tis then the receivers are over his ears;
I'm no more his darling, his dear little kiddo;
I am a forsaken, poor Radio widow.

RAY D. O'KNUTT.

A-B-C Lessons for Indigest Beginners

Chapter VIII—Bring on Your Summer Snow

BY GOSH

HIS for high-tension
On C. W. stuff you know;
Be cautious with the gentlemen,
Or they'll plant you 'neath the snow.

THERE'S A REASON

Sleeping here is Tom McGurdey,
Had no arrester on his set,
It was struck just once by lightning—
There's a reason—you can bet.

—ROTOR E. GAPP.

INDI-GEST Q. & A.

Referred to the P. & Q. Dept.

Dear Indi: I have purchased a good hydrometer syringe but there was no instruction sheet in the box and I would like to know how to tell the positive from the negative pole using same. I like your column very much and believe you will be able to answer this one with ease (not eeeeeeeeeee)'s. B. R. S.

Water, Gas and Taximeter

Dear Indi: Have been listening for broadcasts from Walla Walla since initial announcement but N. D. Am using a neutoflexorator designed by Lem Stebbins but only hear static and howls. Please advise me how many meters the station uses and what they are. J. A.

Maybe It's the Humidity

Condensed

By DIELECTRIC

During the last month several of the broadcasting stations have been observing lengthy silent periods for the purpose of rebuilding their plants. It is perhaps the best season of the year for such work, if choice is made dependent on the size of Radio audiences. Stations WMAQ and WDAP, both of Chicago, are again on the air after alterations to studio and apparatus. No one in Radio is content with things as they have been.

At last! We are promised silent periods, numerals and letters when the army experts have perfected a scheme of code transmission at frequencies lower than the human ear can detect. The irritation caused by trying to listen to a concert through a repetition of three dots and dash will be no more, after a little while. Both code and broadcasts should receive added benefits from this new system, as both may be used at one time with no interference whatever.

In view of the many attempts to prove that broadcasting reduces the attendance at opera and concerts, it is interesting to note the substance of replies to a survey made by "Musical America." Coming from all parts of the country, these statements show the consensus among musical managers as a denial of the reported slump in ticket sales due to listeners in being able to hear good music in their homes. It is further shown, however, that the majority hold to the belief that transmission is too imperfect yet to have a conclusive bearing on the subject.

Correspondence courses in swimming may be a success or they may not, but at least one instance of teaching young boys the art via Radio has shown the utility of the latter method. With a group of youngsters lined up at the pool, a loud speaker and the swimming director in the studio of Station WLW, a real test was made which proved entirely satisfactory. There is no good reason to doubt that this method could be followed on a larger scale with results as good, lessening fatalities and arousing interest more widely.

The more Radio is used with a view to testing its effect on the deaf, the more favorable seems the outcome. B. K. Ford, of Chicago, deserves much credit for his patience in working through this medium with the deaf of that city. Experiments are being made generally by those in contact with the deaf in the hope of promoting such a degree of hearing that their lives may be brighter and their usefulness increased.

Interest in amateur DX work is just as keen as ever it was. From the latest account as to a definitely arranged schedule for transmitting signals across the Pacific it was learned that amateurs in Australia picked up messages from this country consistently and clearly. We are eager to know if amateurs east of the Rockies got across. Again it is Radio which gives promise of creating a spirit of fraternity among the hoi polloi of this old globe.

Since the arrival of Radio quite a list of new words has come into common use. Perhaps the newer of these is "Radario." It has been found that in presenting a drama to Radio audiences an entirely new technique is required, in the absence of vision. To encourage the development of Radariotists (a little clumsy, that) prizes are offered by the Writers' Digest for the three best productions. WLW will broadcast these at the close of the contest.

First Steps for Beginners in Radio

Chapter XII—One Tube Reflex Circuits

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XIII—Multi-Tube Reflex Circuit Operation.
Chapter XIV—Headsets and Loud Talkers.
Chapter XV—Filament Batteries.
Chapter XVI—Plate Batteries.
Chapter XVII—Using Alternating Current on Tubes.
Chapter XVIII—Testing Radio Instruments.
Chapter XIX—Locating Trouble in the Set.
Chapter XX—Useful Information and Formulas.

THE advent of reflex circuits seemed to promise something radically new, but a consideration of their principle of operation will show that there is really nothing new in the phenomena. We have seen from previous chapters that a tube can be used to amplify at both Radio and audio frequencies. Since amplification in both cases is accomplished in a similar manner, it should be possible to amplify both frequencies simultaneously, the real problem being to keep the frequencies separate to prevent interaction and a jumble of sounds instead of music.

Luckily this is readily done; the simple reason is that they differ so greatly in their frequency. To handle the two frequencies in the same circuit use is made of two other principles that should be familiar to the reader. The first is that a condenser will permit a high frequency current to flow through it; the other is that a large inductance will choke a high frequency current but permit direct current to flow through. By using these two instruments we can devise a circuit that will handle both Radio and audio frequency currents without interaction.

When only one tube is used we can then have one stage of Radio frequency amplification and one of audio. For detection, use must be made of another tube or a crystal detector. For the reason that a crystal detector gives clearer reception, is cheaper in construction and maintenance and in the fixed types requires no adjustment, crystal detectors are usually employed.

Assembly of Parts on Single Tube Reflex

Let us see, then, how these various instruments may be assembled to use a single tube for both forms of amplification at the same time. Referring to Figure 51 we find a loop aerial with a variable condenser across it to tune to the waves desired. The received currents are fed directly into the tube as in a Radio frequency amplifier, connections being made to the grid and to the filament through the consenser C 1. This condenser will pass the Radio frequency currents without difficulty.

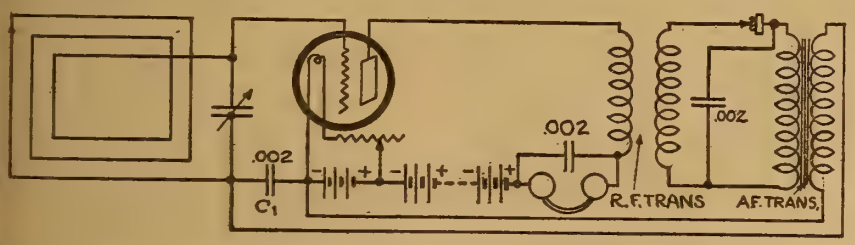

Figure 51—Simplest form of one-tube reflex to show principles of operation

When signals are being received the plate current will be varied in accordance, with a step up in intensily, but still inaudible by reason of their frequency being above audibility. These currents flow through a Radio frequency transformer and the condenser across the phones in the plate circuit. The transformer then induces currents in the circuit containing the detector which is required for detection and rendering the signals audible.

This circuit includes a condenser and audio frequency transformer; according to the operation of the detector, currents at audible frequency will flow into the primary of this transformer. The output of the transformer is now fed back into the grid circuit of the tube by its connection across the condenser in the grid circuit. This condenser will not short the low frequency audible currents; therefore the audible currents are impressed on the grid circuit and again amplified. The audible currents in the plate circuit will not flow through the condenser across the phone; hence the signals are made audible.

Condensers Must Be Mica Dielectric

There are, however, numerous little details that make or mar a circuit of this type. Take, for instance, the condensers. They must be of the mica dielectric type to prevent loss of current or variation in capacity. It has been said that the small condensers used, usually .002 mfd., will not pass audio frequency currents. As a matter of fact the amount of current a condenser will pass depends on the frequency of the current; so some current will flow at audible frequency but not enough to make much difference as far as short circuiting the phones or secondary of the audio frequency transformer. So when a circuit of this type does not function properly it is advisable to try different capacities at these points. The capacity should be such as to pass all the Radio frequency current and little or none of the audio frequency.

Nothing definite can be said about the transformers; some seem to function perfectly and others give little or no results. They should be of the shielded type to prevent feed backs and howling. Often a plate voltage too low will cause reflex sets to work improperly; a high plate voltage should be used to obtain good results. Since hard tubes are used in these circuits exclusively the voltage may be pushed as high as 120 volts without harming the tube. Too much voltage on the plate will be indicated by the tube turning blue.

The very nature of the circuit using as it does a feed back phenomenon for its operation, makes it very prone to self-oscillation. Self-oscillation of the circuit can be prevented to a large extent by adding a potentiometer. This instrument is also valuable in that it serves to bias the grid to a proper amount to put the operating range of the tube on the steepest part of its characteristic curve and thus give the greatest amplification.

Better Way to Bar Oscillation

A better method of preventing oscillations is to add a variable resistance in the plate circuit to stabilize the tube. This resistance should have a range of 500 to 2000 ohms. One of the old type B battery potentiometers serves the purpose nicely, or one can be made using the lead from a medium hard lead pencil for the resistance and arranging a slider to move over the lead and thus vary the resistance. The effect of the resistance is to damp out any oscillations in the circuit, since a circuit will not oscillate when its ohmic resistance is four times as great as its radiation resistance.

The detector is likewise important; it is necessary to employ a type of detector that will not burn out with strong signals passing through it. Some form employing iron pyrites will give good results.

In Figure 52 is shown a circuit embodying the refinements mentioned above. It will give very good results when its operation is mastered. A potentiometer is shunted across the A battery to bias the grid, a fixed condenser being connected from the contact arm to the battery terminal to prevent change of tuning when the arm is moved. The resistance is also shown in the plate circuit to prevent oscillations.

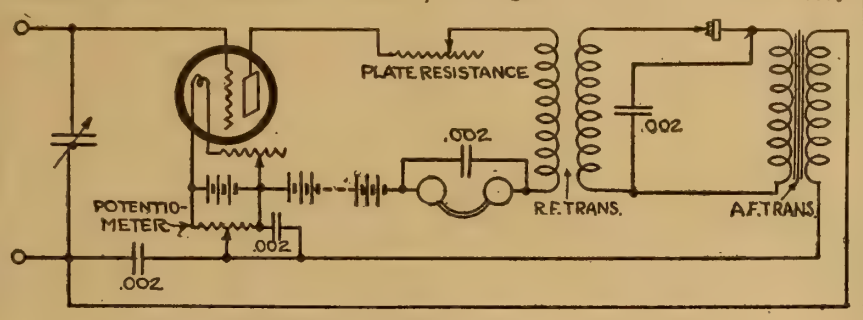

Figure 52—One-tube reflex with refinements for best operation

Any type of hard tube capable of standing 60 to 80 volts on the plate can be employed in this circuit, but the tubes using 1.5 volts on the filament will not function very well, particularly in reflex circuits containing two or more tubes. This is due to the fact that the plate current in these tubes is limited by their construction; when the tube is required to do double work the maximum signal intensity is not as great as in a hard tube capable of carrying larger plate currents. In single tube reflexes the dry cell tubes give fair results, but where amplification is carried further in two and three tube sets they do not function well.

In beginning to experiment with reflex circuits the experimenter is advised to mount the instruments temporarily in the position they will occupy in the finished set and to test the circuit thoroughly before assembling the set. When good results are obtained the set can then be permanently wired.

It should be remembered that the selectivity of the set depends entirely on the tuning apparatus used with it and the height and length of the aerial. The circuit shown employs a loop aerial because this is the simplest arrangement; good work can be done with this device. It gives freedom from static, and selectivity due both to its small size and the ability to utilize the directional effects of this form of aerial. Where greater range is desired with an outdoor aerial it will be necessary to use a variocoupler to obtain selectivity with condensers in both aerial and secondary circuits to obtain close tuning and selectivity.

Having covered here the principle of the operation of the reflex circuits, the second part will consider the application of the same principle to two and three tube sets.

(TO BE CONTINUED.)

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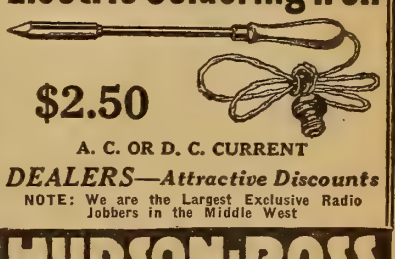

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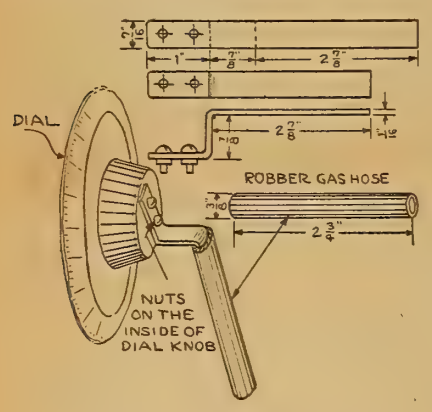
Good Regenerative Set Made Simple

Volume Obtained with a Small Number of Parts

In my opinion, regeneration has only been scratched so far; the ordinary fan who attempts this super-sensitive regenerative hook-up will be surprised by its volume.

The following diagram is self explanatory. I have robbed this of almost everything to make it as simple as possible, yet bring maximum results. Owing to its many fine adjustments, verniers in condensers and rheostats are of very little value. But remember that you cannot tune this super-sensitive set successfully without some non-conductive body capacity effect on your dial. It will begin to squeal before you touch your dial. I am using a little rubber-covered lever or handle, which brings your hand three inches away from your dial and takes the place of the vernier for fine adjustments. It is a pleasure to tune with these.

The lever is mounted on the knob. Drill two ⅛-inch holes in the knob and tap them.



If you have no tap, turn the screws into the holes; they will cut their own threads.

Windings in Variocoupler.

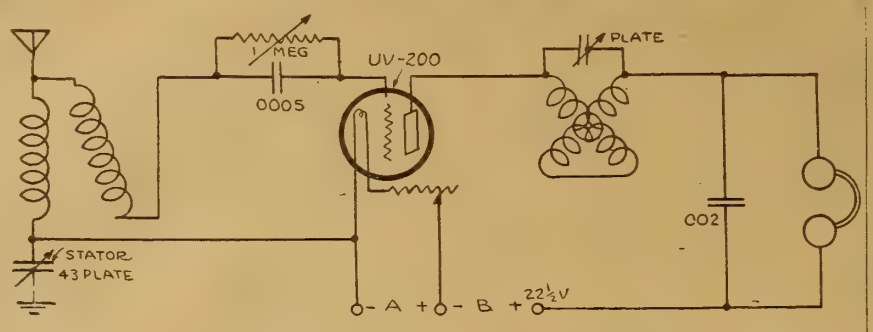
My variocoupler has 42 turns on stator and 40 turns on rotar, but it is my opinion that anywhere up to 100 turns in coupler would work satisfactory. Twenty-three plate condenser should give pretty near the same results as a 43-plate. I am using a variable grid leak; about one megohm is the right capacity. There is nothing critical about its operation. The detector tube can be run with less plate voltage. The variometer should have about a total of 100 turns and should be as closely coupled as possible, so that you can make the fine adjustments.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest
123 W. Madison St., Chicago

MINIMUM OF PARTS IN HOOK-UP



It is important that your B battery have a full 22½ volts. If it has been used some time, a second B battery should be used, tapping in an additional three or six volts as the case may require. Just a little testing should give you the desired results; just as soon as you get too much you will weaken the signals; in fact, you can kill them with 45 volts.

Positions of Variometer and Variocoupler

Mount your variometer at least four inches from the variocoupler, due to inductive interference; herein lies the strong point in the working of this set for loud signals. And the 3-plate condenser hooked across the variometer brings regeneration out full blast. Connection on these two should be made as short as possible. I don't think it makes any difference as to the way they are connected. The other instruments can be mounted to suit the individual taste.

As there are so many different variocouplers and variometers on the market, I would suggest, even if your signals are fairly strong, to change the leads of the rotar of variocoupler to see if you cannot increase the signals. After you find the loudest connection here, try the same procedure with the stator. Just try this; it may be worth your while.

Manner of Operation

Do not turn your rheostat so that the tube is lighted too bright; about ¼ should be enough, because you can bring it out full blast with the variometer. If it should squeal or snarl, it is an indication that regeneration has been carried too far; just back a little with your variometer; then your signals should be loudest with rotar and stator of variometer in the same position and the plates of the 3-plate condenser all the way in. If the set squeals, move your variometer or 3-plate condenser from these positions. A little practice will bring the desired results. Tuning is accomplished with the 43-plate condenser and rotor of the variocoupler.

One stage of amplification can be added without using any higher plate voltage, but 45 volts must be the limit, tapping in your transformer at 21 volts, as illustrated in my previous hook-up, omitting the 3-plate condenser across primary of transformer. For ordinary purposes you will never require it. I have one stage mounted but very seldom use it.—O. P. Klein, Leduc, Can.

Capacity of Condensers

Considerable improvement in the tuning qualities of a receiving set is obtained by the use of a vernier condenser in the antenna circuit and also in the secondary circuit. The vernier condenser may be of the 23-plate variable type, having a capacity of .0005 mfd., shunted by a 3-plate variable condenser. The movable plates of the antenna series variable condenser should be connected to the ground wire and the stationary plates connected to the tuner so as to reduce the effect of hand or body capacity. Condensers of the movable plate type have the following approximate values of capacity:

Type—	Capacity in Mfd.
43-plate	.001
23-plate	.0005
11-plate	.00025
8-plate (vernier)	.00018

Don't Lose that Sensitive Spot

If the crystal detector is mounted on a piece of felt from ½ to ¾-inch thick, the cat whisker can be kept on sensitive spot with ease. The receiving with a crystal set will also be considerably improved.

Cause of Sound Distortion

Distortion of sounds from a Radio receiving set is sometimes caused when many steps or amplification are used and not sufficient amount of high plate voltage is employed on the last tube or tubes.

Iron Filings in Compound Make Transformer Core

The main objection to the iron core Radio frequency transformer lies in the inability to secure thin enough laminations for the core. Laminations such as are used in the audio frequency transformers have a tendency to "lag" and are therefore inefficient. This may be easily overcome by using soft, fine iron filings for the core.

The filings may be secured from most any machine shop or may be readily made if a grindstone is available. Place them on a sheet of iron, stove lid is suitable, and heat them to as high a degree as possible without melting them together, they are then allowed to cool evenly and naturally. This heating process is to anneal the filings so that they will not become polarized.

To make the core pour these filings into molten battery compound, paraffin, or better yet melt an old wax Edison cylinder phonograph record, stir the filing into the solution until it has taken all it will hold together and still be workable.

The filings are then poured into the form for the core.

The best way is to wind the secondary and primary coils, insulate the windings and leads to prevent possible shorts and grounds from the conductivity of the filings, pour the compound with the filings in it around and in the center of the transformer coils, in this way securing closed core construction.—E. A. Johnstone, Pocatello, Idaho.

A variocoupler should be used when making a crystal set, because this unit can be employed when changing the set to a vacuum tube outfit.

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3/16"	THICK	2¢ PER SQ. INCH
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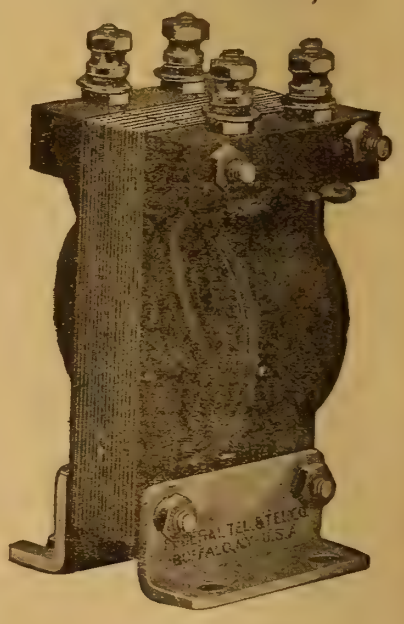

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Difficult Tube Characteristics Explained

Part II—Methods of Computing Them

By H. J. Marx

THE preceding article described some of the more unusual and difficult characteristics of vacuum tubes. The next step is to find how these characteristics can be ascertained; later we shall analyze the possibilities of vacuum tubes by means of their characteristics. The UV-201 A tube will be used throughout in illustrating how the work is done. Later, the same characteristics will be worked out for other tubes and presented for comparison.

Amplification Constant

It has been said that the amplification constant is the maximum voltage amplification obtainable from a tube. Its value is determined by means of the grid and plate voltages. It expresses the ratio of a change of grid potential to a change in plate potential when the change in plate current is the same.

There are two ways of increasing the plate current flow outside of the filament control; one is to increase the plate battery voltage; the other is to increase the grid potential by making it more positive. Of these, the latter is the more important. Volume in reception is dependent on the amplitude of the pulsations in the plate current. In other words, the smaller the grid potential variation required for a given change in plate current, the more efficient will be the tube.

How to Derive Amplification Constant

In deriving the amplification constant, a given value of plate current is assumed; then taking a given reduction in plate voltage, the grid voltage increase necessary to bring the plate current back to its former value is ascertained. This plate voltage difference divided by the grid voltage increase gives us the amplification constant.

Expressed in a formula we have:

$$\mu = \frac{E'p - Ep}{Eg - E'g}$$

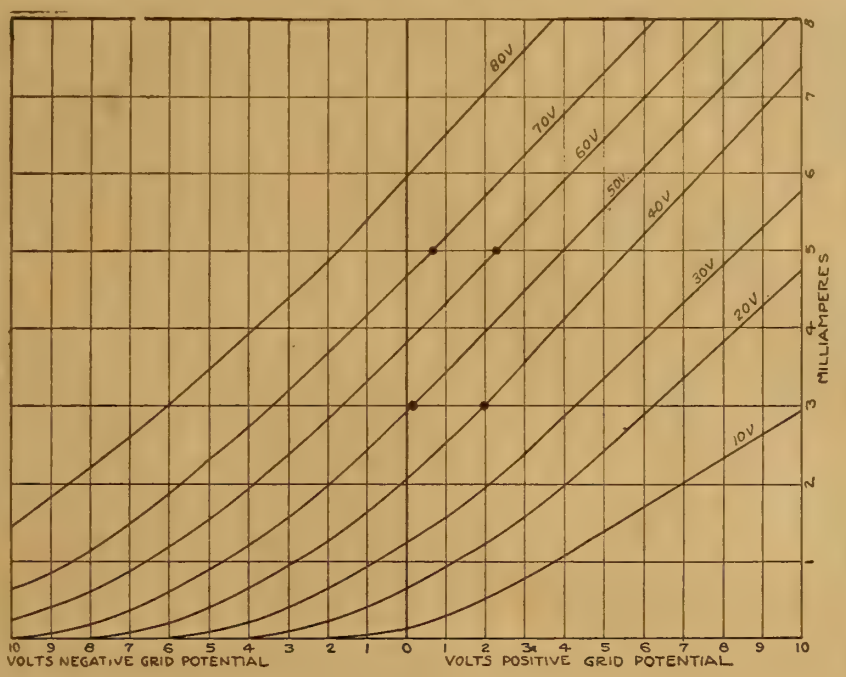


Figure 1

Let the plate current values be taken as 3 milliamperes; then at a plate voltage of 50 the grid potential is .25 volts positive. Then if the plate voltage is reduced to 40, the grid potential must be increased to 2 volts positive in order to get the plate value back to 3 milliamperes. Substituting these values in the formula we get:

$$\mu = \frac{50 - 40}{2 - .25}$$

or $\mu = 5.7$

Repeating this procedure at a plate current of 5 milliamperes, at 70 volts plate potential the grid is .75 volts positive; when the plate potential is reduced to 60 the grid must be increased to 2.4 positive to keep the plate current at 5. Substituting these values in the formula we get:

$$\mu = \frac{70 - 60}{2.4 - .7}$$

$\mu = 5.8$

The amplification constant does not remain in a fixed value, as will be noticed. The value decreases somewhat at lower voltages. It is sometimes given in the form of a curve with its values plotted for variations in plate voltages. Due to inaccuracy of readings and outside factors in the circuit these values may have a possible 5 per cent error, but will be found sufficiently accurate for the purpose the amateur requires of it.

As to Plate Resistance

Making use of Ohms law, the direct current resistance of the plate circuit is equal to the plate voltage divided by the plate current. The alternating current resistance, however, depends on the slope of the curves; since the curves are not straight lines, it is not the same as the direct current resistance.

If the readings are taken at a zero grid potential the alternating plate current resistance equals $\frac{Ep}{2\,Ip}$ where Ip is the plate current in amperes. This will give a fair estimate of the plate resistance value. For convenience the values of the plate resistance are calculated on this basis at the zero grid potential and the plate resistance curve shown in Figure 2 is drawn. Then the resistance value at any specified plate voltage and grid potential other than zero can be found by applying the following formula:

$$E'p = Ep + \mu\, Eg$$

This formula gives the effective plate voltage; this value is used in reading off the proper resistance in the curve of Figure 2.

For example, let it be assumed that the plate resistance at 60 volts plate and 4 volts negative grid potential are desired, then

$$E'p = 60 + (5.8 \times [-4]) = 60 - 23.2$$

$E'p = 36.8$ volts.

Therefore, reading from Figure 2:

Pr = 10,400 ohms

The negative value of the grid potential changes the plus sign to subtraction.

(TO BE CONTINUED)

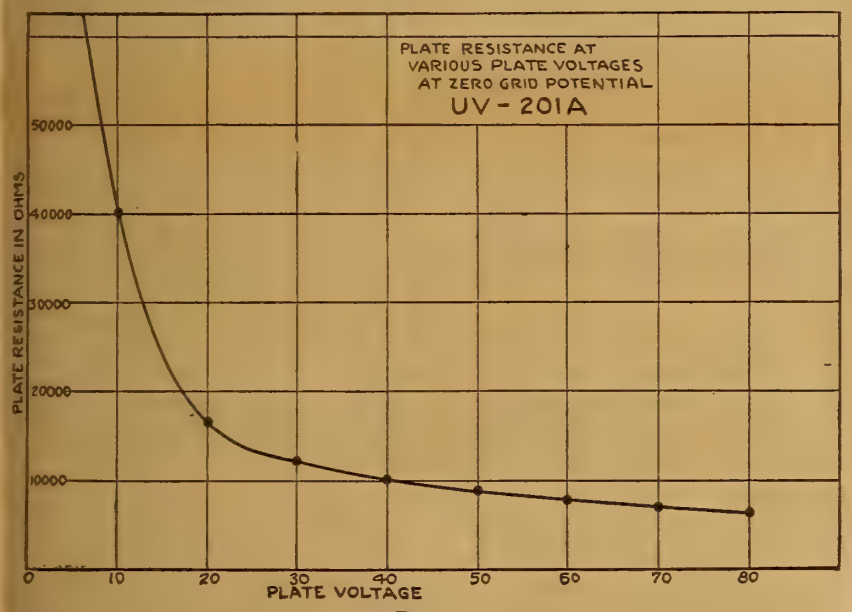
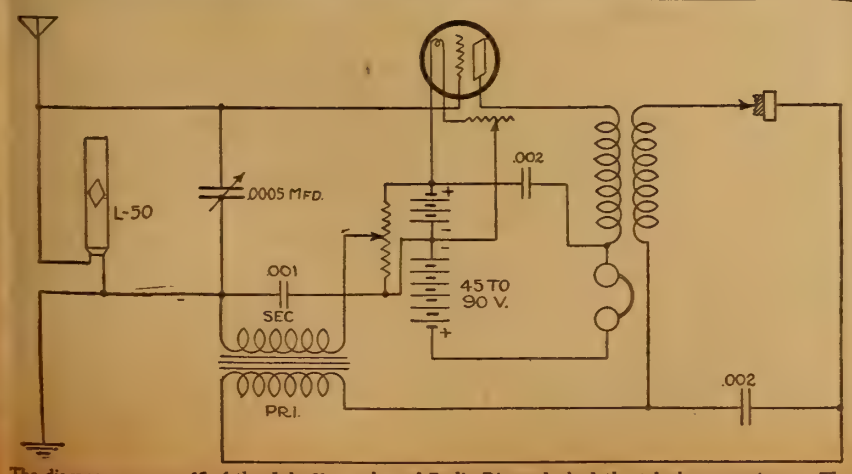


Figure 2

where Ep=plate voltage and Eg=grid voltage.

Figure 1 is a chart showing the plate current and grid potential values with plate voltages in steps of 10 running from 10 to 80. These curves were taken on a typical 201-A tube in the manner described in the June 21 issue of Radio Digest.

TELEPHONE RECEIVERS OMITTED



The diagram on page 13 of the July 21 number of Radio Digest lacked the telephone receivers. The illustration is repeated showing the proper location of the phones in the circuit.

Distance of Set from Aerial

The lower a Radio set is placed with respect to the aerial, the better the results obtained. For example, with the aerial 40 feet off the earth, the best results are obtained with the apparatus on the street floor instead of in the attic.

Position of Transformers

If there is a continual singing noise when the amplifiers are used it is caused by the tubes or amplifying transformers being too close together. If available space is limited, place the transformers at right angles. It is not advisable to use more than two stages of audio frequency amplification.

A variometer has two coils connected in series, while a variocoupler has two coils independent of each other.

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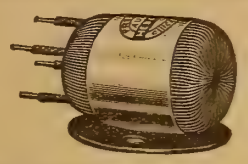

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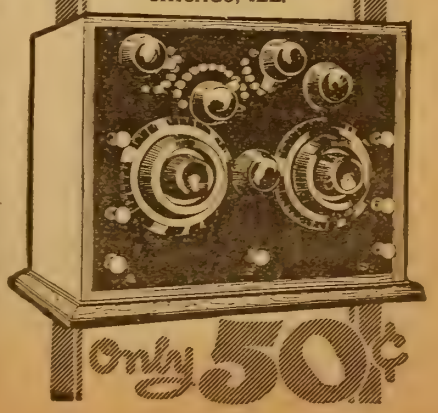

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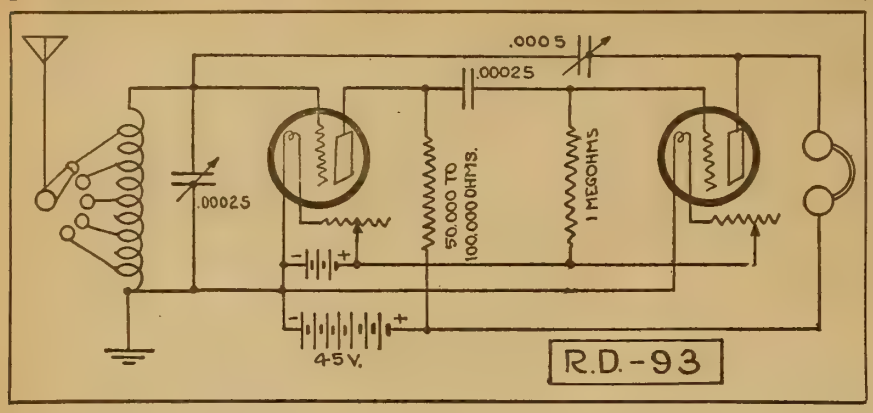
AN ENGLISH REGENERATIVE HOOK-UP



IN the hook-up shown a single stage of resistance coupled Radio frequency amplification is used with a regenerative detector stage. A capacity controlled feed back between the detector plate and the initial secondary circuit is used. Both tubes are amplifiers and require 45 volts in the plate battery. The tuning unit is a tapped inductance covering a wavelength range, in conjunction with a .00025 mfd. variable condenser of 180 to 600 meters.

The resistance unit will vary from 50,000 to 100,000 ohms, depending on the type of tubes used. The grid leak should have a value of one megohm, used with a .00025 mfd. grid condenser. The capacity feed back is controlled by means of a .0005 mfd. variable condenser.

Attention should be paid to the method used in connecting leads to the condensers to minimize body capacity effects. The side of the variable condenser with the heavy dot indicates the rotating plates terminal.

The rheostat and A battery are dependent on the type of tubes used.

Audio frequency amplification can be added in the usual manner if more volume is desired. This circuit is well adapted for long distance reception.

Cabinet Wood Finishing

Enclosing Fine Receiving Apparatus

By W. S. Standiford

LARGE numbers of Radio amateurs throughout the United States and Canada are constructing their own Radiophone sets to "listen-in" to broadcast music, etc., many of their outfits being very good working ones when used a few times, until the spaces between the leaves of their variable condensers and jacks clog with dust, then trouble occurs. In order to make their apparatus give the least amount of trouble, manufacturers of Radio sets enclose them in a wooden cabinet, which not only adds to their appearance, but efficiency in working.

In sharp contrast to this, many amateurs do not enclose their outfits in a case, but try to keep the dust away from the delicate parts by frequent cleaning, a process that not only wastes time, but is liable to press some wires too close together and out of shape, thus making other difficulties such as buzzing sounds during operation. As a general rule, most Radio novices can make neat looking cabinets but fall down in their finishing work, which is very crudely done and mars the appearance of the completed article. As this is due, in most cases, to a lack of knowledge of the processes and materials needed to do a good job of varnishing and polishing, rather than to any carelessness, there is no doubt but that the information given in this article will supply "a long-felt want" of Radio contractors.

Varnish for Finishing

Varnish is used as a base for many finishes, whether it is used for automobiles, furniture or Radio outfits. When learned, this work is very easy to do, but certain precautions have to be taken if a satisfactory and fine looking job is desired. It is of the utmost importance to have a clean, smooth surface in order to get a first-class finish. At the outset, it cannot be emphasized too strongly that a smooth exterior is necessary whether the wood is to be painted, enameled, oil-finished in natural woods or varnished.

The first thing to do is to decide upon what kind of wood the box is to be made of; whether it is open or close-grained and also if it contains any sap, as such conditions will cause different methods of working to be adopted. This is a matter of the utmost importance and should be locked into before proceeding with the finishing work. In order that the amateur finisher may not go astray, a list of open and close-grained woods are appended; the handling of each kind being described later on.

Kinds of Wood

The open grained woods are oak, ash, chestnut, walnut, mahogany and butternut. These woods require fillers. The close grained woods are pine, cherry, maple, birch, cypress, whitewood, poplar, sycamore, beech and redwood. These and others like them do not need fillers, but can be finished in natural colors, or stained as preferred. Five operations in wood finishing are needed, although, in the case of close-grained woods the filling process can be omitted. For varnished cabinets sandpapering, staining, filling, varnishing and the final polishing comprise the list. Directions for each process will be given in rotation as the work progresses.

Preparing the Surface

Plane the wood as smooth as possible, then tack a piece of 00 sandpaper on a smooth block and rub with the grain, using moderate pressure and taking care when working near the edges, not to round them. Wipe all dust from the surface with a cloth so none will remain to make rough spots.

Staining comes next, if pine or poplar are used to imitate the appearance of the more costly woods. By using the former, Radio set containers can be made that will look as if an expensive natural colored wood was used. In wood finishing much trouble in working will be avoided by the purchase of the best stains obtainable. There are two kinds of stains on the market, oil and water, each having their good points. Oil stains are those in which the coloring pigments are dissolved in linseed oil or turpentine, water being the solvent for the other. As pine wood, in some cases, has more or less sap, this wood after coloring with an oil or water stain, when the latter is dry, should have two coats of white shellac varnish put on, and each coat after drying is to be lightly sandpapered to smooth its grain down.

This shellac effectually keeps any sap from discoloring the finish. Varnishing, rubbing down and polishing are the things to do in order named. The best way to use water or oil stains is to apply it with a brush and then rub it into the wood with a piece of cheesecloth. This distributes the color evenly and absorbs surplus moisture which in the case of water stains is apt to raise the grain of the wood, thus making more sandpapering necessary, and also makes a more uniform color tone. If the first application does not give as deep a color as desired, give it another one. If the amateur desires to use an open grain wood such as mahogany or walnut, using stains to make them deeper in color, the pores will have to be filled after staining; otherwise, staining can be omitted, but not filling, which is necessary. Supposing that such a wood has been stained, get a paste filler of a color to match the stain as nearly as possible; put some of the filler on a piece of cloth and rub it on the wood. As soon as this filler has dried a little (don't let it get hard, continue to rub the surface until all pores are filled up, rubbing off any surplus, the main idea being to have nothing but the pores contain filler.

Applying the Varnish

After it is dry and smooth, give it a coat of white shellac varnish, which should be rather thin. If it is thick dilute with alcohol. All surplus varnish must be wiped off the brush before applying to the surface; for if too thick a coating is applied it will not be clear and will allow the stain to show. The first coat of shellac should dry in about three hours, after which put on another coat. Rub the dried surface with the finest grained sandpaper until the wood is smooth. Don't rub too hard or the shellac varnish will be cut through. Varnishing comes next. Good brushes should be used. Cheap ones will not give good results as the bristles coming out will cause trouble. The varnish must not be too cold as this prevents it from flowing freely. Have enough varnish on the brush to just give a level coating when it is brushed across the grain. Finish off by rubbing lightly with the grain, letting it dry 30 hours or until hard.

Hand Rubbed Finish

Purchase some FF grade of pumice stone at a paint store, some linseed oil and a rubbing felt. Dip the latter into the oil, thence in pumice stone which will now adhere to the felt. Rub your varnished surface lightly along the grain and continue this process until all small depressions have disappeared. This may be observed by looking diagonally over the wood's surface when it is held to the light. All hollow places will now show as dark spots. The surplus pumice stone is to be removed with a soft dry cloth. Give it another coating of varnish and repeat the operation with the pumice stone. The cabinet will now have a "dead" non-glossy finish.

Those who prefer a shining polish can easily obtain it by dipping a piece of felt into linseed oil and powdered rotten stone and going over the surface in the same manner as with the pumice stone. A higher polish can be obtained on the last coat by giving the rotten stone treatment and then rubbing the hard varnish with a soft cloth dipped into linseed oil, using plenty of pressure until a high polish is obtained. The surplus oil ought to be wiped off with a chamois skin. The foregoing gives a durable finish, one that will not scar easily.

If all the work has been done carefully, the Radio will have neat looking cabinets that will compare well with the purchased article. The work will also look good to his friends who do not understand polishing work. Varnished and polished woodwork of all descriptions should not have any strong soap powders applied for cleaning purposes to remove finger marks as it will turn white in spots. Use nothing but a good furniture polish which will clean it very nicely and restore its finish at the same time.

Filament Aids Regeneration

Owners of ultra audion sets who obtain long distance results are always those who pay attention to the lighting of the tube. It is characteristic of this kind of set that it will regenerate with the filament at almost any brilliancy, but its maximum efficiency occurs only when the grid leak and rheostat are set at one particular point. With many tubes the feed back is at its maximum without howl or distortion when the filament is barely heated. A vernier rheostat is necessary for control of regeneration.

To Prevent Scraping Dials

The scraping of dials on the panel of a Radio set can be corrected by placing a thin piece of felt on the back of the dials. They will then work smoothly, without noise.—Susan Haymes, Fort Worth, Texas.

PATENTS ON RADIO

Can you secure a patent on your Radio invention? Does your apparatus or circuit infringe existing patents? These questions and others can be answered promptly by consulting my special library of Radio patents compiled to assist Radio inventors and manufacturers. Send for booklet on Radio patents.

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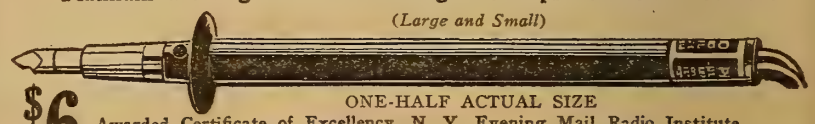

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Questions and Answers

Antenna and Ground

(4019) WES, Manchester, N. H.

I would like to ask the following questions:

How would an aerial work about 140 feet almost entirely over water; how high would it have to be above the water?

Could a lake be used for a ground; what is the best method?

I am situated in a valley; the side of the hill near me is quite densely wooded. Up to a few days ago I could receive almost anything desired, but last evening I could get nothing but WGY and that not exceptionally good. Would the leafing of the trees have this effect, or would you say that it was something in the set? I have gone over it very carefully and found nothing wrong.

A.—The antenna construction as described would undoubtedly afford high efficiency.

To effect a ground, as suggested, the best method would be to solder a wire to an ash can or large piece of galvanized iron and dump it into the lake.

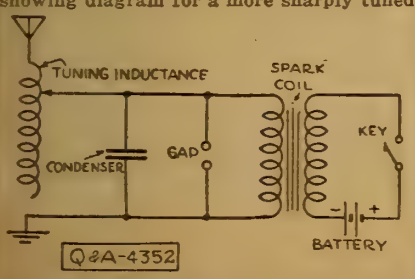
Your described location is not ideal, theoretically, for best reception; undoubtedly the foliage of the trees acts as a deterrent. Every little leaf and fiber in the tree will act as a miniature wireless sponge; after they are through soaking the signal there will not be much left for your set to acknowledge. Have antenna as far removed as possible from this interference.

Sharply Tuned Transmitter

(4352) WJW, Middletown, Ind.

Please publish a hook-up of a spark coil transmitter not using the "plain aerial," connecting the ground to one side of the gap and the aerial to the other.

A.—Complying with your request, we are showing diagram for a more sharply tuned



transmitter than the usual direct antenna excitation method affords. The inductance may consist of thirty turns of number twelve wire wound on an oatmeal box and tapped at every turn.

Variocoupler Windings

(4044) CS, Wymore, Nebr.

I am a subscriber to your paper. I just received the June 2 issue; in looking over the Question and Answer department I noticed (No. 2298) JB., Minnesota City, Minn.

He wants to wind a coupler for wave lengths 180 to 550 meters, and asks how many turns of wire to use. Your answer is 50 turns on primary and 36 on secondary.

I have been using a coupler with 60 turns on the primary, 39 on the secondary. The secondary is tuned with a variometer; I can't get more than 425 meters to save my life.

Why misinform your anxious inquirers? If you can't give authentic advice, it would be better not to give any.

If this is your policy, when my subscription runs out I shall get the latest (?) Radio dope elsewhere.

I notice Flewelling's variocoupler is wound with 130 turns on primary and 100 to 125 turns on secondary to use as a single circuit. What do you say?

A.—We have carefully noted the contents of your letter, and regret your animus in what you are inclined to believe is unreliable advice to the readers of the Radio Digest.

We are placing ourselves on record as open at all times to constuctive criticism; we are at no time assuming infallibility, although we pride ourselves on the personal, interested and generally admitted superior service rendered.

In the matter under discussion we take pleasure in giving to you a detailed explanation of varying conditions that are taken into consideration in answering a specific inquiry.

Referring to Question and Answer 2298, quoted: the answer given is correct. The inquiry specified "180 to 550 meters" wave length. It would of course be impossible to tune the secondary circuit to 180 meters if more than 36 turns were used, without the employment of a series condenser which would impair the effectiveness of the circuit to an impracticable, if not prohibitive degree. It is readily seen that it would not be feasible to use more turns on the secondary and to take a tap for extremely low wave lengths. If a variometer with a sufficient number of turns is employed the circuit will accomplish 550 meters. If the construction of the variometer does not permit this, a loading inductance may be inserted simply without impairing efficiency. It can be accomplished by using fewer turns on the secondary and building a wave length range up with loading coils. It is seen that the tuning will be much sharper than if wave length were accomplished wholly by the number of turns on the secondary coil. It is highly advisable not to use too many turns on the secondary.

In the matter of a primary circuit: tuning in any case is very broad and is governed by the length of the antenna; thus the number of turns is not extremely important. Fifty-six should suffice for present wave lengths.

As to your citation of variocoupler used in Flewelling circuit, we are reminding you that the rotor is used as a tickler coil and not as a secondary tuning unit. This coil is of special construction, designed by the author to balance and perfect a very critical circuit.

Reflex De Luxe

(3920) OLH, Scammon, Kans.

I have built the three-tube "Reflex De Luxe" receiver according to the diagram in the May 5 Radio Digest. I did not use the panel layout, for I built mine to fit in a victrola and used a panel 11½x13 inches in a vertical position, intending to place the loop on top of the cabinet, making a small felt-covered base with a single circuit jack in it to receive the plug direct on the end of the loop, then taking leads with the 4-foot flexible insulated wire from the jack, attaching another phone plug to the end of the line to the plug-in on front of the vertical panel. I followed the diagram exactly, excepting that I probably used different makes of transformers and other apparatus. I have had good success with the receiver on the three tubes, that is, using all three stages, but when I plug-in on the second stage I get nothing but loud, howling noises. I am going to tell you about the apparatus I used; maybe you can help me overcome this trouble. I used 2 Erla No. 1 reflex R. F. transformers and 3 Chelsea, all alike, A. F. transformers, 1 Bradleyometer, 400 ohm, 1 ordinary wire rheostat to control the last tube that carries audio only, and an Acmestat No. 251 to control the first two tubes that carry both audio and Radio current, 1 Work Rite variocoupler, 1 23-plate plain condenser in the primary and 1 23-plate vernier condenser in the secondary and loop circuit.

I used Schwindler "Built Up" mica, copper fixed condensers, .0015 and 4 .002 and 2 Freshman .006 condensers, 1 Freshman variable grid leak, from which I removed the grid condenser, resealing it, using the grid leak only. This leak seems rather critical as to adjustment. One Grewol fixed crystal detector I mounted to the outside of the panel. My wiring is insulated throughout except where I cut through the insulation to solder on leads. The panel is shielded. My instruments are mounted partly on a baseboard, that is, the tubes and transformers and fixed condensers; the other parts are mounted on a ¼-inch celeron panel. I use 2 Cuningham C-301 in the first two sockets and 1 Radiotron 201-A tube in the last or third audio stage. By using all three tubes I get good results, having heard Chicago, Kansas City, Minneapolis, Atlanta, Dallas, Texas, and other stations. It also operates as a single circuit. But so far I have had no results except howling on the first two tubes when plugged-in on them. I have considered the reversing of the leads on the transformers. I would be pleased to hear from you and to receive any suggestions you might give me to overcome this difficulty.

A.—We have noted carefully your specifications and difficulties encountered in the operation of the reflex circuit as shown in the Radio Digest of May 5.

We are citing factors that may be acting as a deterrent to the full possibilities to be expected: It is suggested that the condenser across the second audio frequency transformer may be open or in some other way defective; the jack may not be making a good contact; some discrepancy in wire may have occurred or the trouble may be due to a defect in the transformer, which condition is not without precedent.

With these suggestions and the assurance of the excellence of the properly constructed reflex circuit under discussion, we are confident that you will be able to overcome the limitations experienced.

The apparatus you have indicated should be effective.

The Question and Answer Department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard, therefore when asking questions please make out your query on a separate piece of paper and written on one side only. **Do not** mix your questions with other material, write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered. The Radio Digest does not consider it good business ethics to furnish hook-up diagrams of any standard manufacturer's receiving sets.

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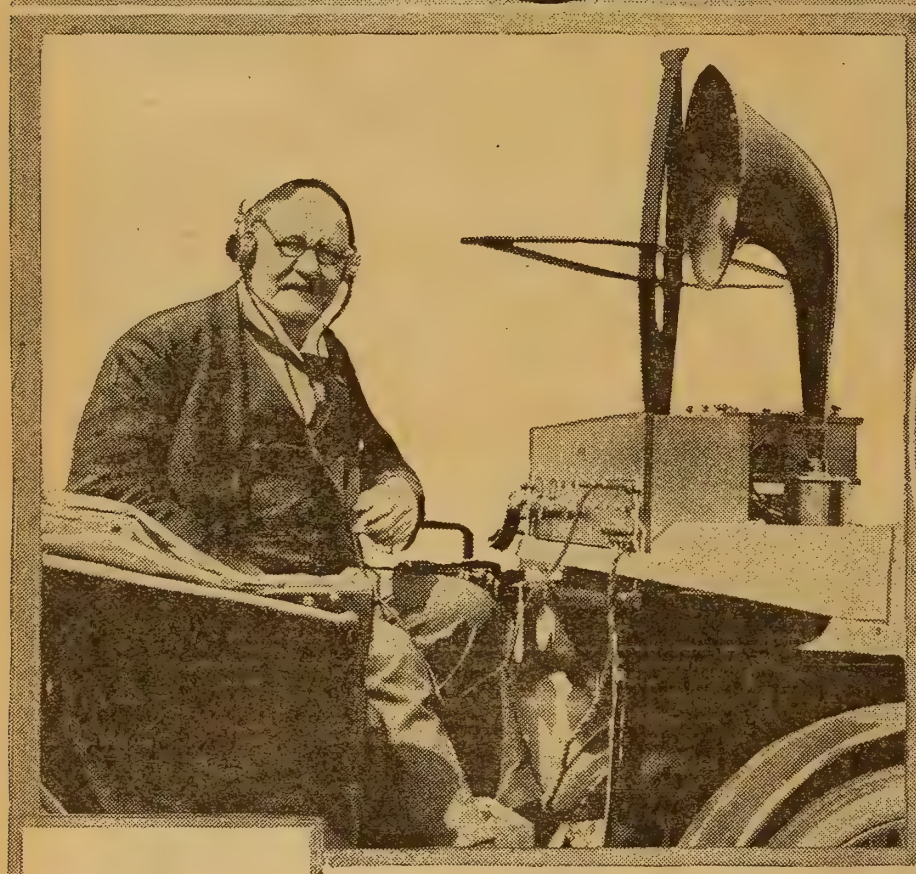
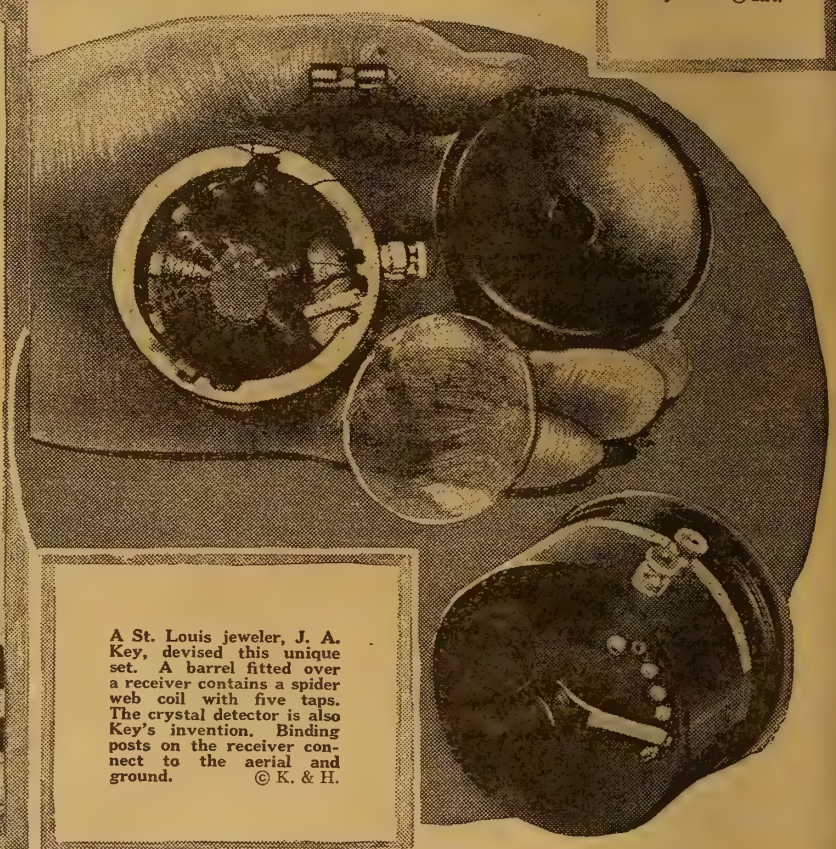
Radio Illustrated

The original Radio hounds, Caesar, a Newfoundland, five feet high, and Buddy, a Boston bull, belonging to J. J. Klibert of Burbank, Calif. They just love their wave lengths and listen in all day. © Int.



Col. Edward R. Green in his electric automobile equipped with a seven tube receiving set and loop aerial for detecting the location of amateurs when they interfere. Col. Green is the son of the late Hetty Green, noted for her great wealth. © Int.



A St. Louis jeweler, J. A. Key, devised this unique set. A barrel fitted over a receiver contains a spider web coil with five taps. The crystal detector is also Key's invention. Binding posts on the receiver connect to the aerial and ground. © K. & H.

Guess who the two couple are? Most any names would do considering the popularity of outdoor Radio. The scene at the left is found at many rivers and lakes at this time of the year. © K. & H.

©CB384146 AUG 17 1923

Multi-Tube Reflex Circuits—Picture Hook-Up

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, AUGUST 18, 1923 | No. 6

PLAN RADIO RUM HUNT

AIR BEARS SCREEN STAR'S GREETINGS

WDAP CARRIES LILA LEE'S MESSAGE TO THOUSANDS

Vast Audience Hears Noted Actress Defend Hollywood and Plead for Clean Living

CHICAGO.—Thousands of listeners in heard Lila Lee, noted screen star of Hollywood, greet her friends and admirers recently through Station WDAP. While the station was broadcasting the prices of pork and wheat, the announcer interrupted the program at 6:15 o'clock to introduce Miss Lee.

Although the famed actress was extremely fatigued, due to hard work in the completion of a motion picture, she was so interested that she forgot her weariness and in calm, clear tones talked to a vast audience. "How do you do it?" she asked as she timidly faced the microphone and, woman like, caressed her tresses. Then, having been told that the broadcasting of the human voice required no more effort nor technique than speaking into a telephone, she began her address.

Chicago Her Birthplace

"My dear friends," Miss Lee said, "wherever you are, far or near, I know you will believe me when I tell you how glad I am to be able to speak to you through the courtesy of Radio Digest. The marvels of the age, the airphone and the motion picture, bring you and me together. But it seems so much

(Continued on page 2)

WASHINGTON HINTS FIGHT BY AIRPHONE

Enforcement Body Debates Use of Navy Plants in Liquor Combat

Secret Code Discussed

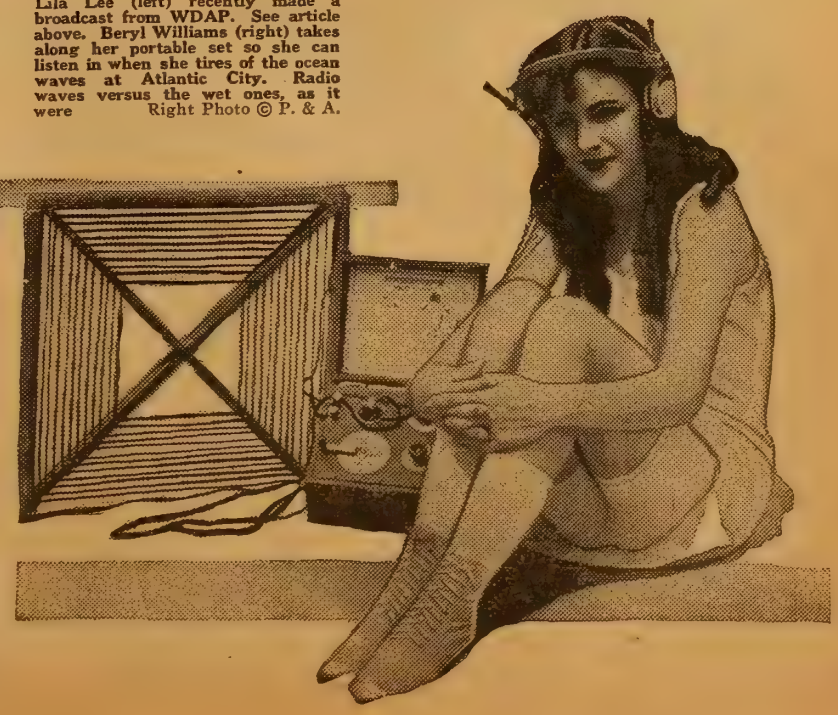
State Prohibition Directors Are Considering Exchange of Data Against Bootleggers

WASHINGTON, D. C.—No more will bootleggers laugh with apparent impunity at boundaries and statutes; no more will slippery rum runners ignore the three-mile and every other limit—when the United States government uses its Radio plants to make the Eighteenth Amendment stick to the constitution.

Plans so comprehensive that they would virtually convert the federal treasury department into a vastly greater land and sea police force were discussed unofficially here recently by high officers of the department of prohibition enforcement. The main idea, it was said, was the use of Radio as the best means to prevent or intercept the illegal transportation of intoxicants

(Continued on page 2)

Lila Lee (left) recently made a broadcast from WDAP. See article above. Beryl Williams (right) takes along her portable set so she can listen in when she tires of the ocean waves at Atlantic City. Radio waves versus the wet ones, as it were Right Photo © P. & A.



PROVES RADIO LOSSES NOT MUCH IN SUMMER

Laboratories in Columbus Hold "Party" to Prove Efficiency Is Up

COLUMBUS, O.—In order to prove that Radio reception in the summer time is almost as efficient as in the other seasons, officials of the Superior Radio and Telephone Equipment Company here recently gave a Radio party at the experimental laboratories of the company, located at Radio Hill, Worthington. The guests listened to reports of the Willard-Firpo battle at Jersey City. A blow-by-blow description of this fight was broadcast by KDKA Pittsburgh. The receiving equipment consisted of a one tube, dry cell outfit, a type designed for use by campers and vacationists, it being extremely portable.

Navy's Triple Relay in 2 1-3 Hours Wins Prize

Rear Admiral Robertson Says Efficiency Is Rapidly Growing

WASHINGTON.—Naval Radio communication efficiency is increasing daily according to Rear Admiral A. H. Robertson, assistant chief of naval operations. Recently the Battleship Oklahoma, at anchor off Bainbridge Island, Puget Sound, sent an important dispatch for the Commander of the battle fleet then at sea off California. The dispatch was relayed three times going down and the answer three times returning; but the reply was received in two hours and twenty minutes. From the Oklahoma to Radio Station Puget Sound the message went direct, being relayed to San Francisco from Puget Sound.

PARTS OFFER SPURS MECHANICAL WORK

INQUIRIES DENY CRITICISM OF SYSTEM IN SCHOOLS

Interest Shown by Youth in Constructing Sets Shows Advance Toward the Manual Arts

SPECIAL REWARD OFFER

Coupon Number 12

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Those who rail against what they call the lack of mechanical training in the public and other schools of this country would find little with which to bolster their contentions in the answers to the special parts offer of Radio Digest.

Many if not most of the inquiries concerning the offer are from boys and girls of school age who by their interest evince marked tendencies in relation to delicate machinery. Construction of Radio sets by the youth of the United States will, it is said by observers, aid, too, the instruction of mechanical drawing.

It would be well to remember that when you send coupons to this office they should be consecutive; they need not begin with Number 1 but they should run in order. You may send as many series and as many coupons as you want. Write plainly the names of the parts you need, send the money and the coupons and we will do the rest.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Shindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable C denser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. C. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer.

Hears WBAP Farthest

BELLEFONTAINE, O.—Mrs. E. K. Deck of this city received the prize offered by the Young Men's Business League of Ballinger, Texas, for the listener at the greatest distance from Fort Worth who heard the program over WBAP by Ballinger talent given some weeks ago. The prize was a fine pair of head phones.

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Looking Ahead

That New Neutrodyne Set—In the next issue there will appear the first part of the neutrodyne series telling about the latest advent in receiving sets. The articles will be written by H. J. Marx, who has made up this set and knows exactly the parts needed and how to assemble them for the best results. Follow these articles and you can make up a Radio frequency set that will bring in long distance during the hot weather.

Headsets and Loud Speakers—Several months ago we published an article by Thomas W. Benson on how to make a loud speaker. There was a great response to this article. Mr. Benson will go into detail again on loud speakers and will give valuable information about the construction and use of them, as well as of headsets.

Some Ideas for the Amateur Workman—In this article there will be told by Carl Masson various ways of doing things for the benefit of the person who cares to do his own work. How to make parts from broken apparatus, and an all-vernier condenser.

Real Two-Coil Loop Aerial Circuit—The Simplex Diagrams have proven a great success. In the next issue there will be another circuit under the above title. It is a circuit similar to the Flewelling. Make one up. It's worth while.

Single Tube Reflex Circuit—This hook-up will appear in the next issue. It is planned to be used with a good outside aerial and ground. Two honeycomb coils are used in the set.

Have a Copy with You on Your Vacation

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

PLAN RADIO RUM HUNT

(Continued from page 1)

and above all to effect the capture of violators of the law.

Plan Use of Naval Stations

All of the intricate mechanism of the department of prohibition enforcement, all of its expert trackers, all of its enormous financial resources having failed to blot bootlegging, the treasury department is likely soon, it was intimated, to take steps to use at first the Radio stations of the navy department for the transmission of messages in code by enforcement directors in each state to their subordinates or by the latter to their superiors. Although the story was denied by prohibition officers here it was given substantiality and credibility by the attitude of others elsewhere.

Close questioning of reluctant or reticent members of the prohibition enforcement department revealed the fact that the applicability of Radio had been seriously considered. This was said to have been the line of reasoning:

If, as an instance, a gang of bootleggers in Ohio or Illinois were to evade state and local authorities in an attempt to run a batch of goods from Cincinnati to Cleveland or from Peoria to Chicago or, as another illustration, across the Canadian border from Windsor, Canada, to Detroit, the usual detecting or arresting devices would be employed—the telephone or the telegraph. But these have been of little avail. Often the bootleggers are given information in advance as to the plans of the officers. Frequently runners are enabled to hide their illegal burdens until the danger of capture is past. And repeatedly they have eluded their pursuers by means of high-powered cars or perhaps a more intimate knowledge of the country.

Would Use Secret Code

"If we decide to use Radio," said a widely known prohibition enforcement officer, "we would establish a secret code. Thus the director of a state could apprise his subordinates or would himself be informed of bootlegging expeditions or caches. None but a few of those of his department would know his plans. If they were revealed prematurely he would be enabled to find the spy. The director of one state could apply Radio to aid the director of an adjoining or even of a distant state. The governments of Canada and the United States, perhaps of Mexico, could by means of Radio do much to bar the smuggling of 'booze.' It seems to me that the application of a secret, perhaps an international, Radio code would do much toward the eradication of bootlegging and the enforcement of prohibition laws."

Trailing Rum Convoys

In most states of this country the directors of prohibition enforcement are assisted by three or more others who usually are established at strategic points, that is, where whisky and the like have been or are made or handled in greatest quantities.

If the director in Cincinnati (following the suggestions of the department as to the use of Radio) learns that a liquor convoy is on the way to Cleveland secret word would immediately be sent either by telegraph or telephone to the nearest naval broadcasting station. The director in Cleveland, whose force would keep at all times in contact with the Radio receiver, would be informed by the naval Radio station that the bootleggers were en route to the lake port. Officers from both cities would immediately take the trail and the authorities of all nearby cities and towns would be advised as to the chase. If motor cars were used by the officers each automobile would be equipped with a Radio receiving set so as to enable the pursuers to keep constantly in close touch with the developments of the hunt.

Bootlegging on a large scale would thus be reduced, according to those who have considered the various phases of the application of Radio.

LILA LEE ON WDAP

(Continued from page 1)

more friendly to be able to speak directly to you.

"Here I am in Chicago, my birthplace, on the way from New York City to Hollywood to make the new picture—'All Must Marry'—written by George Ade, in which Thomas Meighan and I are to play the principal roles.

"Yes—all must marry"—a merry twinkle in the actress' eyes and a coy smile showed that she believed it. (She was wed a few days later to James Kirkwood, her director.) "And it is well. To my young girl and boy friends especially do I send these words—your work and your play must be clean. Your thoughts must be clean. These lead to and further happy marriages."

Defends Screen Notables

Then Miss Lee broadcast a defense of screen notables, who, she said, were no more vicious than the men and women of other walks of life. "Do not believe the stories about the orgies of Hollywood," she pleaded. "They are not true. Of course there are some among us who have been indiscreet, but as a whole we are just folks, eager for your good will."

That Miss Lee's talk was well received was shown by the many letters addressed to her from all parts of the country in care of Station WDAP. A telegram from Upper Michigan, forwarded to Hollywood, said: "Miss Lee can talk as well as she can act."

ROOMS WITH RADIO AT TALLEST HOTEL

GUEST CAN TAKE CHOICE OF PROGRAM DESIRED

$15,000,000 Book-Cadillac Hostelry Also to Have Broadcast Station —Nothing Lacking in Radio

By F. L. Huntley

DETROIT.—The new $15,000,000 Book-Cadillac hotel, to be the tallest transient and commercial hotel building in the world and the erection of which has just been started here, will be equipped with the latest in Radio apparatus. It will have three large aerials, one of which will be devoted entirely to broadcasting and the other two for reception. Each room will be equipped with a receiving telephone connected with a central. A guest wishing to listen in will only have to announce the fact to the hotel central and his room will be plugged in just the same as if he were using the telephone. Guests from their rooms will be able to enjoy a program of music, speaking or singing, just as they may choose, by merely ordering it from the operator.

Will Broadcast Conventions

The hotel will also give special attention to broadcasting convention proceedings. For instance, if a state or national organization or any other assemblage, were meeting in convention, it will be possible to broadcast their proceedings to all the United States and perhaps farther. It also is planned to broadcast regular programs, the same as other large stations in other parts of the country.

This hotel, which is being erected by the Book Estate, will be twenty-nine stories high. There will be nothing lacking in it, so far as the Radio is concerned.

DAILIES GET PLANT TO GRAB UP NEWS

Canada Licenses Permanent Station for American Press

OTTAWA, ONT.—The Canadian Department of Marine has issued a license for the erection of a high powered press Radio telegraph station at St. Margaret's Bay, Nova Scotia, near Halifax, to C. F. Crandall of the British United Press, acting for the American publishers' committee. For over a year a group of American papers, including New York, Philadelphia, Chicago and other dailies, has been operating an experimental station at Dartmouth, across the bay from Halifax, for the reception of Radio press reports from London and Europe, and relaying them by land lines to the newspapers. The project will now be made permanent, a dispatch from Consul General Gunsaulus states.

PENN COLLEGE GIVES RADIO COURSE BY MAIL

Lessons Lead from Elementary to Advanced Study

STATE COLLEGE, PA.—Correspondence courses in Radio reception and transmission are being offered by the engineering extension department of the Pennsylvania State College.

The course is divided into two parts, each with its own text and assignment pamphlets. The first establishes principles and suffices for the ordinary students. It takes up common electrical phenomena, Radio circuits, the vacuum tube, amplification, sources of power, transmission circuits and applications of Radio.

The second goes more thoroughly into the theory of electricity to prepare for a detailed study of electro-magnetic waves, Radio circuits and apparatus for reception and transmission.

If you add a potentiometer to your detector set the latter will be improved.

BALL WRITERS FEAR BROADCAST SCORES

NEW YORK.—Now comes the Baseball Writers' Association with a protest against the broadcasting of baseball results. "If this is permitted," reads their complaint to Commissioner Landis and Presidents Heydler and Johnson of the National and American Leagues, "it will kill circulation of afternoon papers and in the end will result in less ball writing."

WANTA MAKE $5000? HERE'S YOUR CHANCE

WASHINGTON, D. C.—The United States Civil Service Commission has announced examinations for Radio engineers to fill vacancies in the departmental and field services throughout the United States. The Radio engineers receive from $4,000 to $5,000 per annum; associate engineers from $3,000 to $4,000, and assistant Radio engineers from $2,000 to $3,000.

MANAGES STATION WDT'S STUDIO

Vaughn De Leath, the first woman in the United States, hence in the world, to broadcast vocal music, also one of the first to try to bridge the Atlantic by the human voice, has been appointed studio and program manager for Station WDT, New York, which recently was opened for general broadcasting

Water Streams Used as Aerial in French Tests

PARIS.—Interesting experiments were recently conducted by the Naval Bureau of Radio Research of the French Navy, using streams of water as transmitting aerials.

Streams of salt water, pumped from the sea into the air, were connected to the regular transmitting apparatus of the ship and communication was possible for a distance of approximately eight miles. The water aerial is far less efficient than the wire type, but provides means of maintaining communication from a warship.

Breaks Silent Half Century

SAN FRANCISCO.—Ether waves recently brought music to the ears of an aged San Francisco woman who had not heard a sound since her early childhood. She is Miss A. Christa Peck, of 2716 California Street. Sitting in the KPO studio at Hale Bros., here, Miss Peck, with earphones on, heard accurately and distinctly a complete concert which was being broadcast by Rudy Singer's orchestra at the Fairmont Hotel.

As a matter of safety to the tube, remove it from its socket before working about or changing any wires in the set.

MARCONI CUTS DOWN EXPENSE OF SENDING

EVOLVES NEW SYSTEM OF TRANSMISSION

Inventor's Method Also Reduces Amount of Electrical Power to Minimum —Method Speedier

LONDON.—Another step in the development of Radio telegraphic transmission has been realized, says Senatore Guglielmo Marconi, who has returned to London after a two months' experimental cruise in his yacht "Electra." A system has been evolved by the Italian inventor whereby Radio messages are transmitted with a minimum of electrical power, and at very low cost.

"We have transmitted messages up to 2,250 miles, not only with a much smaller amount of power and energy but faster and more cheaply than with the ordinary system of long-distance Radio," said Senatore Marconi. "When the new system is adopted it will mean that a power station for long-distance work can be erected at much less cost than at present.

Sends Over Long Route

"I have telegraphed on this system from Cape Verde islands, off the African coast, to London. To send messages clearly and more rapidly over those 2,500 miles took less power than a message from London to Paris by the ordinary methods."

Senatore Marconi explained that these advantages were gained by the utilization of waves that have not before been used. Given the necessary mechanical element, he said, messages could be sent clearly seven times faster than the present rate, and that the public would ultimately have the benefit of much cheaper commercial charges. His opinion is that Radio is only in its infancy, and that the future has in store greater marvels than have been revealed in the past.

Thinks Secrecy Far Off

Commenting on recent experiments conducted by American inventors looking to privacy in Radiophone conversations, Senatore Marconi said he was afraid such an achievement was still far off.

"I do not say that telegraphy will ever be an absolutely private means of transmission, but I will say that in future it will be possible to make it much more difficult for any one to get messages not intended for them."

Senatore Marconi proposes to go on another experimental trip in a few weeks' time, and later to try the new system of long distance, low cost Radio from the coast of the United States to Europe.

LONDON POLICE MOTOR TRANSMITS AS IT RUNS

Invention of Scotland Yard Expert Enables Transmission

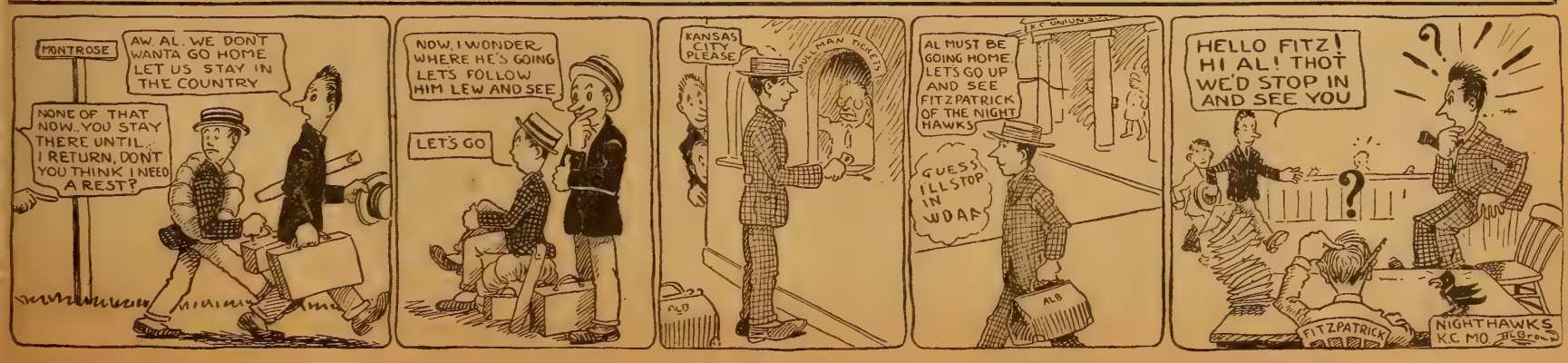
LONDON.—The invention of a semi-automatic aerial by A. H. Wootton, Radio expert at Scotland Yard, has provided the English police with a motor vehicle which, while traveling at high speed, can not only receive but also transmit messages.

The aerial, which can be raised or lowered from the interior of the car, consists of 5 strands of wire, each 14 feet in length, and when only raised 3 feet above the roof of the vehicle, enables telephone messages to be despatched, while with the aerial down messages can be received from a distance.

Novelist Plans Broadcaster for His Estate on Hudson

NEW YORK.—A. Stone, novelist, lecturer and founder of the A. Stone Foundation, is making preparations to establish a powerful Radio broadcasting station upon his estate at Milton-on-the-Hudson this fall. The station will be used for the purpose of broadcasting lectures on important topics of science and literature.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Some Inside Information



TWO NEW STATIONS SET CAPITAL AGOG

WCAP AND WRC INCREASE FANS IN WASHINGTON

Marine Band and "Children's Hour" Mark Inception of Rivals of Army and Navy

By Carl H. Butman

WASHINGTON.—Radiophans in the nation's capital are agog over the two new Class B broadcasting stations WCAP and WRC. Enthusiasts even several hundred miles from Washington are beginning to listen in to the fine entertainment from a new Radio center. This has been an army and navy Radio center for some time but good private broadcasting has been scarce.

Recently WCAP, the Chesapeake and Potomac Telephone company, went on the air, broadcasting a duplicate of WEAF's program in New York. The telephone company's first really local effort was the broadcasting of the U. S. marine band, which brought many enthusiastic returns. WCAP was included in the six stations which had made plans to broadcast President Harding's speech in San Francisco just before his illness and sudden death. Within a month it is understood WCAP will be sending a formal program, dividing the time with WRC on 469 meters.

"The Voice of the Capital"

Recently WRC, the new station of the Radio Corporation of America, named the "Voice of the Capital," was christened. Its programs are broadcast Tuesday, Thursday, Saturday and Sunday afternoons and Monday, Wednesday and Friday evenings, WCAP broadcasting in the alternate evenings and afternoons.

Colonel Theodore Roosevelt, assistant secretary of the navy, made a speech at the dedication of WRC. Major-General John L. Hines, deputy chief of staff of the army, also spoke. Acting Secretary of Commerce S. B. Davis talked of commercial and public interest in Radio.

The opening ceremonies of WRC included a Radio message from General Harbord, president of the corporation, who is abroad.

The initial program of WRC was not entirely devoted to talk. Musical numbers were broadcast by the U. S. marine band, Taylor Bronson leading. Celebrated artists on the program included Charles C. Tittman, bass soloist; Elias Breeskin, Russian violinist; Ruth Peter, soprano; Victor Golibart, tenor, and Clelia Fioravanti, mezzo-soprano.

WRC Duplicate of WJY-WJZ

WRC is a duplicate of the corporation's stations in New York; it is rated at 500 watts. Having two sets of apparatus, it could in an emergency put out 1,000 watts and reach every corner of the continent. Every precaution is taken to insure excellent broadcasting, from the sound and echo-proof station, where the artists perform, to the small receiving set on which the operator listens in to his own station and for distress calls from ships with which the broadcasting might interfere.

The new station is under the personal direction of S. P. Guthrie. W. L. Tesch is local engineer and Ralph Edmunds is program manager, assisted by Announcers Gannon and Berkeley. On opening night Announcer Cross of WJZ assisted.

A special feature of the regular WRC program will be a daily "children's hour" from 6 to 6:20 broadcast by Mrs. Edward Albion, who, experienced in the entertainment of children, will write all her "talks" and deliver them in a manner a little more personal than most broadcasters in an effort to effect closer relationship with her young audience.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

(Submitted by W. D., Staten Island, N. Y.)

Summer Reception

Question. I built a Flewelling set in accordance with the diagram and information furnished in Radio Digest, but failed at first to make the set work. I worked with it for more than two weeks before I read in one of your articles that it might be necessary to reverse the leads to the tickler coil. When the leads were reversed the set worked exactly in accordance with the descriptions published except for distant reception. Have tried all ways for ground, loop aerial, etc., but still am unable to get any distant stations. Local stations come in wonderfully any way that I try for them. I get the roaring sound and the whistle and can adjust these sounds suitably by the grid leak as you have said, so that I know my set must be about right. Can you tell me why I get no distant stations?

Answer. You are a good deal like myself and I guess millions of others. We are all having difficulty during the summer months to equal the reception that was accomplished during the winter. I am quite sure that it will be of interest to the fans to see how this has worked in my particular case; here's a little line on it. Some time ago I went into the open market and purchased several of the best types of Radio sets, took them home, set each one on a shelf by itself with its own phones, batteries, etc., and a quick change switch so that the same antenna might be used on any set.

The results were to say the least very illuminating. Practically all of the sets gave about the same results, which were not nearly as good as results that I have seen obtained during the winter with sets that were far inferior to those used during this test. One set in particular ranked slightly better on the distant plants. This was due entirely to the ability one had to exercise a micrometer control over the adjustment. The tuning condenser in particular was a beauty. It was of the type that I believe I have spoken of before, i. e., one that could be moved the slightest fraction of an inch as might be desired. Adjustments were so critically fine that this set really gave the best results. Now while these results, as has been said, were not as good as those obtained during the winter, they were so much inferior that they really constituted an absolute test that Radio reception is not nearly so good in the summer months as it is in the winter.

The Flewelling set while evidently giving exceptional returns of course cannot be expected to do the impossible; in view of this and the above facts, if I were you, I would rest on my laurels and wait for the "good old winter time."

Emergency Batteries Save Lives on Sinking Ship

Operator Resorts to Auxiliaries When Grounding Cuts Off Power

HALIFAX, N. S.—An example of the value of auxiliary Radio power in the form of batteries on seagoing vessels and the necessity of their frequent inspection, is found in the report on the total loss of the steamship Advance.

When the Advance went aground off Halifax recently, the operator found that his power was cut off soon after grounding, as it was feared there might be a boiler explosion. This made it necessary for him to shift to his emergency batteries for transmitting SOS calls to ships and shore stations. His batteries stood up for one and a half hours, when it became necessary to abandon ship. All lives were saved though the vessel itself was lost, due to the bringing of aid by Radio.

There would undoubtedly have been a loss of life if the batteries had not been in good shape, and it is understood that just before the vessel cleared from Boston for Halifax, a government Radio inspector discovered that the old batteries were in very bad shape and condemned them. The owners immediately installed an entirely new unit of batteries, the same ones which figured in the rescue later.

Ohio 'U' Plant Converted to Class B, Adds to Set

Faculty, Campus Organizations to Have Hand in Programs

COLUMBUS, O.—Sanctioned by the university board of trustees and the government, the Ohio State university broadcasting station, WEAO, is operating as a Class B station. As such it is one of only four such stations in Ohio.

Conversion of the station to Class B brought about some changes. Additions are being made to the equipment and the broadcasting room is being improved. In addition, M. I. McDowell, an operator of wide experience, has been employed to have charge of the electrical operation of the station. A manager of programs also will be added to the staff.

Last year WEAO programs were heard from Oldtown, Me., on the East to Winnipeg and Moosejaw, Canada, on the North, and from Vancouver, B. C., and Los Angeles on the West to Houston, Texas, and Havana, Cuba, on the South. Hundreds of postcards received at the broadcasting station show the wide territory covered.

As heretofore, the station will broadcast twice daily, at 1:30 and 4:00 p. m. At these times the usual daily bulletins, including market reports, weather forecasts and items of news interest, will be put on the air. Each Thursday evening there will be a more extensive program in which members of the faculty and campus organizations will have a big share.

When you are looking for something to wind your tuning coils on be sure it is moisture proof or make it so.

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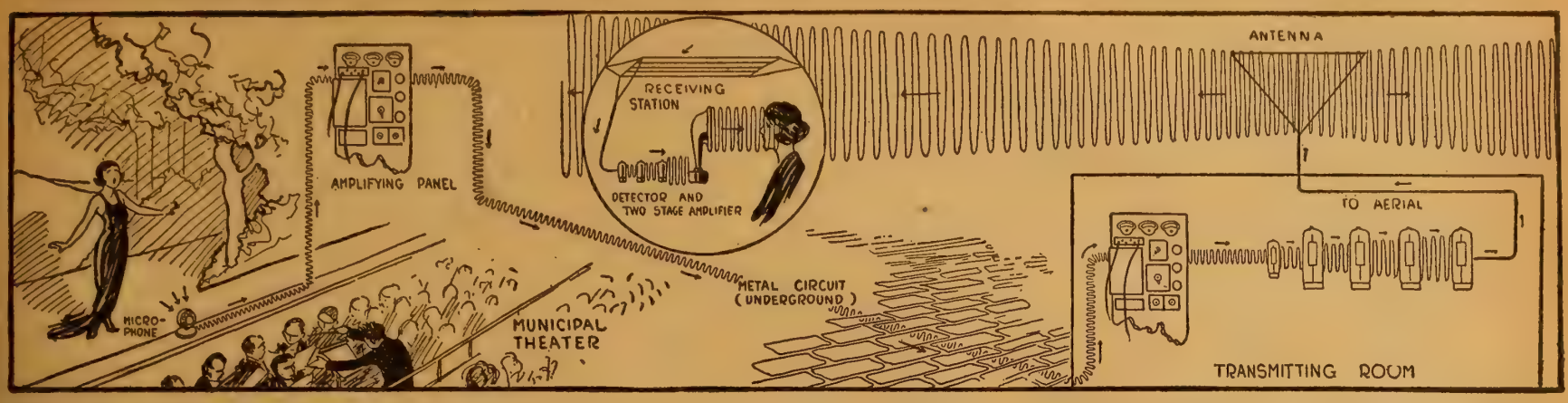
HOW KSD BROADCASTS FROM STAGE



SHOWS METHOD OF WIRING TO THEATER

OPERATOR WHO CONTROLS PICK UPS NOT SEEN

Wire Takes Theater Program from First Line Amplifier Direct to KSD Studio

By S. C. Mahanay

ST. LOUIS.—Of the many thousands of Radio enthusiasts who listen in to the varied programs presented by Station KSD, the Post-Dispatch here, only a very limited few are familiar with the great amount of work, plans and preparations necessary to make possible broadcasting from places other than the building housing the newspaper and the broadcasting student.

During the past winter programs have been broadcast from churches, theaters, a hotel, and from the Coliseum.

The question has arisen in the minds of many as to where the transmitting instruments are located when "broadcasting from" a certain place. The apparatus which does the actual transmitting is permanently installed in the Post-Dispatch building on which the antenna is erected, and the speech or music is conveyed to this building over a metallic circuit just as though it were a telephone conversation.

Where Announcements Are Made

Announcements are made either from the theater or from the roof, depending on the program to be transmitted. When broadcasting from the Municipal Theater, announcements are made from the transmitting room of KSD.

The microphone, a small instrument about four inches in diameter and an inch thick, is the device which picks up sound vibrations and converts them into electrical waves, whence they travel over a three-wire circuit to the first "line amplifier." (For those who are technically inclined, it may be added that the microphone is the double-button type, and of the wires connecting it, one is neutral while each of the others is connected to one of the carbon buttons on either side of the diaphragm.)

Why First Amplified

After passing through the first amplifying panel as shown in the diagram, the waves are conducted by wire to the transmitting room on the roof of the Post-Dispatch building. This amplification is necessary because of the "line drop" which occurs when feeble currents are conducted over wires to any great distance, and without this amplification—several million times—there would be insufficient energy to operate the transmitter.

In the transmitting room at the station they are again increased by an apparatus which is an exact duplicate of the amplifier in the theater, and it is at this point that the actual control of the volume of amplification is governed, being increased or decreased as may be necessary, depending upon the program transmitted.

Into Actual Transmitter

From this, they pass through a fifty-watt tube which also increases their energy and then through the four 250-watt transmitting tubes—two oscillators and two modulators—and from these, to the antenna to be broadcast into infinite space.

The greatest problem is encountered when broadcasting from a theater, as many tests and experiments are necessary in order to determine the best location for the microphones. Every auditorium has different acoustical properties and these must be taken into consideration in locating the microphones.

How Microphones Are Located

In most cases, a microphone is suspended from the balcony, for organ music, another is placed in the center of the footlights, for orchestral music, while still another is located about the center of the stage, usually cut in only for vocal numbers. Changes from one to the other, depending on the music, to be picked up, are made by the operator at the amplifying panel back of the stage.

When announcements are to be made, a signal from the announcer notifies the operator to cut in a microphone in small sound-proof room "back-stage," constructed for the purpose, and when they are concluded, another signal notifies him to change back to the other microphone. This accounts for the "click" so often heard just before and after announcements.

AN EVENING AT HOME WITH THE LISTENER IN

(SEE NOTE BELOW FOR INSTRUCTIONS)

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFDB, San Francisco, Calif.	509	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30	9:00- 9:30
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:20	3:30- 4:30
WBZ, Springfield, Mass.	337	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	9:00- 1:00	.....	9:00- 1:00	.....	9:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-11:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	8:30- 9:30	8:30-12:00	9:30-10:30
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	.....	.....	.....	.....
WJAZ, Chicago, Ill.	448	.....	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	4:00- 7:00
WJY, New York, N. Y.	405	.....	.....	.....	5:30- 9:30	5:30- 9:30	.....	1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:25-10:55	.....	.....	.....	9:25-10:55	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	7:00-12:00	7:00-12:00	7:00-12:00	7:00-12:00	7:00 12:00	7:00-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

Desires Stone Chippers

SCHENECTADY, N. Y.—A correspondent of Station WGY, located here, who has a beautiful faith in the efficiency of Radio in the capture of criminals recently recently requested the station to announce that a reward of $50 would be paid for the arrest of the "parties" guilty of chipping words off the family grave stone.

SUMMER PHOTOGRAPHS? EARN $$$$$—

SUMMERTIME means summer pictures. You and your camera can earn a dollar by sending The DIGEST out-of-doors photos involving the use of Radio in camp, the automobile, swimming, boating, canoeing, on the hike, playing golf, etc. Send such photographs **with negatives** and a few descriptive words, including a stamped, addressed envelope so that unsuitable pictures may be returned.

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123 Madison St., Chicago.

AIN'T SCIENCE GRAND? RADIO BARBER SHOPS!

Mme. Whoozis Disarms Tonsorial Artist with Gift o' Gab

COLUMBUS, O.—Tired guest at Hotel Columbus: "Well, if I must go into the barber shop, I must. And I can just imagine it. A baldheaded barber who talks about the ladies, a short barber who talks about baseball, a tall barber who talks—oh, what's the use?"

He enters the barber shop, finds absolute silence, gets in chair, gives order. Barber nods silently. Sharp metallic noise in corner. Guest starts.

Barber (reassuringly) "That's all right, sir. Just Station BOWW coming in. Mme. Whoozis sings the Barcarolle from 'Gefuellte Fish' today and Professor Horace Bang of Catsknuckle Institute talks on 'A plea for more general use of Cerebellum.' Excellent program today, sir."

Guest listens all the way from haircut to massage. Smilingly pays bill of $4.45, compliments management and goes to writing room. Writes: "Dear Bill: Just met first barber who didn't talk you to death. They couldn't talk for listening to Radio. Ain't science wonderful?"

WLW Again Sends Opera

CINCINNATI, O.—Station WLW, Crosley Manufacturing Co. here, again broadcast an opera from the famous Cincinnati Zoological Gardens recently. The operas are broadcast directly from the open-air theater by means of a special apparatus and sent out from the studio at the Crosley plant some miles away.

SEA AIRPHONE TRIO PRAISED AS HEROES

MEDALS GIVEN OPERATORS BY LOS ANGELES MAYOR

Impressive Ceremonies Mark Honors to Three Who Saved 250 from Ship Fire

By Strachan McMillan

LOS ANGELES.—Heroic gallantry, exemplified in the faithful performance of duty while facing death, received official recognition recently when Mayor George E. Cryer, of this city, publicly bestowed gold medals of honor and more substantial rewards in the form of checks for $500 each on the three Radio operators of the steamship City of Honolulu, in the final scene of the last act of the great ocean tragedy of October 12, 1922, when the steamer was burned and abandoned at sea 700 miles from this city.

The presentation took place on the balcony of the City Hall. The recipients were W. P. Bell, chief Radio operator; H. D. Hancock, second operator, and N. C. Kumler, third operator. The presentation was at the instance of the Radio Corporation of America, employer of the operators. A. A. Isbell, Pacific Coast manager of the corporation, introduced the recipients to the mayor and served as his aid during the ceremonies.

Modestly Receive Medals

Modest and unassuming in demeanor, the trio chatted informally with all who approached them before and after the ceremony but showed marked disinclination to discuss the exploit in which they were heroes. The young men are of medium height and build, and clean cut. Bell, since the burning of the City of Honolulu, has been operator on the steamship President Harrison but at present is awaiting a new assignment. His home is in Oakland, Calif. Hancock, resident of Venice, Calif., is now chief operator on the steamer City of Los Angeles; Kumler, who lives in this city, has just returned from the Orient as operator on the steamer West Niger; he also is disengaged. This was their first opportunity to meet in this city since last October at the same time.

Mayor Cryer's Address

In his address Mayor Cryer said:

"This is an expression of our responsiveness to American heroism, loyalty to duty and acceptance of responsibility by three young men which resulted in saving about 250 lives through the miracle of Radio which circles the world with instant communication and the power to render instant service through God's free air, between states and nations, o'er land and sea.

"We marvel at the scientific achievement but we remember, too, that without the human soul these inventions would be of little value. We are here to pay slight tribute to these stalwart young Americans whose intrepidity made effective the work that science had entrusted to them."

How Passengers Were Rescued

The City of Honolulu left Honolulu for Los Angeles on October 7, 1922, on what was to be her final trip. Fire was discovered at 5:30 a. m., October 12. It was then that Radio spread "S O S," the distress call that thrills the world when it is broadcast. Continuous Radio communication was maintained with the shore, and the vessels which were rushing to the rescue.

At 9:30 a. m. the passengers, and the crew of 250, had left the ship. Bell and Captain R. H. Lester went last. Six hours later the S. S. West Faralon rescued them all. At daylight, next morning, they were transferred to the U. S. naval transport Thomas, from which they were landed in Los Angeles harbor. Later the floating hulk of the City of Honolulu was sunk by gun fire from the U. S. S. Shawnee, because the former was a menace to navigation.

NATION-WIDE TALK HALTED BY DEATH

STOPS PRESIDENT'S TRANS-CONTINENTAL MESSAGE

Five Stations, Coast to Coast, Had Planned to Prove Radio's Great Sending Power

SAN FRANCISCO. — The unexpected sudden illness and death here of President Harding put an end to plans for what would have been the first attempt at a national broadcast to millions of Radiophans by the late chief executive. His message was to have been broadcast simultaneously by five stations located from coast to coast.

Elaborate arrangements had been made by Stations KPO, San Francisco; WOAW, Omaha; WMAQ, Chicago; WEAF, New York, and WCAP, Washington, D. C., to carry the words of the deceased from the Pacific to the Altantic coast. The stations were linked by the long-distance telephone lines of the American Telephone and Telegraph company.

Work Weeks on Plan

Engineers, telephone and Radio worked several weeks to perfect the plan. Many tests were made to prevent distortion of sound caused by the great distance to be covered. Line amplifying devices of special design were applied to the apparatus in each station. At a given signal the operators of the stations were to have moved the switches which would have formed the continuous connection.

One of the greatest obstacles to the success of the scheme was the fact that there was only one wire from the microphone in the auditorium in San Francisco, where the President was to have spoken, to the central telephone station in Denver. At every other station precautions had been taken to install a system of alternate wires, which in the event of their breakdown would have transmitted the speech without interruption.

Radiophans Hear Death of Harding Broadcast

Dr. George T. Harding Hears via Ether of Brother's Death

CHICAGO.—Hundreds of thousands of Radiophans while listening in to concerts heard their favorite stations stop their programs to announce the news of President Harding's death. The programs were then discontinued in reverence of the moment. The first flash was broadcast from Station KPO, Hale Brothers, San Francisco. Then other big stations heard the news and as they put it on the air, the word travelled from West to East with lightning rapidity, scoring a beat on practically every newspaper in the country.

Dr. George T. Harding of Columbus, Ohio, received word of the sudden death of his brother, the President, through a neighbor who heard the news broadcast. The neighbor heard Station KPO a few moments after President Harding had passed away in San Francisco.

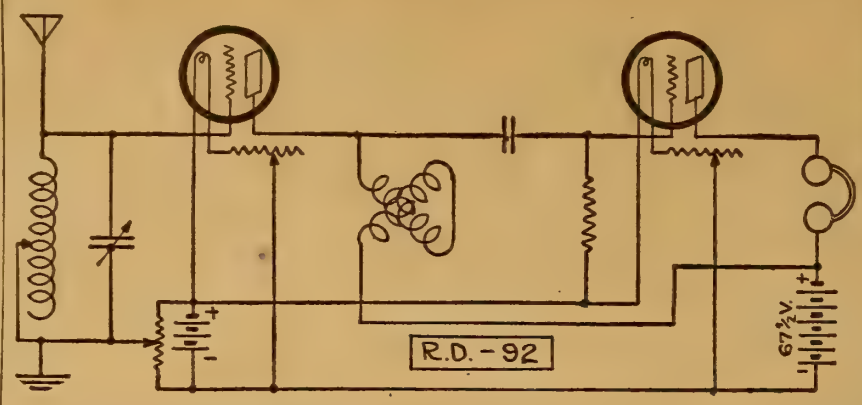
PATENTS ON RADIO

Can you secure a patent on your Radio invention? Does your apparatus or circuit infringe existing patents? These questions and others can be answered promptly by consulting my special library of Radio patents compiled to assist Radio inventors and manufacturers. Send for booklet on Radio patents.

JOHN B. BRADY

Ouray Building WASHINGTON, D. C.

SIMPLE TWO TUBE HOOK-UP R.D.92



A TWO tube hook-up requiring a minimum amount of apparatus is shown in the illustration. The circuit is designed for selectivity, clarity and distance. For additional volume audio frequency amplification should be added. The usual method of inserting the primary of the audio frequency transformer in place of the receivers is employed.

Both tubes are hard (amplifiers) tubes; a plate voltage of about 67 in employed. Due to variations in tubes, it would be best to test for best taps in order to get maximum distance reception.

The tuning unit consists of a single slide tuning coil and a variable condenser (.00025 mfd.) shunted across it. In Radio frequency work it is advisable to keep all capacities as low as possible. For this reason a lattice wound type of variometer is recommended. The grid condenser has a capacity value of .00025 mfd. and the the leak a resistance of two megohms. The rheostats and A battery should conform with the type required for the particular tube used.

The potentiometer for grid potential should have at least 400 ohms resistance.

DUCK DINNER GIVES MAC MILLAN HUNCH

Gets Idea of Taking Set to Arctic As He Chews Drumstick

CHICAGO.—Captain Donald MacMillan first got his idea of taking Radio on his trip northward to the pole at a "Duck Dinner" given him in this city last spring. At the dinner Captain MacMillan met E. F. McDonald, Radio engineer and manufacturer, who explained the value of a receiving set as a means of getting news, concerts and other matter from the States during the long stretches of Artic solitude, which is the real hardship of the North.

At first the explorer explained that limited space prevented the installation of a set, but later he agreed that it would be fine for his men. As soon as he was sold on the receiving end, Mr. McDonald and a friend began to expound the greater value of a transmitting set, incidentally mentioning the possible distribution of information and stories to the world at home. The Captain finally decided he wanted a complete Radio outfit, and many persons believe that the equipment will make him the most popular arctic explorer, whether he gets to the North Pole or not.

AUXILIARY TUNER

THIS new instrument connected to your present receiving set with one wire enables you to easily bring in both the long and short wave stations which you cannot get with your present equipment. It also enables you to eliminate that local interference so you may listen to distant stations.

Copyrighted diagram and complete instructions for building and operating this instrument $1.00, or with all parts, including Condenser, Coils, Switches, Panel and Cabinet, $10.00. Complete instrument, $15.00. All goods prepaid.

S. A. TWITCHELL

1925 Western Avenue, Minneapolis, Minn.

Plan to Organize Listeners

BALTIMORE, MD.—The Radio Listeners' Protective Association, with headquarters here, is endeavoring to form a national organization of Radio users. Temporary officers have been elected and a Maryland charter has been obtained. A Baltimore chapter has been started and it is proposed to found chapters in other cities as the membership grows.

Radio music picked up by wheeled carriers is now taking the place of the hurdy-gurdy in the streets of London.

Radio Equipment

EDISON Elements for making "B" Batteries, 6c per pair; tubes, 2c each. Nickel Wire, Insulators and Cabinets at reasonable prices. TODD ELECTRIC CO., 178 Lafayette St., New York City.

HAMDOM PLANNING BIG CHICAGO MEET

A.R.R.L. NAMES CITY FOR SECOND CONVENTION

Transmitting Amateurs from Far and Near to Attend Confab and Discuss Problems

CHICAGO.—The largest gathering of Radio amateurs in history is scheduled for this city September 12 to 15, when the second national American Radio Relay League convention will be held here under the auspices of the Chicago Radio Traffic Association. This was announced recently following receipt of information that Chicago had been selected as the scene of the convention by the A. R. R. L. board of direction at a meeting in New York.

Transmitting fans all over the country and Canada, from New York to the Golden Gate and Ontario to the Gulf, many of whom communicate with each other nightly over thousands of miles through the A. R. R. L. system, and who know each other best by their call letters, will here meet face to face for a discussion of their special problems.

There has been but one other such convention, held here in 1921, and the tremendous strides in amateur Radio since that time, and with it the growth of the amateurs' representative body, the A. R. R. L., will make the coming event one of great moment to all amateurs and to the Radio public in general.

WE REPAIR RADIO TUBES

WD-11	$3.50	UV-199	$3.75
WD-12	3.50	UV-299	3.75
UV-200	2.50	UV-201-A	3.75
UV-201	3.00	C-301-A	3.75
C-300	2.50	UV-202	4.00
C-301	3.00	C-302	4.00

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ALL INSTRUCTIONS INCLUDED ALL PANELS DRILLED— READY TO MOUNT

FLEWELLING CIRCUIT COMPLETE!!

CONSISTING OF	Reg. Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.75	.40
2 Coil Mounts with Straps	1.20	.80
1 Bakelite Socket	1.00	.45
Vernier Rheostat	1.50	1.35
1 Bakelite 3" Dial	1.00	.25
8 Binding Posts	.80	.40
1 Baseboard for Mounting	.30	.20
1 Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$22.16	

Our Price **$12.45**

LONG RANGE $10.00 VALUE HEAD SETS **$3.65**

Made in style and design proved by use and experiment to be the best. Coil wound with about 6,560 turns of No. 40 enamel coated copper wire. Direct current resistance approximately 1,600 ohms. Impedence at average music and voice frequency (800 cycles) is 21,000 ohms.

MASTER BALDWIN PHONES

Type C with head band and cord	$8.95
Type C unit	3.95
Brandes superior headset	5.75
3,000 Ohm Guaranteed Headsets, $8.50 value	3.65

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- 1 7x21x3/16 drilled formica panel
- 1 Howard rheostat
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- 8 Binding posts
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- 1 Wave control neutroformer
- 2 Radio frequency amplifying neutroformers
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- 1 .00025 micon grid condenser
- 1 Marco variable grid leak
- 1 Base board for mounting
- 25 feet tinned copper bus bar wire and complete instructions for assembling and wiring.

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The Week's Advance Broadcast Programs

Tuesday, August 14

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, Selection from "Chu Chin Chow." Star Concert Orchestra: "Souia," Fred Stanger, tenor; "Melodie," Manny Roth, violinist; "Lunar," Star Concert Orchestra. "Song of the Clock," Fred Stanger; "I Know of Two Bright Eyes," Star Concert Orchestra; "Legende," Manny Roth, violinist; "Air de Ballet," Star Concert Orchestra; "Moon of the Cherry Gardens," Fred Stanger; Selection of Scottish Airs, Star Concert Orchestra.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee musicale; 6:45-7:30 P. M., Children's hour; 8:00-10:00 P. M., De Luxe program, arranged by Harry James Beardsley, baritone.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Grand Symphony Orchestra; 6:45 P. M., The Children's Period; 7:20 P. M., Concert, Mrs. O. E. Lytle, reader; Mrs. Edwin E. West, soprano; Dorothy Trombley, cello; Mrs. Gertrude Robinson Dodds, piano; Howard Keister, trombone; Mrs. Mart Keister Kerr, accompanist.

KGW (Pacific, 492), 10:00-11:00 P. M., Dance music, George Olsen and his orchestra.

KPO (Pacific, 423), 8:00-10:00 P. M., Program arranged by Augusta Hayden.

KSD (Central, 546), 8:00 P. M., Band concert.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, Lyon & Healy Concert Department; 7:00-7:58 P. M., Musical program, courtesy of Giovanni Gennaro School of Italian Bel Canta; Cope Harvey's Orchestra, College Inn, Sallie Menkes, pianist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical Program, Arcadia Cafe Concert Orchestra; Children's Hour, talk on care of children; 4:30-5:55, Musical program, talk, "Affairs of the Heart," Betsy Logan; 7:30 P. M., Bedtime stories, Dream Daddy.

WFAA (Central, 476), 8:30-9:30 P. M., Jerome L. Wright's Male Quartet of Singers; 11:00-12:00 Watson's Lully-Low Orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00, Song recital; 7:00-7:30, Children's own half hour, stories by Cousin Sue; 8:00, Boy Scouts Radio Corps, under Supervision of Boy Scouts of America; 8:30, Song recital; 10:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, 360), 12:00 noon, Organ recital; 5:00 P. M., Twilight Tales, Eunice L. Randall; 7:00 P. M., Concert by Mrs. Nellie Ramey Gay, Contralto, Ruth I. Wetherbee, Accompanist.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., Selections at the Wurlitzer, George Albert Bouchard; 4:00-5:30, Cathering Stang, violinist, Martha Gumph, harpist.

WGY (Eastern, 380), 7:45 P. M., Musical Program, "O Canada." Chorus Franco-Canadian; "False Chromatique," Beatrice Gerard, pianist; "L'Apostat," L. N. Marcil, bass; "Garotte," Georgette Manny, violinist; "Les Soirees de Quebec," Chorus; "Les Anciens Canadiens," Guillaime Loiselle, reader; "O Carillon," Alphone Gerard, baritone; "Obstination," Beatrice Gerard, soprano; "Tes Yeux," "Les Trois Couronnes d'or," Edward Froment, tenor; "L'Amour," Henri Pellerin, baritone; "Fantasie de Passion," Georgette Manny, violinist; "Les Chants Canadiens," chorus.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre orchestra, Ollie Jones, conductor; "Just Among Home Folks"; Organ recital, Roy C. Parks; 7:30-9:00, Concert under direction of Howard Weller Hardaway.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Song recital, 6:00, Dinner music, WIP Little Symphony Orchestra; Dick Regan, director; 7:00-7:30, Bedtime stories, Uncle Wip; 8:30, Organ recital, Karl Bonawitz, Germantown Theater.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results.

WJAX (Eastern, 390), 7:30 P. M., Concert furnished by Cleveland News.

WLW (Eastern, 309), 10:00 P. M., "My Heart At Thy Sweet Voice," "Sunshine Song," Gladys Helen Woerz, soprano; "Behind the Scenes," a Play in one Act; Selections, Circle Orchestra.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Glenn Dillard Gunn School of Music; 9:00, Concert, LaSalle Roof Garden Orchestra, direction E. E. Sheets, Jr.; 9:15, Mr. & Mrs. Wm. R. Dicjenson, tenor and contralto.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 3:30, News Orchestra, Schmeman's Band.

Wednesday, August 15

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "Phedre," Orchestra; "Schon Rosmarin," Harry Adaskin, violinist; "Amina," orchestra; Selections, Muriel Lomax, soprano; "Serenad," Orchestra; "Serenade," Harry Adaskin, violinist; "To Thee," orchestra; Selections, Muriel Lomax, soprano; "Maytime," orchestra.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee Musicale; 6:45-7:30 P. M., Children's Hour; 8:00-10:00 P. M., De Luxe program, presenting Burkman Brothers, Hawaiian Quartet.

KDKA (Eastern, 326), 7:20 P. M., Concert, Little Symphony Orchestra, under direction of Victor Saudek, assisted by Pietro Cresciani, tenor, "Symphony G Minor," "To Spring," "Whispering Flowers," "A Dream."

KGW (Pacific, 492), 3:30-4:00 P. M., Children's Program, Music and story by Aunt Nell; 8:00-9:00 P. M., Concert Enterprise Philharmonic Orchestra; 10:00-11:00 P. M., Dance music, George Olsen and his orchestra.

KSD (Central, 546), 8:00 P. M., Music from Fashion Show, Municipal Theatre in Forest Park.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Concert, courtesy Cable Piano Company, Harry Geise, pianist; Cope Harvey's orchestra.

WBZ (Eastern, 337), 7:05 P. M., Concert Sarah K. Howes, mezzo-soprano; WBZ trio; 8:30, Bedtime story for grown-ups, prepared by Orison S. Marsden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, dinner music, Acadia Cafe Concert Orchestra; 2:00-3:00, Musical program, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 4:30-5:30, Song recital and fashion talk; 7:30, Bedtime stories, Dream Daddy; 8:00, Song recital and dance music, Howard Lanin's Arcadia Cafe Dance orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue.

WGI (Eastern, 360), 12:00 noon Organ recital; 6:45 P. M., Girls' Hour conducted by Eunice L. Randall; 7:30 P. M., Duo piano Battle of Music; Concert by Uncle Eddie and Uncle John.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., Selections at the Wurlitzer, George Albert Bouchard; 4:00-5:30 Catherine Stang, violinist, Martha Gumph, harpist; tea-time music; 9:00-11:45 P. M., Concert Program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by Mary Anderson Theatre orchestra; 7:30-9:00, Guitar solos, J. Henry Brady, guitar trio, Georgia Pope, Ruth Elder, J. Henry Brady; Rita Walsh, soprano; Virginia McCullough, saxaphonist, accompanied by Joe L. Baker; Harry William Meyers, pianist.

WHK (Eastern, 360), 8:00 P. M., Musical program, WHK Orchestra; Automobile Road Report for Northern Ohio; Babson's Radio Release.

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Song recital and short talks; 6:00-6:45, Dinner dance music; 7:00-7:30, Bedtime stories and roll call, Uncle Wip.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55, Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sports results and police reports.

WLW (Eastern, 309), 8:00 P. M., "Winter," "Spring Song," Margaret Niesel, pianist; Quartet selections, The Cincinnati Harmony Four; "Serenade," "A la bien Aimee," Margaret Niesel, pianist; Concert, The Cincinnati Harmony Four, "Drifting Back to Dreamland," Steerin' for Erin"; Dance selections, Aichele Novelty Orchestra; "Old Time Waltz Songs," The Cincinnati Harmony Four; selections Aichele Novelty Dance Orchestra; The Cincinnati Harmony Four, "Annie Laurie," "When You and I Were Young Maggie"; Selections by Aichele Novelty Dance Orchestra.

WMAQ (Central, Daylight Saving, 448), Program by Cosmopolitan School of Music and Dramatic Art; 7:00, Georgene Faulkner, stories for children; 9:00, LaSalle Roof Garden Orchestra; 9:15, John Stamford, tenor.

WOC (Central, 484), 8:00 P. M., Pipe Organ Recital, Erwin Swindell, organist, Harold Stelk, boy soprano; 10:00 P. M., Concert "Blackhawk Hotel Orchestra."

WWJ (Eastern, 517), 3:00 P. M., Concert, Scheman's Band; 6:30, News Orchestra, Schmeman's Band.

Thursday, August 16

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "The Magic Flute," orchestra; "The Mocking Fairy," Nellye Gill, soprano; "Andante," Jacques Sterin, cellist; "The Blue Danube," orchestra; "Music When Soft Voices Die," Nellye Gill soprano; "Air de Ballet," orchestra; "A Dream," Jacques Sterin, cellist; Intermezzo from "Naila," orchestra; "Song of the Open," Nellye Gill, soprano; "La Pere de la Victorie," orchestra.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee Musicale; 6:45-7:30 P. M., Children's Hour; 8:00-10:00, De Luxe program.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Grand Symphony orchestra; 7:20, Concert, Brass Quartet, Mrs. Margaret Leyda, contralto; Gladys Langfelt, soprano.

KGW (Pacific, 492), 3:30-5:00 P. M., Woman's program devoted to Child Training; 10:00-11:00 P. M., Dance music, George Olsen's orchestra.

KPO (Pacific, 423), 8:00-9:00 P. M., Organ recital; 9:00-10:00, Albert Rosenthal, cellist; Mrs. Albert Rosenthal, soprano; Evelyn Eck, pianist, and Melvin Steinmetz.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, Lyon & Healy Company; 7:00-7:58, Concert, Emilie Cipriani, soprano, Sallie Menkes, accompanist, Herbie Mintz, pianist; Cope Harvey's orchestra.

WBZ (Eastern, 337), 5:45 P. M., Organ recital from the Capitol theater by Elsie Robbins Gross; 7:05, Concert, Bernice Mosher, lyric soprano, Aime Bernard, tenor, Roul Bicard, violinist; 8:20, Bedtime story for grown-ups.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00, Short talks and musical program; 7:30, Bedtime stories, Dream Daddy.

WFAA (Central, 476), 8:30-9:30 P. M., Mario H. Bolack, blind pianist; Mrs. Clyde F. Magee, reader.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00, Song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 8:00, Musical program.

WGI (Eastern, 360), 12:00 noon, Organ Recital; 7:30 P. M., "Squaring It With the Boss," presented by the Amrad Players; "Bits of Wisdom," by George Brinton Beale, Boston newspaper editor.

WGR (Eastern, Daylight Saving, 319), 4:00-5:30 P. M., Catherine Stang, violinist; Martha Gumph, harpist; tea-time music; 6:00-6:30, George Albert Bouchard at the Wurlitzer.

WGY (Eastern, 380), 7:45 P. M., Musical program, "The Trumpeter," Raymond Becker, baritone; Selections, Raymond J. Zwack, violinist; John M. Zwack.

(Continued on page 9)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

GET A
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and you are assured of proper results.
Ritter loops can be assembled in five minutes. Instructions with every loop Price $1.00. By mail, 10c extra.
RITTER RADIO CO.
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For REAL Filament Control

Your set is probably bringing in DX stations you never heard because your rheostat cannot control your filament action. The Filkostat gives infinite adjustment and enables you to magnify the weak stations and bring them in strong and clear.

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At dealers in high grade Radio Supplies, everywhere. $2

The Condenser Sensation of Modern Radio

FRESHMAN NOISELESS TESTED MICA CONDENSER MFG. BY CHAS. FRESHMAN CO. Inc. NEW YORK CITY

Through the accuracy and dependability of Freshman Condensers, hookups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

These little storers of energy and rectifiers of Radio Current are the very heart of a well-built radio set.

The proper fixed condenser will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	$0.35	.002	$0.40
.00015	.35	.0025	.50
.0002	.35	.003	.60
.00025	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	1.75
.0015	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

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17 Plate	4.00	1.95
23 Plate	4.00	1.95
43 Plate	5.00	2.25
11 Plate Vernier	6.00	3.25
17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
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Radiophone Broadcasting Stations

Corrected Every Week—Part I

AA3, Denver, Colo. 440 meters. 1,500 mi. Fitzsimmons Gen. Hospital. (Educational Dept. U. S. Army). Fri. 8-9 pm, music, entertainment. Mountain.
AQ6, Canton, O. 425 meters. 500 mi. Hdqtrs. 135th Field Artillery O. N. G. Wed, Fri, music. Sun, church services. Eastern.
AS6, San Antonio, Tex. 360 meters. 200 mi. U. S. Army, Ft. Sam Houston. Mon, Thurs, irregular.
AV7, St. Paul, Minn. 400 meters. 500 mi. 6th Inf. Minn. Nat'l Guard, St. Paul Armory. Daily ex Sun, 2-2:30 pm, music, announcements. Tues, 8:30-10 pm, Thurs, 8:30-9:15 pm. Central.
BEI, Tacoma, Wash. 400 meters. 100 mi. Camp Lewis, U. S. Army, Third Signal Co. Daily ex Thurs, Sun, 6-7 pm, music, announcements, lectures. Pacific.
CFAC, Calgary, Alta., Can. 430 meters. 1,000 mi. Calgary Daily Herald. Daily ex Sun, 12:30-1 pm, 3-4. Daily, 7:45-8:45 pm. Mountain.
CFCA, Toronto, Ont., Can. 400 meters. 500 mi. Toronto Star. Daily ex Sun, 12 m, weather; 2:30-3:30 pm, news, music; 5:30-6, news; 8-9, concert. Sun, 8:45 pm, concert. Eastern Daylight Saving.
CFCB, Vancouver, B. C., Can. 440 meters. 1,500 mi. Vancouver Daily Province. Daily, 8:30-9:30 pm, reports, news, music. Pacific.
CFCE, Halifax, N. S., Can. 440 meters. 150 mi. Marconi Co. Mon, Wed, Sun night, music, entertainment.
CFCF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconi Co. Daily ex Sun, 1-1:30 pm. Monday, Wed, Fri, 7:30-9 pm. Eastern.
CFCH, Iroquois Falls, Ont., Can. 400 meters. 200 mi. Abitibi Power & Paper Co., Ltd. Daily, 8 pm, weather and stock reports. Experimental station. Eastern.
CFCK, Edmonton, Alta., Can. 410 meters. Radio Supply Co. Daily ex Sun, 8-8:30 pm, music. Sun, 8:30-4:30 pm, Concert. Mountain.
CFCN, Calgary, Alta., Can. 275, 440 meters. 1,500 mi. W. W. Grant Radio Ltd. Slogan, "Voice of the Prairies." Mon, 9 pm, music. Fri, 10:30-12:30 pm, dance music. Sat, 10-12 pm. Wed, Sat, Sun, after 11:30 pm using test call 9AC. Mountain.
CFCX, London, Ont., Can. The London Advertiser.
CFPC, Fort Frances, Ont., Can. International Radio Develop. Co.
CFTC, Toronto, Ont., Can. The Bell Telephone Co. Licensed only.
CFYC, Vancouver, B. C., Can. Victor Wentworth Odlum.
CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quotations, music. Mountain.
CHCA, Vancouver, B. C., Can. Radio Corp. of Vancouver, Ltd.
CHCB, Toronto, Can. Marconi Co. No regular program.
CHCF, Winnipeg, Man., Can. Radio Corp. of Winnipeg, Ltd.
CHCS, London, Ont., Can. London Radio Shoppe.
CHCX, Motreal, Que., Can.. B. L. Silver.
CHYC, Montreal, Que., Can. 410 meters. 1,500 mi. Northern Elec. Co. No regular schedule.
CHXC, Ottawa, Ont., Can. 450 meters. 50 mi. J. B. Booth, Jr. Mon, Wed, 8:30-11 pm, music, entertainment. Eastern.
CJBC, Montreal, Que., Can. 420 meters. 75 mi. Dupuis-Freres. Wed, Fri, 9-10 pm, music. Eastern.
CJCA, Edmonton, Alta., Can. 450 meters. 1,000 mi. Edmonton Journal, Ltd. Slogan, "The Sunniest Spot in Sunny Alberta." Club, "Igloo Hut." Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour. 8:30-9:30 pm, concert, reports. Tues, 11-12 pm, Club. Mountain.
CJCB, Nelson, B. C., Can. 400 meters. 100 mi. James Gordon Bennett. Daily, 8-9 pm, music, news, reports. Pacific.
CJCD, Toronto, Canada. 410 meters. 200 mi. T. Eaton Co., No regular program.
CJCE, Vancouver, B. C., Can. 420 meters. 150 mi. Vancouver Sun. Daily ex Sun, 8-10, music, news. Pacific.
CJCH, Toronto, Ont., Can. United Farmers of Ontario.
CJCI, St. John, N. B., Can. 400 meters. 75 mi. McLean, Holt & Co., Ltd. Mon, Wed, Fri, 7:30-9 pm, music. Eastern.
CJCN, Toronto, Ont., Can. Simons, Agnew & Co. Licensed only.
CJCS, Halifax, N. S., Can. Eastern Telephone & Telegraph Co.
CJCX, Olds, Alta., Can. 400 meters. 1,500 mi. Percival W. Shackleton. Tues, Thurs, 9:45-11 pm, music. Sat, 8:45-10 pm, music. Mountain.
CJCY, Calgary, Alta., Can. Edmund Taylor.
CJGC, London, Ont., Can. 430 meters. 800 mi. London Free Press. Daily ex Sun, 12:30-1:30 pm, news, weather. Daily ex Tues, 7-7:45 pm, music. Tues, 7:30-8:30 pm, special program. Eastern.
CJNC, Winnipeg, Man., Can. 400 meters. 1,000 mi. Tribune Newspaper Co. Daily ex Sun, 1-2 pm, Tues, 8-10 pm, Thurs, 7-8 pm, Fri, 8-10. Alternate Sun, 8:30-10 pm. Central.
CJSC, Toronto, Ont., Can. Evening Telegram. Licensed only.
CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily ex Sun, 2 pm, 3:30, weather, news, markets. 5-5:15, music. Tues, Thurs, Sat, 7-7:30 pm, bedtime stories; 7:30-10 concert, Sun 4-5:30 pm, music. Eastern.
CKCB, Winnipeg, Man., Can. T. Eaton Co., Ltd.
CKCE, Toronto, Ont., Can. Can. Ind. Telephone Co.
CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Daily ex Sun, 10-10:30 am, news, music; 1:15-2 pm, reports, music. Mon, Wed, Fri, Sat, 7:30-8:15, music. Tues, 7:30-9 concert. Sun, 9 pm, sacred concert. Mountain.
CKCR, St. John, N. B., Can. 400 meters. 75 mi. Jones Elec. Radio Co., Ltd. Daily 4-5 pm, concert, reports. Eastern.
CKKC, Toronto, Ont., Can. Radio Equipment & Supply Co., Ltd. Licensed only.
CKOC, Hamilton, Ont., Can. 410 meters. 100 mi. Wentworth Radio Supply Co., Ltd. Mon, Wed, Fri, 8:30-9:30 pm, concert. Sun, church services. Eastern.
CKQC, London, Ont., Can. 410 meters. 50 mi. Radio Supply Co. Mon, Wed, Fri, 7:30-8:30 pm, music, entertainment. Eastern.
CKY, Winnipeg, Man., Can. 450 meters. 500 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-1:45 pm, news, markets, music. Tues, Thurs, Fri, 8:30-10 pm, concert. Sun, 9-9:45 pm, concert. Central.
CKZC, Winnipeg, Man., Can. Salton Radio Eng. Co.
DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.
KDKA, E. Pittsburgh, Pa. 326 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 10-10:15 am, 12:30-1 pm, music; 6-9:55 pm, news features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern.
KDOW, New York, N. Y. S.S. America. Home port is New York.
KDPM, Cleveland, O. 270 meters. Westinghouse Elec. & Mfg. Co.
KDPT, San Diego, Calif. 360 meters. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Sun, 11:30-12:00 am, sermon. Pacific.
KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.
KDYM, San Diego, Calif. 252 meters. Savoy Theater.
KDYQ, Portland, Ore. 360 meters. 200 mi. Oregon Institute of Technology. Temporarily discontinued.
KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.
KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Hughes & Co. Temporarily discontinued.
KDYX, Honolulu, T. H., Hawaii. 360 meters. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.
KDZB, Bakersfield, Calif. 360 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.
KDZE, Seattle, Wash. 455 meters. 500 mi. Seattle Radio Assn. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed, 8-9 pm, concert. Pacific.
KDZF, Los Angeles, Calif. 278 meters. Automobile Club of Southern California.
KDZI, Wenatchee, Wash. 360 meters. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon, Wed, Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.
KDZK, Reno, Nev. 360 meters. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal). Sun, 7-8 pm. Pacific.
KDZQ, Denver, Colo. 360 meters. Pyle & Nichols.
KDZR, Bellingham, Wash. 261 meters. 200 mi. The Bellingham Pub. Co. Mon, Wed, Fri, 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.
KDZT, Seattle, Wash. 360 meters. Seattle Radio Assn.
KFAD, Phoenix, Ariz. 360 meters. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock reports. Mountain.
KFAE, Pullman, Wash. 360 meters. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.
KFAF, Denver, Colo. 360 meters. 1,500 mi. Western Radio Corp. Slogan, "Voice from the Rockies—Out Where the West Is." Daily ex Wed and Sun, 8-9 pm, music, reports, news. Mountain.
KFAJ, Boulder, Colo. 360 meters. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.
KFAN, Moscow, Ida. 360 meters. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.
KFAP, Butte, Mont. 360 meters. Standard Pub. Co.
KFAQ, San Jose, Calif. 360 meters. City of San Jose.
KFAR, Hollywood, Calif. 280 meters. Studio Lighting Service Co.
KFAT, Eugene, Ore. 275 meters. 100 mi. Pac. Radio Co. Mon, Wed, Sat, 8-9 pm, lectures, music. Pacific.
KFAU, Boise, Ida. 270 meters. 200 mi. Boise H. S. Daily ex Sun, 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri, 8-9 pm, concert. Thurs, 7:30-8:15 pm, music. Mountain.
KFAV, Venice, Calif. 258 meters. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.
KFAW, Santa Ana, Calif. 360 meters. 100 mi. Radio Den. Daily ex Sun, 4-4:30 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.
KFAY, Medford, Ore. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.
KFBB, Havre, Mont. 360 meters. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.
KFBC, San Diego, Calif. 278 meters. 500 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.
KFBE, San Luis Obispo, Calif. 360 meters. 50 mi. B. H. Horn. Mon, Wed, Fri, 4-5 pm. Wed, Fri, 7-7:30 pm. Pacific.
KFBG, Tacoma, Wash. 360 meters. First Presbyterian Church.
KFBK, Sacramento, Calif. 283 meters. 300 mi. Kimball-Upson Co. Slogan, "Heart of California." Daily ex. Sun, 6-6:45 pm, concert, news, codes. Wed. 8-9:30 pm, concert. Sun, 10-11 am, church service; 8-9 pm, concert. Pacific.
KFBL, Everett, Wash. 224 meters. 50 mi. Leese Bros. Daily ex Sun, 7:15-8:15 pm. Sun, 2-3 pm. Pacific.
KFBS, Trinidad, Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.
KFBU, Laramie, Wyo. 283 meters. Bishop N. S. Thomas.
KFCD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.
KFCF, Walla Walla, Wash. 360 meters. Frank A. Moore.
KFCH, Billings, Mont. 360 meters. 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.
KFCK, Colorado Springs, Colo. 360 meters. Colorado Springs Radio Co.
KFCL, Los Angeles, Calif. 360 meters. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am. 1:15-1:45 pm, 4-4:30, 8-8:20, live stock reports. Thurs, 9-9:20 pm. Pacific.
KFCM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Slogan, "Out Where the West Ends." Daily ex Sun, 1-2 pm, music. Tues, Fri, 8-9 pm, music. Pacific.
KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare.
KFCV, Houston, Tex. 360 meters. 1000 mi. Fred Mahaffey, Jr. Daily ex Sun, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, entertainment. Central.
KFCY, Le Mars, Ia. 360 meters. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.
KFCZ, Omaha, Neb. 258 meters. Omaha Central H. S.
KFDA, Baker, Ore. 360 meters. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.
KFDB, San Francisco, Calif. 509 meters. 1,500 mi. Mercantile Trust Co. Daily ex Sun, 10-11 am, weather, markets; 11-11:30, news, quotations; 2-3 pm, lectures; 7-7:30 pm, reports. Pacific.
KFDC, Spokane, Wash. 235 meters. 25 mi. E. B. Craney. Temporarily discontinued.
KFDD, Boise, Idaho. 252 meters. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.
KFDF, Casper, Wyo. 360 meters. 600 mi. Wyoming Radio Corp. Daily ex Sun, 12:30 pm, weather, stocks. Wed, Fri, 8-9 pm, music. Sun, 8-9 pm, sacred music; 11-11:30, music. Mountain.
KFDH, Tucson, Ariz. 360 meters. 200 mi. Univ. of Ariz. Temporarily discontinued. Mountain.
KFDJ, Corvallis, Ore. 360 meters. Oregon Agri. College.
KFDL, Denver, Colo. 360 meters. Knight-Campbell Music Co.
KFDO, Bozeman, Mont. 360 meters. H. Everett Cutting.
KFDP, Des Moines, Iowa. 278 meters. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3-3:45 pm, reports, music. Mon, 9-11 pm, music. Thurs, 9-11 pm, music, entertainment. Central.
KFDR, York, Neb. 360 meters. Bullock's.
KFDS, San Francisco, Calif. 360 meters. John D. McKee.
KFDU, Lincoln, Neb. 240 meters. Neb. Radio Elec. Co.
KFDV, Fayetteville, Ark. 360 meters. 300 mi. Gilbrech & Stinson. Slogan, "Southern Gateway to the Ozarks." No regular schedule. Central.
KFDX, Shreveport, La. 360 meters. First Baptist Church.
KFDY, Brookings, S. D. 360 meters. S. D. State College of Agri. & Mech. Arts. Mon, Sat, 8:30 pm, music. Tues, Thurs, 11 am, music, lectures, news. Central.
KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.
KFEC, Portland, Ore. 360 meters. 75 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, weather, reports; 4-5 pm, music; 6:30 pm, weather, crop, markets, reports. Thurs, 9-10 pm, concert. Sat, 11 am 12 m, children's hour. Pacific.
KFEJ, Tacoma, Wash. 360 meters. Guy Greason.
KFEL, Denver, Colo. 360 meters. Winner Radio Corp. Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4 pm, music. Mon, Fri, 9-10 pm, 12-1 am, concerts. Sun, 9-10 am, church services. Mountain.
KFEP, Denver, Colo. 240 meters. Radio Equipment Co.
KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.
KFER, Fort Dodge, Ia. 231 meters. Auto Electric Service Co.
KFEV, Douglas, Wyo. 263 meters. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.
KFEX, Minneapolis, Minn. 275 meters, 600 mi. Augsburg Seminary. Mon, Wed, Fri, 10:30 am, chapel. Tues, Sat, 6 pm, music. Sun, 9:15 pm, church services. Central.
KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.
KFEZ, St. Louis, Mo. 360 meters. American Society of Mech. Engrs.
KFFA, San Diego, Calif. 244 meters. 200 mi. Dr. R. O. Shelton. Daily, 6-7 pm, entertainment. Pacific.
KFFB, Boise, Ida. 240 meters. 70 mi. Jenkins Furn. Co. (Owyhee Hotel). Daily, 8-9 pm, concert. Mountain.
KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.
KFFO, Hillsboro, Ore. 229 meters. Dr. E. H. Smith.
KFFP, Moberly, Mo. 275 meters. 300 mi. First Baptist Church. Slogan, "The Gospel Messenger of the Air." Sun, 10:45 am, 8 pm, church services. Central.
KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Marksheffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.
KFFR, Sparks, Nev. 226 meters. 50 mi. Jim Kirk. Wed, Fri, 8-9 pm, "Sagebush Canaries." Pacific.
KFFV, Lamoni, Iowa. 360 meters. 600 mi. Graceland College. Wed, 9:20 am, music appreciation. Thurs, 8 pm, entertainment. Central.
KFFX, Omaha, Nebr. 278 meters. 600 mi. The McGraw Co. Daily, 2:30-3:50 pm. Central.
KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.
KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes Amusement Co.
KFGC, Baton Rouge, La. 254 meters. Louisiana State University. No regular schedule.
KFGD, Chickasha, Okla. 248 meters. 50 mi. Chickasha Radio & Elec. Co. Slogan, "Queen of the Washita." Daily ex Sun, 11:30-12 am; 9-9:30 pm, music. Central.
KFGH, Stanford Univ., Calif. 360 meters. 500 mi Leland Stanford Junior University. No regular schedule.
KFGJ, St. Louis, Mo. 266 meters. National Guards Missouri.
KFGL, Arlington, Ore. 234 meters. Arlington Garage.
KFGP, Cheney, Kans. 229 meters. Cheney Radio Co.
KFGQ, Boone, Ia. 226 meters. Crary Hardware Co.
KFGV, Utica, Nebr. 224 meters. 50 mi. Heidbreder Radio Supply Co. No regular schedule.
KFGX, Orange, Tex. 250 meters. First Presbyterian Church. Sun, 11 am, 7:30 pm, church services. Central.
KFGY, Baudette, Minn. 224 meters. Gjelhaug's Radio Shop.
KFGZ, Berrien Springs, Mich. 268 meters. Emanuel Missionary College.
KFHA, Gunnison, Colo. 360 meters. Colorado State Normal School. "Where the Sun Shines Every Day." Daily ex Sun, 8:30 am, weather, markets. Tues, 7:30 pm, entertainment. Mountain.
KFHB, Hood River, Ore. 280 meters. 50 mi. P. L. Boardwell. Daily ex Mon, 6:20-6:35 pm, sports, news. Sun, 1-1:45 pm, music. Special programs 11 pm. Pacific.
KFHD, St. Joseph, Mo. 226 meters. 50 mi. Utz Electric Co. Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat, 8-9:30 pm, concert. Central.
KFHF, Shreveport, La. 266 meters. Central Christian Church.
KFHH, Neah Bay, Wash. 283 meters. Ambrose A. McCue.
KFHI, Wichita, Kans. 224 meters. Charles V. Dixon.
KFHJ, Santa Barbara, Calif. 360 meters. Fallon Company.
KFHL, Oskaloosa, Ia. 227 meters. Penn College.
KFHP, Kearney, Neb. 246 meters. Radio Bug Products Co.
KFHQ, Los Gates, Calif. 242 meters. Curtis Bros. Hdwe. Store.
KFHR, Seattle, Wash. 270 meters. Star Elec. & Radio Co.
KFHS, Hutchinson, Kans. 220 meters. Robert Nelson.
KFHU, Mayville, N. D. 261 meters. M. G. Sateren.
KFHY, Trinidad, Colo. 242 meters. R. S. McEwan.
KFI, Los Angeles, Calif. 469 meters. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 5-6 pm, 6:45-7:30 pm, 8-11 pm, Wed, Fri, Sat, 8-12 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.
KFIB, St. Louis, Mo. 244 meters. Franklin W. Jenkens.
KFIC, Denver, Colo. 224 meters. Phillip Laskowitz.
KFID, Iola, Kans. 246 meters. Ross Arbuckles Garage. Daily, 5:15-5:45 pm. Mon, Thurs, Sat, 7:30-8 pm. Tues, Sat, 9-10 pm. Central.
KFIF, Portland, Ore. 360 meters. Benson Tech. Student Body.
KFIJ, Platte, S. D. 236 meters. Sidney I. Thorean.
KFIK, Gladbrook, Iowa. 234 meters. Gladbrook Elec. Co.
KFIL, Louisburg, Kans. 234 meters. Windisch Elec. Farm Equip. Co.
KFIO, Spokane, Wash. 252 meters. North Central High School.
KFIQ, Yakima, Wash. 224 meters. 200 mi. Yakima Valley Broadcasting Assn. Slogan, "The Station That Will Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Fri, 8-9 pm, concert. Pacific.
KFIU, Juneau, Alaska. 226 meters. Alaska Elec. Light & Power Co.
KFIV, Pittsburg, Kans. 240 meters. V. H. Broyles.
KFIX, Independence, Kans. 240 meters. Reorganized Church of Jesus Christ, of Later Day Saints.
KFIY, Seattle, Wash. 236 meters. Brott Laboratories.
KFIZ, Fond du Lac, Wis. 273 meters. Daily Commonwealth.
KFJA, Grand Island, Nebr. 244 meters. Central Power Co.
KFJB, Marshalltown, Iowa. 248 meters. Marshall Elec. Co.
KFJC, Seattle, Wash. 233 meters. Post Intelligencer.
KFJD, Greeley, Colo. 236 meters. 300 mi. Weld County Printing & Pub. Co.
KFJF, Oklahoma City, Okla. 252 meters. National Radio Mfg. Co.
KFJH, Selma, Calif. 273 meters. The Sugar Bowl.
KFJI, Astoria, Ore. 252 meters. Liberty Theatre.
KFJJ, Carrollton, Mo. 236 meters. Carrollton Radio Shop.
KFKA, Greeley, Colo. 248 meters. Colorado State Teachers College.
KFKH, Lakeside, Colo. 226 meters. Denver Park Amusement Co.
KFLE, Denver, Colo. 268 meters. National Educational Service.
KFZ, Spokane, Wash. 283 meters. 300 mi. Doerr-Mitchell Elec. Co. Slogan, "In the Heart of the Inland Empire." Tues, Fri, 7:30-9 pm, music. Sun, 6-7 pm. Pacific.
KGB, Tacoma, Wash. 360 meters. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.
KGG, Portland, Ore. 360 meters. 500 mi. Hallock & Watson Radio Service. Slogan, "The Rose City." Daily ex Sun, 5-6 pm, music, entertainment 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.
KGN, Portland, Ore. 360 meters. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.
KGO, Altadena, Calif. 360 meters. 300 mi. Altadena Radio Lab. No regular schedule.
KGU, Honolulu, Hawaii. 360 meters. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)
KGW, Portland, Ore. 492 meters. 1,500 mi. Oregonian Pub. Co. Slogan, "KGW, Keep Growing Wiser." Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30 pm, weather, 10-11 pm, music. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 7-7:30 pm, lecture; 11-12 pm, Hoot Owls. Sun, 7-8 pm, concert. Pacific.
KGY, Lacey, Wash. 258 meters. 250 mi. St. Martins College. Slogan, "Out Where the Cedars Meet the Sea." Tues, Fri, Sun, 8:30-9:30 pm, news, concert, lecture, bedtime story. Pacific.
KHJ, Los Angeles, Calif. 395 meters. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific.
KHQ, Seattle, Wash. 360 meters. Louis Wasmer.
KJQ, Stockton, Calif. 360 meters. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.
KJR, Seattle, Wash. 270 meters. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.
KJS, Los Angeles, Calif. 360 meters. 500 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30 pm, 6-6:45, 8-9, church services. Pacific.
KLN, Del Monte, Calif. 261 meters. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Tues, Fri, 7-7:30 pm, 8-8:30, concert. Pacific.
KLS, Oakland, Calif. 360 meters. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm. Sun, 12-1 pm. Pacific.
KLX, Oakland, Calif. 360 meters. 500 mi. Oakland Tribune. Daily ex Sun, 3:15-5:15 pm, sports; 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.
KLZ, Denver, Colo. 360 meters. 200 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.
KMJ, Fresno, Calif. 360 meters. 300 mi. San Joaquin Lt. & Pr. Corp. Sun, 8-10 pm, music. Pacific.
KMO, Tacoma, Wash. 360 meters. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7 pm, 9:15-10, concert, news, lecture. Pacific.
KNJ, Roswell, N. M. 250 meters. Roswell Public Service Co.
KNT, Aberdeen, Wash. 263 meters. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert. Pacific.
KNV, Los Angeles, Calif. 360 meters. Radio Supply Co.
KNX, Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.
KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.
KOP, Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.
KPO, San Francisco, Calif. 423 meters. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 1-2 pm, 4:30-5:30 pm, music. Mon, Tues, Thurs, Sun, 8-10 pm, concert, lectures. Sat, 8-12 pm, music. Sun, 11-12:30 pm, church services. Pacific.
KQI, Berkeley, Calif. 360 meters. Univ. of Calif.
KQP, Hood River, Ore. 360 meters. Apple City Radio Club. Slogan, "Apple City of the West." Mon, Wed, Fri, 6:30 pm, music. Wed, 9 pm, special. Pacific.
KQV, Pittsburgh, Pa. 360 meters. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed, Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.
KQW, San Jose, Calif. 360 meters. 1000 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.
KRE, Berkeley, Calif. 278 meters. 600 mi. Maxwell Elec. Co. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.
KSD, St. Louis, Mo. 546 meters. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Central.
KSL, San Francisco, Calif. 360 meters. 50 mi. The Emporium. Temporarily discontinued.
KSS, Long Beach, Calif. 229 meters. Prest & Dean Radio Co. No regular schedule.
KTW, Seattle, Wash. 360 meters. 500 mi. First Presbyterian Church. Sun; 11-12:30 pm, 8-4:30, 7-9:30, church service. Pacific.
(NOTE—The second part of the station schedule list will appear next week.)

Serially Continuously—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-fourth appearing this week, the second quarter to appear next week, and the third part the week following and the fourth will have the state, city and station index.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

The state, city and call list appears with the last week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

ADVANCE PROGRAMS

(Continued from page 7)

pianist; "Song of Love," Beatrice Zollinger, soprano; "Mavis," "Think, Love, of Me," Carl F. Mathieu, tenor; "Hungarian Rhapsodie," Mary Rhein, pianist; "Until," "Marcheta," Mrs. Frank Ringelmann, contralto; "None but the Weary Heart," "Rondino," Raymond J. Zwack, violinist; "Reckin' in de Win'," "Pegging Along," Raymond Becker, baritone; "For You," "When Song Is Sweet," Beatrice Zollinger, soprano; "Tommy Lad," "Sweet, Sweet Lady," Carl F. Mathieu, tenor; "Duetto," Mary Rhein, pianist; "O, Salutaris," "Cradle Song," Mrs. Frank Ringelmann, contralto; "Out Where the Blue Begins," Carl F. Mathieu, tenor.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater orchestra, Ollie Jones, conductor; Organ recital, Roy C. Parks; 7:30-9:00 P. M., Concert by Stemle's Novelty orchestra.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Song recital; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Musical program; 9:00-9:30, Organ recital, Karl Bonawitz, Germantown Theater.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Police reports and sports results; 7:45, Dinner music, Hotel Adelphia Roof Garden Concert Orchestra; 8:30, Concert and organ recital, Mary E. Vogt.

WJAX (Eastern, 390), 8:00 P. M., Concert furnished by Sylvester Lundberg's orchestra.

WLW (Eastern, 309), 10:00 P. M., "Men of Valor." "Au Printemps," Steinkoening Orchestra; Concert solo, Clifford Fricke, Hobart Fricke, accompanist. "Air from Lucia;" Solo, William Steinkoening, baritone; "Call Me Back, Pal o' Mine," Steinkoening orchestra; "Just You," "The Kingdom Within Your Eyes," Oliver Plunkett, tenor; Piano solo, Mercedes Voss; "Elegie" (with violin obligato by Margaret Rolfes), "My Galloway Rose," Oliver Plunkett, tenor; "June Time Is Soon Time," "Sweet Eileen," Steinkoening orchestra.

WMAQ (Central, Daylight Saving, 448), Concert, Gasparini orchestra; 9:00, Concert, La Salle Roof Garden orchestra; 9:15, Corydon Smith orchestra.

WOC (Central, 484), 5:45 P. M., Chimes Concert; 6:50 P. M., Sandman's Visit.

WWJ (Eastern, 517), 3:00 P. M., Concert, Scheman's Band; 8:30 P. M., News orchestra, Schmeman's band.

Friday, August 17

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "The Magic Flute," orchestra; "Vale," Joyce Worsley, soprano; "Song of India," orchestra; "Souvenir," Harry Adaskin, violinist; "Mock Morris," orchestra; "At Dawning," Joyce Worsley, soprano; "The Flatterer," orchestra; Violin selections, Harry Adaskin; "My Dear Soul," Joyce Worsley, soprano; "San Toy," orchestra.

KHJ (Pacific, 395) 2:30-3:30 P. M., Matinee musicale; 6:45-7:30, Children's program; 8:00-10:00 P. M., De Luxe program.

KDKA (Eastern, 326), 5:15 P. M., Concert, Grand Symphony orchestra; 7:20, Concert, Anthony Jawelak, blind pianist; Frank Jones, tenor.

KGW (Pacific, 492), 8:00-8:15 P. M., Concert, George Olsen's orchestra; 10:00-11:00 P. M., Concert, George Olsen's orchestra; 11:00-12:00 P. M., Hoot Owls.

KYW (Central, Daylight Saving, 345), 10:00-11:00 P. M., Late show, given by the Pullman Porters' band, Major N. Clark Smith, director; Cope Harvey's orchestra; Herbie Mintz and Harry Geise, pianists; Sallie Menkes, pianist.

WBZ (Eastern, 337), 5:30 P. M., Dinner concert, WBZ trio; 7:05, Concert, Lina Scott Jeffcott, soprano; WBZ trio.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert orchestra; 2:00-3:00, Musical program, Arcadia Cafe Concert orchestra, Feri Sarkozi, director; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00-12:00, Special features from Stanley Theater and WDAR Studio, Dance music, Howard Lanin's Arcadia Cafe Dance orchestra; Morning Glory club.

WFAA (Central, 476), 8:30-9:30, Musical recital, presenting Walter Emerson, tenor, and assisting musicians.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford orchestra; 3:00, Musical program and song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford orchestra; 7:00-7:30, Children's Own Half Hour, stories by Cousin Sue.

WGI (Eastern, 360), 12:00 noon, Organ recital; 7:30 P. M., Concert by Leo Fenway and his Serenaders.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., George Albert Bouchard at the Wurlitzer; 4:00-5:30 P. M., Catherine Stang, violinist, Martha Gumph, harpist, tea-time music; 9:00-11:45, Concert program.

WGY (Eastern, 380), 7:45 P. M., Radio Comedy, "The Country Boy;" "Eleanor," "For You," William A. Scott, Thomas Meyer, accompanist; 10:30, Concert, Perran's orchestra; "Far Across the Desert Sands," Henry A. Schauffler, baritone; "The Ringers," Henry A. Schauffler, baritone; Orchestra selections, "Lullaby Waltz," "Island Nights," Fox Trot; "Friend of Mine," Henry A. Schauffler, baritone; March, "Aerial Corps" orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater orchestra; 7:30-9:00 P. M., Opal Gerhardt, soprano; Alice Linkenberg, soprano, Alice Linkenberg, accompanist; Guitar and mandolin duets, Billy Hinkle and Gean Kohlhepp; John Whallen Kelly, tenor, playing own accompaniments.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Musical program; 6:00, Dinner dance music; 6:45, "Radio Baseball Dope." Monte Cross, old time ball player; 7:00-7:30, Bedtime stories, Uncle Wip.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sports results and police reports; 7:45, Dinner dance music, Hotel Adelphia Roof Garden Dance Orchestra; 8:30, Musical program; 8:45-10:50, Dance music, Hotel Adelphia Roof Garden Orchestra, Ray Miller, director; 11:10, Continuation of dance music.

WMAQ (Central, Daylight Saving, 448), 4:30 P. M., Chimes; 7:30, Musical lecture, Mrs. Marx E. Obendorfer; 9:00, Concert, LaSalle Roof Garden Orchestra; 9:15, Armour Jubilee Singers.

WOC (Central, 484), 3:30 P. M., Educational talk by C. E. Wilent; 5:45 P. M., Chimes Concert; 6:30 P. M., Sandman's Visit.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 8:30, News Orchestra, Schmeman's Band.

Saturday, August 18

CFCA, (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Concert, "LaBoheme" orchestra; Selections, Kathleen Cameron, soprano; "Aria", Jacques Sterin, cellist; "Scenes Poetiques", orchestra; Selections, Kathleen Cameron, soprano; "Skaters Waltz", orchestra; "To a Wild Rose", Jacques Sterin, cellist; "Minuet", orchestra; Selections, Kathleen Cameron, soprano; "Gavotte", orchestra.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Westinghouse Band, direction T. J. Vastine; 7:20, Concert, Westinghouse Band, "Martha", "Tartantells, Forsoetta", "Bowl of Pansies", "Gypsy Life", "Characteristic", "Fantasia Traumbilder", "Tales from the Vienna Woods", "Heart's Message".

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, story by Aunt Nell; 10:00-11:00 P. M., Dance music, George Olsen's orchestra.

KPO (Pacific, 423), 8:00-10:30 P. M. Art Weidner's Farimont Hotel Dance orchestra.

KSD (Central, 546), 8:00 P. M., Orchestral concert, organ recital and specialties from the Missouri Theatre.

KYW (Central, Daylight Saving, 345), 7:00-7:58 P. M., Concert, Lyon & Healy; Cope Harvey's orchestra, College Inn.

WBZ (Eastern, 337), 7:05 P. M., Concert, Louis Hamel orchestra.

WFAA (Central, 476), 8:30-9:30 P. M., Old Fiddlers from Renner, Texas, in old-time favorites; 11:00-12:00, Netto Male Quartet in musical recital.

WGI (Eastern, 360), 7:00 P. M., Concert, DesChampe Orchestra.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., George Albert Bouchard at the Wurlitzer; 4:00-5:30 P. M., Catherine Stang, violinist, Martha Gumph, harpist, tea-time music; 6:00-6:30, George Albert Bouchard at the Wurlitzer.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater orchestra; 7:30-9:00, Nancy Munday, soprano; Mrs. Emery Nold, contralto; Dorothy Haag, violinist; Majorie Haag, saxophonist, Mrs. Earl K. Haag, accompanist.

WMAQ (Central, Daylight Saving, 448), 8:00-10:00 P. M., Concert, Ukrainian Band; Music from the Chicago Theater.

WOC (Central, 484), 3:30 P. M., Educational talk, C. C. Hall; 5:45 P. M., Chimes Concert; 6:30, Sandman's Visit; 9:30, Dance program by P. S. C. Orchestra.

WWJ (Eastern, 517), 3:00 P. M., Concert, Schmeman's Band; 7:30 P. M., Concert, Schmeman's

Sunday, August 19

KPO (Pacific, 423), 8:30-10:00 P. M., Rudy Seiger's Farimont Hotel Concert orchestra.

KYW (Central, Daylight Saving, 345), 10:00 A. M., Services broadcast from St. Chrysostom's Episcopal Church, Chicago; 5:00-8:00 P. M., Classical and semi-classical selections will be furnished by the Sisson Trio.

WFAA (Central, 476), 2:30-3:30 P. M., Bible class conducted by Dr. William M. Anderson, pastor of the First Presbyterian Church; 4:00, Dramatic presentation by players from Cycle Park Theater; 9:30-10:00, Sacred music by choristers from Haskell Avenue Baptist Church; 10:00-11:00, Hawaiian School of Hawaiian Music presents faculty recital.

WGI (Eastern, 360), 4:00 P. M., Twilight program; 8:30, "The Old and the New Bible", Rev. Frederick Grant; Musicale.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., George Albert Bouchard at the Wurlitzer; 3:00 violinist, Martha Gumph, harpist, tea-time music; P. M., vesper service; 4:00-5:30, Catherine Stang, 6:00-6:30 P. M., George Albert Bouchard at the Wurlitzer.

WGY (Eastern, 380), 10:00 A. M., Services, Prelude "Larghetto"; Doxology; Call to Worship; Invocation and Lord's Prayer; Responsive Reading, Psalm 66, Selection 22; Gloria; "Lead Me to Thee", Edith R. Ennis, soprano; Scripture lesson; Hymn; Prayer; Offertory, "Consider the Lilies", Edith R. Ennis, soprano; Hymn, "O Love That Wilt Not Let Me Go"; Sermon, George Alexander, D. D., Pastor of the First Presbyterian Church of New York City; Hymn, "O Mother Dear, Jerusalem"; Prayer and Benediction; Silent Prayer; Postlude, "Spanish Chant."

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00 A. M., Church service under the auspices of the Associate Reform Presbyterian Church, Rev. H. B. Blakely, pastor; Alice Linkenberg, organist; 4:00-5:00 P. M., Concert, under the auspices Mrs. Jane Webster Murrell.

WHK (Eastern, 360), 8:00 P. M., Operatic selections and vocal music, WHK Trio and soloists.

Monday, August 20

KPO (Pacific, 423), 8:00-9:00 P. M., Organ recital, Gladys Salibury; 9:00-10:00, Jack Hillman, baritone, Edwin Holton, tenor, Walter Frank Wenzel, concert pianist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical program; 4:30-5:55, Talk, "Affairs of the Heart", Betsy Logan; song recital; 7:30-8:00, Bedtime stories, Dream Daddy.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00, Short talks and song recital; 3:45, Piano recital; 6:30, Dinner dance music, Meyer Davis Bellevue Stratford Orchestra.

WGR (Eastern, Daylight Saving, 319), 12:00-12:30 P. M., George Albert Bouchard at the Wurlitzer; 4:00-5:30, Catherine Stang, violinist, Martha Gumph, harpist, tea-time music; 9:00-11:45 P. M., Concert program.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Short talks and song recital; 6:45, "Radio Baseball Dope", Monte Cross, old-time ball player; 7:00-7:30, Bedtime stories and roll call, Uncle Wip.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 1:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports; 7:45-8:30, Dinner dance music, Hotel Adelphia Roof Garden Orchestra; 8:30-9:30, Concert, WOO Orchestra, Robert E. Golden, director; vocal selections; 9:30, Organ recital, Mary E. Vogt.

WLW (Eastern, 309), 8:00-9:00 P. M., The Zoo Opera Company, direction Ralph Lyford, artists from Metropolitan Opera Company and othe leading opera comanies, chorus of sixty voices; 9:00-9:30 P. M., Rogor Hill Dance orchestra; 9:45-10:45 P. M., Continuation of the performance of the Zoo Grand Opera Company.

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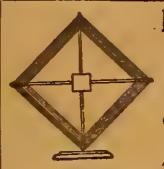

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VARIOCOUPLER, Litz wire wound secondary, 150-600 meters, list $4.50..... 2.25
Triple Coil Mounting..... $3.35 Double Coil Mounting..... 2.45
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Honeycomb coil, mounted 50 turns	$0.95	Ball bearing inductance switch	.25
Honeycomb coil, mounted 75 turns	1.00	Single circuit jack, list 65c	.30
Freshman var. grid leak and cond	.75	Double circuit jack, list 90c	.45
Freshman variable grid leak	.60	Lightning arrester, approved by underwriters	.90
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		2" dials, high finish, at	.25
		Filament rheostat, 6 ohms	.65
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		Filament rheostat, 50 ohms	.90
		Rheostats with 2" dial, 15c extra	

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Radio Digest Illustrated

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

Member of the Audit Bureau of Circulations

PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies 10 cents.

Vol. VI Chicago, Saturday, August 18, 1923 No. 6

Rest Cure by Ether Waves

After Dinner Mint Substituted by Radio Music

THAT those who attach their headsets and listen in for a few minutes following their midday meal are destined to a more healthful and long life is the belief of some scientists. At least time spent in this way will give the needed rest. But if the lure of voices from a distant city means late hours and loss of sleep for the entranced fan then it will have a detrimental effect.

Woman Will Be Real Radiophan

After Set Is Installed She Will Take Up the Science

EXPERIENCE is indicating that the farm woman is going to be the most enthusiastic Radiophan in the family.

The man usually is the one who studies up on it. He finally gets up courage to buy and install an outfit. But after the first few days, when the housewife has listened in and been thrilled by the news and lectures, the husband takes a back seat.

Radio is going to mean a great deal to farm women. There has been an old joke about listening in on the party telephone line to get all the news. The Radio makes such an idea real and multiplies it a thousand times.

Education While You Sleep

In the Depths of Slumber You Absorb Difficult Lessons

FURTHER reports from the naval air station at Pensacola, Florida, as to the success attained in teaching Radio code to sleeping student aviators show progress. The experimental stage in the trials has been passed and the method has become standard as a means of saving students from failure.

When the test was started, twelve students were unsatisfactory in their progress in Radio code. After two nights, during which Radio code was sent to the students in their sleep, the work of only two of the students was unsatisfactory; these two men left before the experiment was finished, professing disbelief in it.

The students sleep on the tables in the Radio room where the code is taught during the regular school periods. Operators send messages at varying speeds all night. The students concentrate on the messages as they are sent until they fall asleep.

Are we coming to an age in which all will be taught while asleep? There will be no need for a teacher; just turn on the machine—the student takes on history, mathematics or whatever may be outlined for the night's lesson.

Use More Care with Microphone

Critical Attitude of Radio Audience Growing

WITH the Radio audience growing more and more critical regarding the rendition of Radio programs, it has been necessary for Radio broadcasters to devote no little attention to their microphones. In the early days of broadcasting, not so long ago, considerable attention was devoted to the acoustic properties of the studio, particularly troublesome sound reflection or echo, until this phase of the new art was finally mastered.

However, it has been found that the microphone is the main link between the studio and the Radio audience. No matter how perfect the studio may be and no matter how flawless the music at the studio end, the microphone stands in the way. The usual carbon microphone is far from the ideal "pick-up" device. It misses many holes because its diaphragm, having a natural period of tone of its own, cannot be expected to vibrate over the wide range of frequencies encountered in a musical program. Furthermore its mechanism is somewhat heavy and represents considerable inertia to rapid oscillations. The question of natural period also applies to the condenser "pick-up" device, in which the vibration of a diaphragm causes a change in the capacity of the modulating circuit in accordance with the sound values.

RADIO INDI-GEST

Vindicated; or How to Be Happily Married

I WAS TALKING TO MY FRIEND JIGGS THE OTHER NIGHT WHEN HE VOLUNTEERED THE TIDINGS THAT HE TOO, LIKE MANY OTHERS, WAS A RADIOKNUT FOR FAIR AND I ASKED WHY SUCH A SUPERIOR MAN OF HIGH INTELLIGENCE SHOULD TAKE TO SUCH A LOWBROW SPORT AS RADIO. SAID HE, "BUT YOU SEE I CAN'T HEAR MY WIFE'S CHATTER WITH THE GOOD OLD EARPHONES ON." GOO GOO.

Morals: She Didn't Have Any

Lived a maid on Walla Walla,
Wore a ham-string for a collar;
Weighed two-fifty did this dusky
Maid, who was so fat and husky
Oft she sat beneath the palms.
Wore a smile—and other charms—
Sat all day and played a "uke,"
Singing "Hi yu, Hi yu, zookie-zuke,"
The National Hymn of Walla Walla.
You should have heard her whoop and holler—
All the South Sea Shieks and Dandies
Often brought her DeMett's candies—
They would sit beside the shore
And beg her to play some more. . . .
Others oftimes gave her pay
To shut her trap so that they
Could go to sleep and rest their bones—
Around about their torrid zones.
Then Indi founded his wireless station
To broadcast songs of Walla nation.
So she sang "Hi yu, Hi yu, Zuke,"
And strummed the tune on her "uke;"
Sang the d——n song all the night,
Yea gods, it was a fright!
Sang she 'till the sun on high
Chased the stars from out the sky;
Sang until the mountain rocks
Boomed with echoes from the shocks. . . .
Sang she thus night and daily
And playing on her ukulele.

L'ENVOI

Now this maid draws big wages
Playing vodvil for Pantages—
The moral of this poem is wise,
"It often pays to advertise."

—Quinch Gapp.

A-B-C Lessons for Indigest Beginners

Chapter IX—If Not Sure, We Lie About It

BY GOSH

I IS for intensity,
It's never quite enough
To let you be real certain,
If it's DX sure enough.

We Haven't the Heart

Dear Indi: Please inform me whether or not a loop aerial is an aerial manufactured in the heart of Chicago?
SPIDER WEBB.

Here lies the body
Of Jawn Paul DeVine,
Who stole copper wire
Off a high voltage line.

Reflexing Lem's Best Requires Reflexion

Dear Indijest:—Do you Publish Any other hookups besides Lem Stebbins Kind. Thousands of Fans Dident try the Lem Stebins. But bein of a Hankerin Mind I took a good look at the Diagram And saw the future Noisless Control system comin in,

Now I tryed em all, theirs the Rhinarts, for inkstance the furst time I tryed it I herd the Germans on the rhing, Spat, Spat Spat Bluye Bluye then a Tank Fell Off in the River And the Biler blew Up. You could hear it Plain,

Then theirs the Flewelling Fliver That circuit is soly for rail purposes, it so sencetive you can dectect a Head on Colision By the awful rush of wind Before you hear the crash. It is class (N),

Now the armstrong Super Major armstrong Never did Invent The super, He got his Idea Outen the old Bible a Million years Ago a Man Named Adam Had two son who Needed Regeneration And by useing various Substances to Develop CainS on, He got armstrong, the same is in use the world over

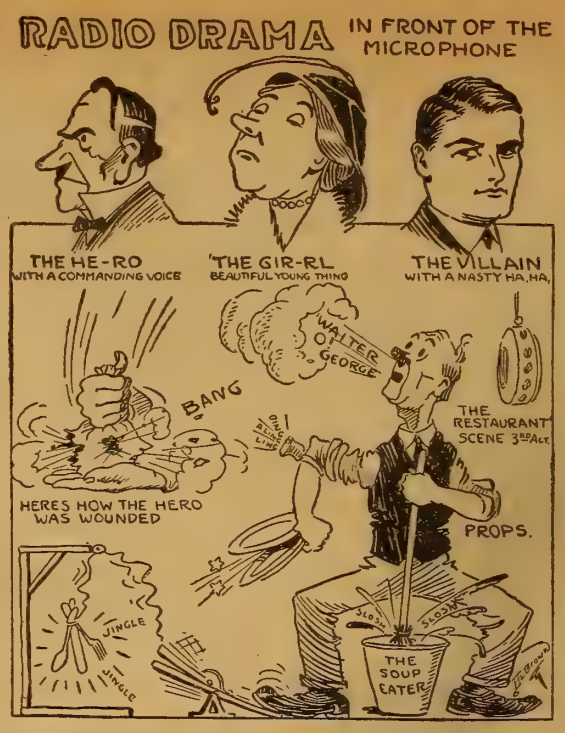
Then theirs the Hazelnut circuit, the Nutredome Dynemite class The spider web type, which has no fives on it. Then theirs the Honeycomb Circuit. Keeps you Bisy changin Honey combs.

But layen all jokes aside Lem Stebins has em all skined when it comes to distance, I site you to one of my own long distance Records:

I had the grounds hooked in at the lower left Usin 14 meg Leak on filement. No B battery two dry sell in plate circut Usin My window screen as an arial, The music came fine but i couldent understand the language I kenw I must have China. I could even heare the Wooden shoes scraping the cinders the Came a fearefull thud, and all was still, On close ixamination i found two large size Grasshopers had Desided to have a scrap right on My atena, Yor walla walla construction of antena is the one i shalll try Next.

They is one or two questions iI would like to ask?? When you conect the Strainer Direct to the OutPut your ear Muffs Swet fearfull is this the soup? Is the Book type of condenser, O K for Controlin the filement If So why? How many feet of spagetta will it take to cover 585 meter wave W M C has the spagetta Covered Coils thats why i Desire this inflamation,

If 90 volts put your filement out what will bring it back Will the Lem Stebins stan Reflexin Please sen hookup for Relaked super Reflex. For Ladies. Enclosed find The Dolar Four kinK. AnoN e. MoUse.



Condensed

By DIELECTRIC

When you find it impossible to curb your impatience, let go with a broadcast greeting to the approaching friend and trust to Lew P. that he will have a portable set to receive your salute. The chief of police of Los Angeles was welcomed home as he stepped into a Radio-equipped auto at the railway station in that city. Station KHJ carried the massage of welcome from George K. Home, captain of detectives. I wonder if the prison inmates chimed in.

Work is still going on to perfect a device to remove our arch enemy—static—from his present fields of operation. How soon we hams will be able to make use of such a longed-for unit it is impossible to say. Anyone owning a balloon or airplane may get safely above the effective level of static's influence, if he wants. Climb until you reach an elevation of three thousand feet where, according to Ralph Upson, no interference from static exists.

The French show us the proper way in which to direct all political messages transmitted by Radiophony. "Proper," that is, if those in charge of the government at the time are to face no counter-charges. It was decided in the French cabinet recently that only such material as would meet the favor of the ministry should be broadcast. This would take away much of interest in political speeches, for most of us like to hear both sides of a question. Of course, such a decision in this country would not go far—just now.

From naval sources comes the assurance of complete success with the system of "Learn while you sleep." If errors are made in sending code, the sleeping student quickly revives or the sudden cessation of dots and dashes will bring him to complete consciousness. This will no doubt revolutionize our school system. Boys and girls may hereafter spend the day in play, then when sleep comes to them, their headsets will convey Latin, calculus and Sanskrit in proper proportions. Thus, the Radio school of the future!

Every little while a rumor appears as to the erection of the largest broadcasting station. That rumor in itself is enough to make us stop to listen in, but when such a report has connected with it the name of a well known public man then we ask for the wave length right off. Henry Ford is said to be building a superstation—and you know what that means! But you don't. It is strictly for commercial use; not to tell us how much we need him in the big station at D. C. Radio grows more necessary to large concerns.

It is hard to realize that listening to fine lectures and concerts—and jazz—has been possible for really so short a time. But the truth is brought home to us when a broadcasting station celebrates its first birthday. Station WOR, to which so many fans listen, had the pleasure of witnessing its one candle flicker during a program which was a star in every particular. With the governor, mayor and two senators addressing the large audience tuned in that evening, the station felt that it was coming of age.

No explorer with a Radio compass can claim to have grasped the North Pole, and have the claim accepted, unless he has really done so. All Radio eyes will be fixed on the trip of the ZR-1 as that naval airship begins its flight to the top of the world. Can messages come through? Will she make it? The answer will come dash-ing back to many an anxious listener at his receiving set. Here's hoping.

First Steps for Beginners in Radio

Chapter XIII—Multi-Tube Reflex Circuit Operation

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XIV—Headsets and Loud Talkers.
Chapter XV—Filament Batteries.
Chapter XVI—Plate Batteries.
Chapter XVII—Using Alternating Current on Tubes.
Chapter XVIII—Testing Radio Instruments.
Chapter XIX—Locating Trouble in the Set.
Chapter XX—Useful Information and Formulas.

HAVING mastered the principle of reflex circuits as applied to one tube it is not difficult to apply the same principles to two or more tubes with an increase in range and volume. Previously we found that audio frequency amplification was not usually practicable beyond two stages. Therefore two tubes in a reflex circuit permits the highest amplification at audio frequencies and is practically the only circuit in which the full reflex action is obtained in all tubes.

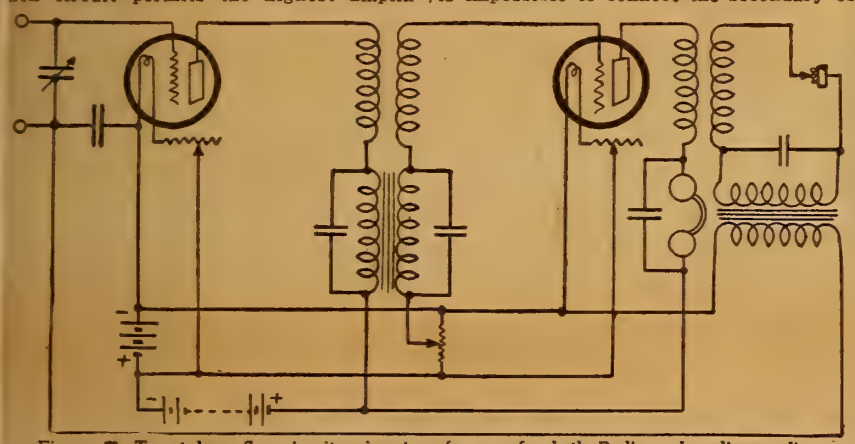


Figure 53—Two tube reflex circuit using transformers for both Radio and audio coupling

Two Tube Reflex Circuit

In Figure 53 is shown a two tube reflex circuit giving two stages of Radio frequency amplification and two at audio. In this circuit two Radio frequency and two audio frequency transformers are used to couple the tubes and detector as shown in the diagram. As in the one tube circuit the waves are picked up on a loop aerial and amplified by the first tube and passed on at Radio frequency to be amplified by the second tube before being detected. During this operation the transformer and headphones are practically shorted out of the circuit by the condensers across them.

After the Radio currents have been detected and reduced to an audible frequency the transformer, after the detector, directly to the grid of the second tube because it will drain off the Radio frequency currents from the grid and render the tube inactive. To overcome this, use is made of another tuned circuit consisting of a variometer and fixed condenser of .002 mfd. capacity connected between the grid and filament. The secondary of the audio transformer is shunted across this condenser with a 10 milhenry inductance in series with it.

The purpose of this inductance is to choke back any Radio currents that would have a tendency to leak through the transformer secondary. It will be noted also that two potentiometers of 400 ohms resistance are employed. One of these serve to control the potential of the grid of the first tube; the other serves in like manner to two inches above the stator windings to obtain looser coupling and greater selectivity. This circuit could be modified to increase its selectivity and signal volume by using tuned Radio frequency coupling between the tubes instead of the transformer coupling. This adds greatly to the tuning and amount of apparatus required and for that reason is more suited to three tube reflexes.

Adding Radio Frequency

The addition of a third tube to a reflex simply adds a stage of Radio frequency amplification to the set and thereby increases the range. To obtain maximum results it is advisable to use tuned impedance coupling as it is more efficient than a transformer coupling. A circuit using three tubes with tuned coupling between the first two tubes is shown in Figure 54. It will be seen that the use of a Radio frequency coupling makes it rather difficult to feed the audio currents back into the grid of the second tube.

As in the usual tuned coupling circuit use is made of a fixed inductance of about 50 turns shunted by .0005 variable condenser. This circuit is coupled to the grid of the second tube through a small fixed condenser of .00025 mfd. capacity. It is impossible to connect the secondary of

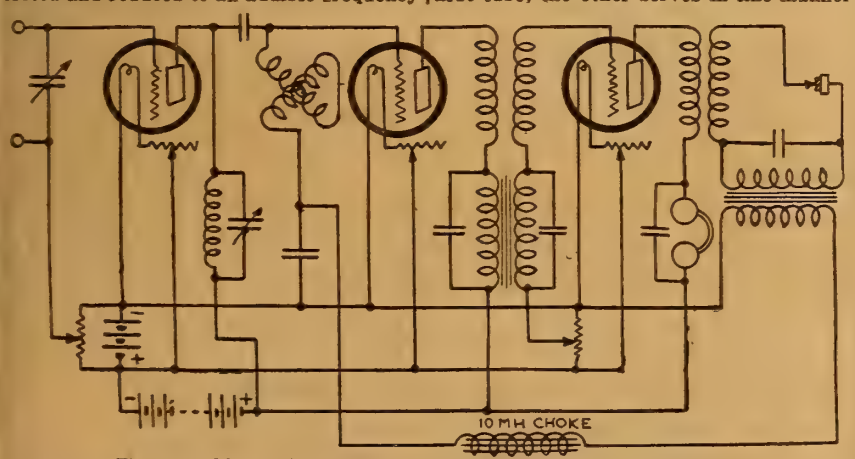


Figure 54—Three tube reflex using tuned Radio frequency amplification

the condensers no longer act as bypasses by reason of the current being of lower frequency. The audible signals are now impressed on the grid of the first tube and amplified by both tubes in the usual manner. The audio frequency currents of course flow through the Radio frequency transformers but due to the few turns on them they have little resistance and no appreciable coupling effect.

The selectivity of this circuit depends entirely on the tuning apparatus used; therefore when used with an outdoor aerial a vario-coupler or other form of loosely coupled tuner must be employed. It will be found advisable when using a vario-coupler to mount the rotor from an inch

the grid of the second tube. By means of these potentiometers maximum amplification is obtained.

Three Steps of Radio Frequency

The circuit is identic in principle with the others described with the exception that Radio amplification is employed three time and audio but twice. This circuit is ideal for long range work, giving as it does the maximum effect of reflex operation. It will be found very selective even when used with an outdoor aerial provided a loose coupled tuner is used. This is due to the tuned coupling used for the plate circuit of the first tube and grid circuit of the second tube which are tuned to obtain full signal strength.

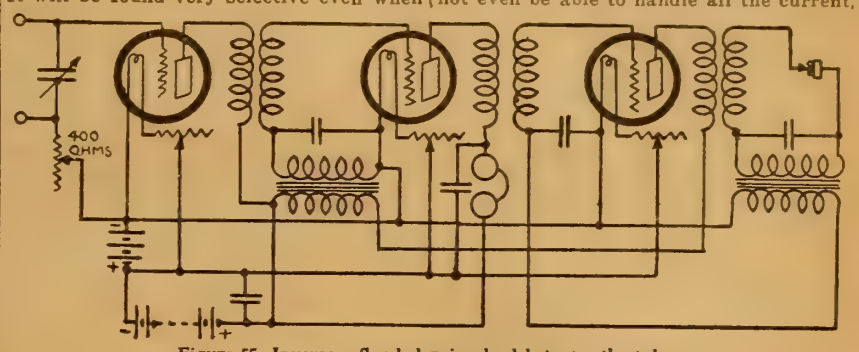


Figure 55—Inverse reflex balancing load between the tubes

It is entirely practicable to couple the first and second tubes with a Radio frequency transformer and thus eliminate the tuned circuit, but on the score of selectivity and greater amplification obtained with the tuning arrangement their use is advised, for then one can receive most from the set. Selectivity is vital in sets of this type for the amplification is so marked that any interference becomes a great annoyance.

Reflex sets may be built employing four or even five tubes but in this instance the extra tubes act as Radio frequency amplifiers or one of them is used in place of the crystal detector. The latter arrangement removes one of the features of the reflex operation, namely its quietness and clearness when properly operating. A poor reflex set is made worse when a tube is used as a detector.

Grimes Inverse Reflex

So far we have considered what might be termed the straight reflex; that is, one in which amplification at Radio frequency is carried on in succession by the tubes and the audio currents returned to go through the amplification stages in the same order. It is very apparent with this arrangement that the last tubes will be carrying the greater values of both audio and Radio currents. Thus the first stages may be working away below capacity while the last stage is working up to capacity or may not even be able to handle all the current, thus limiting the output. To overcome this the Grimes circuit was devised; it is termed the inverse reflex.

The inverse reflex differs from the straight reflex in that the currents at Radio frequency pass through the tubes as usual but the audio currents are amplified in reverse order. The effect of this is that the first tubes of the set carry weak Radio currents but large audio currents while the last tubes have large Radio currents and weaker audio currents. This results in a more even distribution of the load between the tubes; the limiting effect of the tube is not so noticeable.

(Continued on page 14)

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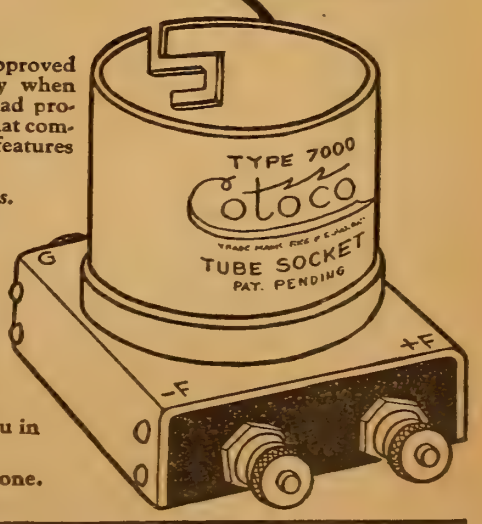

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Vernier Variable Condenser on Dial

Fine Tuning Results from Condenser Plate

A rotor plate of any condenser is glued to the back of a dial. Another plate of the same kind is obtained and cut out so that it will clear the bearing for the shaft of the dial. A bearing is put into the panel of the right size. A threaded brass rod, about ¼ inch in diameter, will do for the shaft. A spring may be made by winding several turns of stiff wire around a pencil. This is put on the shaft after it has been fastened to the dial and run through the bearing. This keeps the dial close to the panel and insures smooth turning.

The nut is now turned on the shaft and the tension of the spring tested. When the right pressure has been found turn on the second nut for a locknut. The connections are made to the stator by a wire coming through the panel and to the rotor by a pigtail connection. Very fine tuning can be accomplished with such a vernier. —William Bruening, Jr., Concordia, Mo.

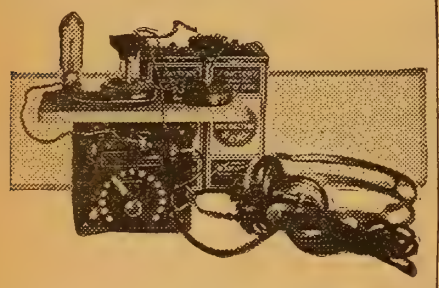
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

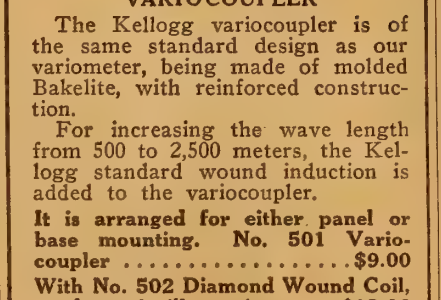
RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

Two Element Vacuum Tube Set

Everyone who builds their own Radio outfit desires to receive over a maximum distance with a minimum expenditure. The writer recently constructed a receiver which is far more sensitive than a crystal outfit but is more economical and reliable in its operation. In fact, the results have been so pleasing perhaps brother fans would like to know how to do the same thing.



Now-a-days everyone wants a vacuum tube set and yet everyone cannot afford to invest in the necessary storage battery, B battery and other accessories that go to make up receivers of this type. While shopping around recently, I came across a Fleming valve type vacuum tube which was purchased complete with all accessories for $2.50. This is a two-element tube operating from dry cells. The receiver circuit outlined in the diagram was set up and perfect reception was made possible. Previous to the purchase of this vacuum tube, a crystal receiver was used. With the vacuum tube, stations that were never heard before were picked up and the quality of the reception was every bit as good as that obtainable with a good crystal set, and there was an entire absence of circuit noises and howling. In fact, one cannot make the two element tube howl, no matter how one tries.



Such good results were obtained with this vacuum tube that a friend asked me to change his crystal set over into a vacuum tube set, employing this same type of tube. It was not found necessary to completely demolish the crystal set to make the necessary changes. In fact, all of the instruments of the old crystal set with the exception of the crystal were used.

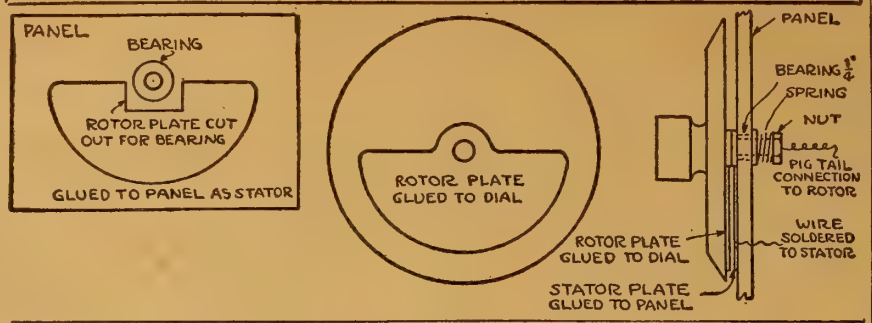
To operate the rheostat is turned until the signals are the loudest. When the rheostat is placed at the proper point, it is not necessary to adjust it further and the tube retains its same degree of sensitivity for several hours. It is evident that it would not be advisable to operate these tubes without a rheostat as that would allow too much current to pass through the filament from the battery.

The advantage of permanent adjustment of this arrangement will appeal strongly to those who have been troubled with crystal detectors. Crystal detectors are fine, but they do get out of adjustment and here is something that gives us just as good quality, greater distance and no trouble in adjustments.

In the way of experimenting a second circuit was set up, using a 200-ohm potentiometer. By the use of this arrangement the results were found to be a little better, but those who cannot afford the addition of the potentiometer can be assured that they will get good results well worth the trouble by using the other circuit.

We crystal users are difficult to please as we are generally sticklers for quality. Here, however, the writer has found something that he can unqualifiedly endorse to those who want to bring their outfits a rung up the ladder of perfection. —Harold B. Turner.

DEVICE PLACED IN DIAL KNOB



White Letters on Panels

To letter a bakelite panel, clean the surface you want to use with wood alcohol to remove any greasy film, then write whatever you want on the panel with a sharp, stiff steel pen and draftsman's white ink, such as are used for writing on blue prints. When the writing is perfectly dry, take a fine, soft camel's hair brush and cover it with transparent varnish to protect it. If at any future time you want to remove the writing just dampen a rag with wood alcohol and wash it off; the wood alcohol dissolves the varnish.

Use Coupling with R. F.

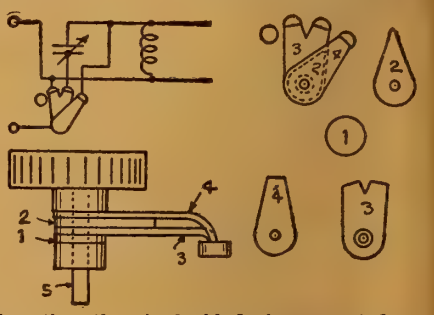
When using more than one stage of Radio frequency amplification it is always advisable to use a coupling device which will permit a wide separation between the coils; otherwise the tuning may be too broad.

Series-Parallel Switch for Primary Condenser

A series-parallel switch for the primary condenser is almost a necessity now that stations have such a wide range of wave lengths. The present type requires eight taps and a great deal of panel space.

In constructing a portable set in which the panel space was very limited, a series-parallel switch using only four taps, taking no more space than the ordinary tap switch, was made, as shown in the illustration. This switch is a very small condenser within itself but the primary condenser will offset this effect.

By making over a common switch, as shown, and using a little care the new switch can be made with little trouble. Note that the double blade is in no way connected to the rest of the instrument



but that the single blade is connected as usual. The diagram shows how to put it in the circuit.—Gilbert Earle, Berkeley, Cal.

Connecting the Condenser

In a vacuum tube receiver employing a shunt variable condenser for tuning the secondary, the rotor plates of this condenser should be connected to the filament for the purpose of reducing the effects of body capacity. For the same reason, if a antenna series variable condenser is used in the primary circuit and connected in the ground lead of the coupler, it is advisable to connect the movable plates to the ground and the fixed plates to the coupler.

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Difficult Tube Characteristics Explained

Part III—Test Circuits

By H. J. Marx

IT HAS been stated and shown that the amplification constant depends almost entirely on the structure of the grid and its position relative to the filament and plate. It is defined as the plate voltage increase divided by the grid voltage increase. The plate resistance has been described as depending on the same factors and in addition the surface of the plate and filament.

The mutual conductance depends on both of the two previous characteristics; it is a function of the slope of the grid voltage plate current characteristic curve. It is defined as the change in plate current divided by the change in grid voltage producing it. Inasmuch as this value changes considerably with different values of the grid potential, it should be taken at that point at which the tube is going to be worked. The grid potential values are taken with respect to the negative terminal of the filament. If the tube is to be used as an amplifier and the grid return is connected to the negative side of the filament, the values should be computed at zero grid potential. If a biasing battery is used the potential of the grid is determined by the biasing voltage.

Mutual Conductance Formula

The formula for the mutual conductance (Gm) is:

$$Gm = \frac{\mu}{Rp}$$

The amplification constant can be taken at 5.7 as previously calculated. The plate resistance value can be taken from the curve shown in Figure 2 of the latest article. For example, the average plate voltage used is 45; at this value, assuming a zero grid potential, the plate resistance is 9,400 ohms. Substituting in the formula:

$$Gm = \frac{5.7}{9400} = .000606 \text{ mhos}$$

Mutual conductance, however, is usually expressed in "micro-mhos." The term "micro-mho," a convenient value, is simply one millionth part of a mho. (A mho is the conductance of a circuit of one ohm resistance; the name derived by taking the reciprocal of the word ohm, that is, spelled backwards.)

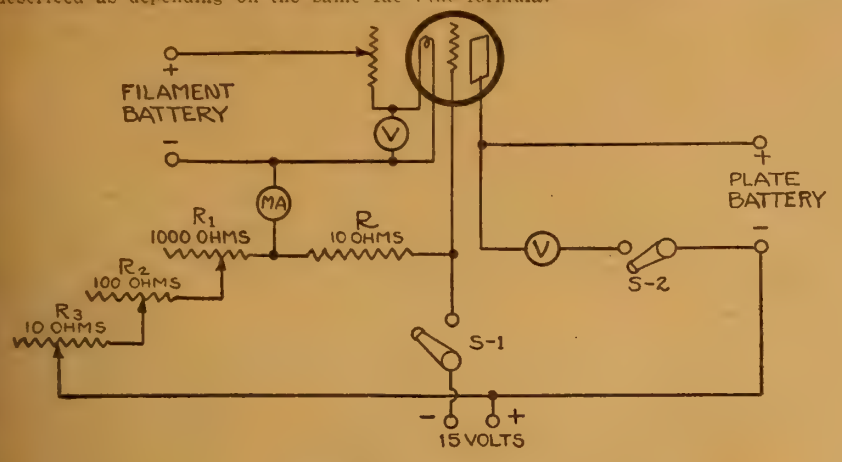

Figure 3—Test circuit No.

This then gives a mutual conductance of about 600 micro-mhos.

As to Biasing Battery

If a biasing battery is used and the value is desired for a negative potential, the plate resistance value must be corrected, as previously stated by applying the formula:

$$E'p = Ep + \mu Eg$$

It must be remembered, however, that a biasing battery for the grid is usually used only in conjunction with fairly high plate voltages so that the mutual conductance will not drop off as would at first appear to be the case. The curves as given are drawn for a maximum plate voltage of 80 volts; with Radio frequency, reflex circuits and power amplification higher plate voltages are often used, so it would be advisable to carry curves to the maximum plate voltage permissible or recommended for the particular tube under test.

There is always a possibility of error when each characteristic is calculated from previous solutions. For this reason, and for convenience in direct solutions numerous test circuits have been designed for solving these characteristics. These are given as follows:

Test Circuit No. 1

Figure 3 shows a test circuit that will permit quick evaluation of the amplification factor of any tube. The three successive rheostats have graduated readings in stages of one-tenth the total resistance of each. In using this instrument the desired plate voltage is connected to the proper binding posts, likewise the filament battery required for the tube to be tested. The battery connected to the lower binding posts should have a voltage of about fifteen. The filament is then adjusted; when the switch 1 is closed the milliammeter will show a current flow in either direction (zero center reading recommended). The variable resistances R_1, R_2 and R_3 are then adjusted until no current flow is indicated.

Then

$$\mu = \frac{R_1+R_2+R_3}{R}$$

Test Circuit No. 2

In test circuit No. 2, Figure 4, the ammeter has been replaced with telephone receivers; a source of alternating current is necessary instead of the direct battery current.

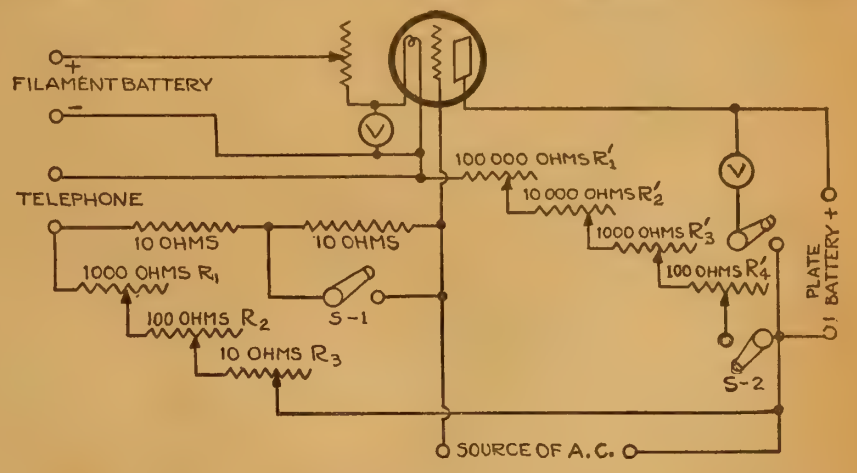

Figure 4—Test circuit No. 2

Another set of variable resistances of 100,000 ohms, 10,000 ohms, 1000 ohms and 100 ohms is added with a switch for obtaining the plate resistance values. Adjustments are made by listening to the tone of the receiver. The minimum tone in each case indicates the best adjustment.

With S-1 closed and S-2 open, adjust R_1, R_2 and R_3 for minimum tone, then

$$\mu = \frac{R_1+R_2+R_3}{10}$$

Keep the adjustments as made; open S-1 and close S-2; adjust R'_1, R'_2, R'_3 and R'_4 for minimum tone in the receivers, then

$$Rp = R'_1+R'_2+R'_3+R'_4$$

Mutual conductance may be directly evaluated by test circuits but a special test setting is necessary. The circuit used is well equipped but complicated in relation to the obtainment of all three characteristics.

A description with the method of operation would necessitate a considerable amount of space; it will therefore be taken up later.

With the previous test circuits the amplification constant and plate resistance values can be obtained for a range of plate voltage; from these the mutual conductance can easily be obtained.

(THE END)

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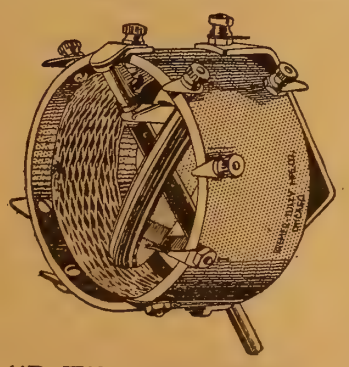

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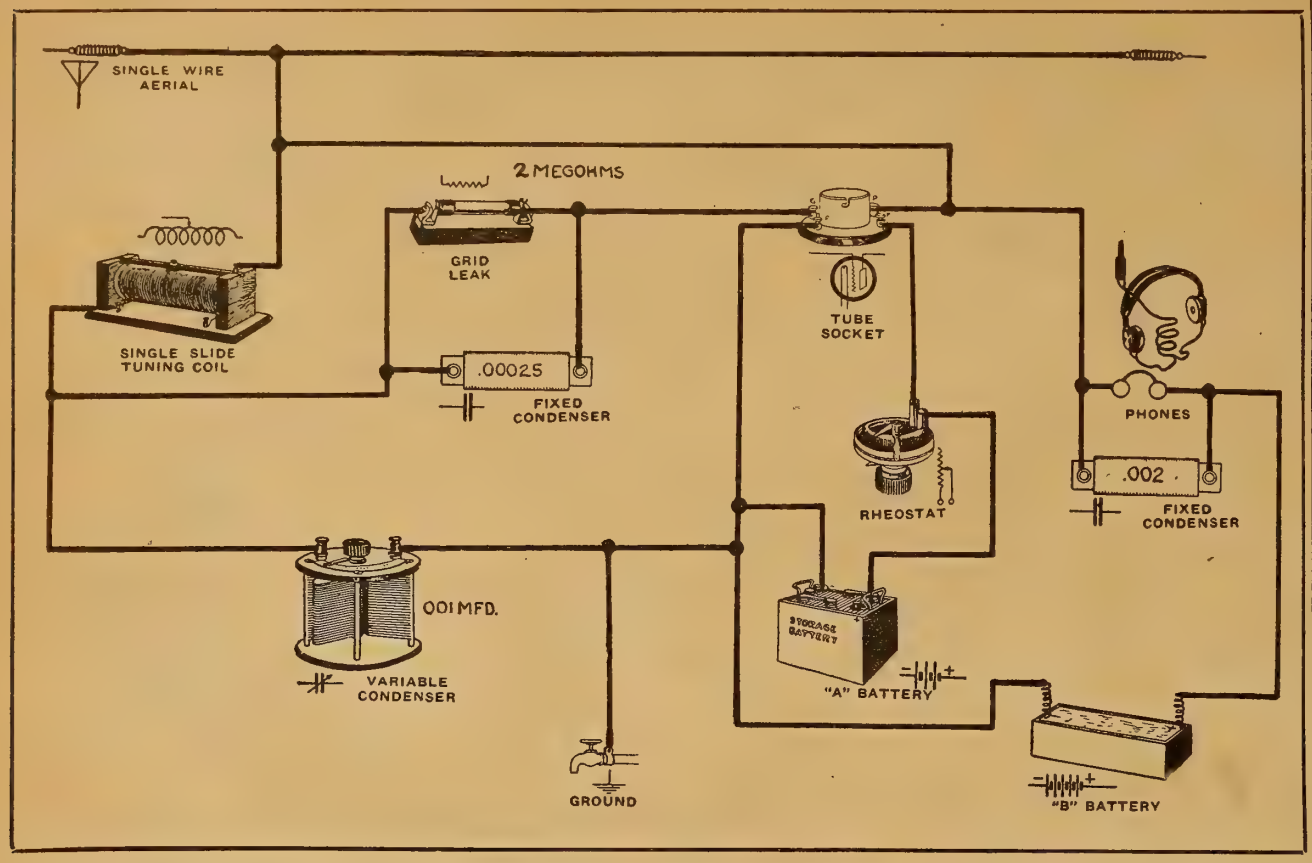
ALTER CIRCUIT TO USE OLD SLIDE TUNING COIL



THERE'S no reason why you shouldn't use the tuning coil from your old crystal set when you advance to the tube stage. Here's a simplex diagram of a circuit that enables you to change with the least expenditure of cash; yet the circuit is very efficient. Your crystal set probably included a variable condenser, too; if it has a capacity of .0005 or .001 mfd. it can be used, although the diagram indicates only .001 mfd.

A dry cell tube can be used; the proper "A" battery and rheostat as required should be substituted. The plate battery voltage will depend on the type of tube used, ranging from 18 to 45 volts.

The phones are by-passed with a .002 mfd. phone condenser. The grid leak called for has a resistance of 2 megohms, but with some tubes it may be advisable to change this to 1 or 1½ megohms. The grid condenser capacity should be .00025 mfd.; in some cases .0005 is used.

For good reception a good ground connection and good aerial are necessary. The aerial should be a single wire about 80 feet long.

FIRST STEPS IN RADIO

(Continued from page 11)

In Figure 55 is shown the inverse reflex. In this circuit the currents at Radio frequency are passed from one tube to the other flowing from left to right. After detection, however, the audio currents are fed back into the grid of the third tube to be amplified. The amplified audio currents in the plate of this tube are then fed back by a audio transformer in to the grid of the second tube to be amplified again.

The phones are in the plate circuit of the second tube; so the signals are made audible after the second stage of audio frequency amplification. A 400 ohm potentiometer is connected in the grid circuit of the first tube to stabilize the circuit and prevent it from oscillating. Another feature of this circuit is the condenser bypassing the B battery thus further preventing reaction between the various frequencies. The condensers in this circuit as well as the other circuits shown are all of .002 mfd. capacity and have a mica dielectric.

There have appeared many modifications of these circuits; as a matter of fact after one has mastered their principle it is a simple matter to devise circuits; for we have at our disposal several methods of Radio frequency coupling and two of audio frequency. By introducing different methods of coupling between the various tubes a great variety of circuits may be devised. The aim has been however to keep the circuits simple and efficient.

Operation of Reflex Circuits

A few words as to the operation of reflex circuits. The filament rheostats are not very critical and verniers are not really necessary. This is due to the use of hard tubes and high voltage on the plates. The sets are prone to howl which may be due to several things; experimenting may be necessary before they are quieted. Adjustment of the potentiometers may cure the howling or reduce the plate voltage. Poor transformers or tubes may be the cause. Try shifting the tubes around. Interference between leads or feedbacks between the transformers will often cause howling. Separate the transformers as much as possible. Try different values of bypass condensers and the insertion of resistances in the plate circuit of the tubes in an attempt to steady their operation.

The results are well worth the effort for with a reflex one obtains everything possible out of the tubes in use.

(TO BE CONTINUED)

An outdoor aerial does not necessarily have to run in any particular direction to pick up a certain station. Run the wires the way that gives the most "open view."

Reviews of Books

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, 2.00.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz., Jr., E. E. This is a De Luxe edition of this famous circuit. Profusedly illustrated and fully explained. Fifty-two pages. Price, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.

Radio First Aid. Illustrated with working drawings and complete data as to the necessary equipment and cost of constructing from the simplest to the most modern Radio outfits at home. Price, $1.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The A B C Vacuum Tubes. By E. H. Lewis. Is a book for beginners who have no knowledge of either Radio or electricity and sets forth the elementary principles of theory and operation of the vacuum tube. No attempt has been made in this book to describe all the possible circuit arrangements, but those shown may serve as suggestions to experimenters who desire to evolve their own circuits. Price, $1.00.

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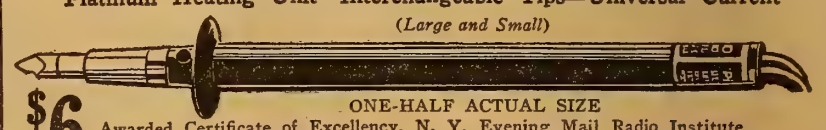

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Questions and Answers

Coil Winding

(4481) LJB., Kansas City, Kan.

I have begun the set described on Page 12 of the July 14 issue of Radio Digest, using No. 26 single silk-covered wire on the secondary and No. 24 single silk on the primary, but I find that I have not enough of the No. 24 wire for about 20 turns. Would it be advisable to finish with No. 26 wire? If so, should I increase or decrease the number of turns to the tap?

A.—There would be no disadvantage in completing the winding of the coil with No. 26 wire. No change in number of taps is necessary in doing so.

Neutrodons

(4486) JRL., San Antonio, Tex.

I would like to know the following:

What length of brass sleeve should I use to make neutrodons?

What size potentiometers?

What size grid condenser?

What size grid leak?

What size phone condenser?

A.—With reference to the Neutrodyne circuit we advise you that the brass sleeve for neutrodon should be 2 inches in length.

The usual 200 ohm potentiometer is indicated.

The grid condenser is of .00025 mfd., the grid leak 2 megohms.

The phone condenser is, as usual, of .001 mfd.

Nacireman Super

(4436) WHL., Kansas City, Okla.

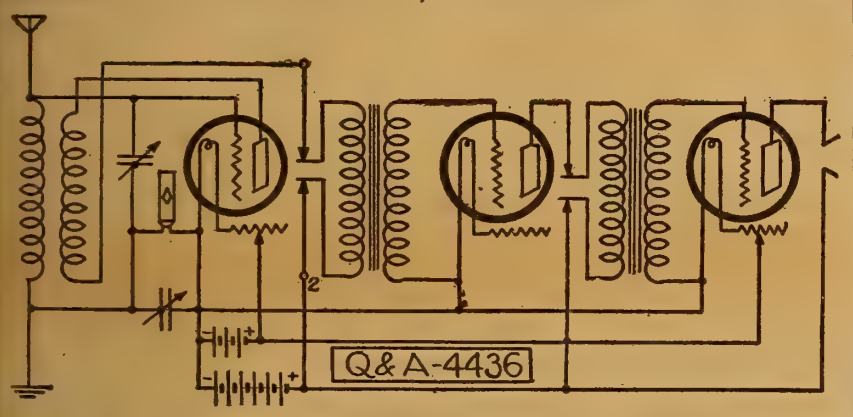
Please send me a panel diagram of the Nacireman latest super R. D. 87 that is in Radio Digest June 30, 1923, as I want to build one and don't understand the diagram in that form. I have two 17-plate condensers. Will they work instead of the 23-plate? Can I use a two-stage audio amplifier?

A.—We regret that we are unable at this time to furnish more data as to the Nacireman circuit other than those which have already appeared in Radio Digest.

The matter of panel construction is almost entirely for personal convenience and discrimination. It is important to keep all leads as short as possible and to space instruments suitably.

A 17-plate condenser may be substituted for the 23-plate specified.

Amplification may be added in the usual manner as shown in the illustration.



Transformer Cores

(4485) VB., Edgerton, Wis.

In building an apparatus for recording speech upon steel wire by means of magnetic impulses (I do not remember the name for this kind of recorder), is it possible to use a number of soft iron wires as cores for the magnets or must a single metal rod be used?

Can Radio and audio frequency transformers be made from Ford ignition coils? Briefly, how can it be done?

A.—A number of iron wires may be used as a core in the contemplated construction. Any magnetic core is more efficient when made up of laminated parts rather than the solid type.

Audio frequency transformers may be made from Ford ignition coils but it is not advisable as the efficiency of an open core is very low. Solid iron, of course, will not respond to Radio frequency.

Honeycomb Coils

(4497) JEM., Toledo, O.

I have a standard triple honeycomb coil set with 35, 50 and 75 turn coils. I hear WWJ very well, but I am not able to get any other station. I have tried 25, 35 and 50 turn coils and I can't get even WWJ. Will you kindly explain how to overcome this difficulty?

A.—It is probable that the coils you are using are too small to accomplish wavelengths, although without a diagram of the circuit, etc., it is impossible to determine definitely the source of your limitation.

We are recommending coils of 50, 50 and 75 turns; if these are not effective, those of 50, 75 and 100 turns, or 50, 50 and 100 turns. The proper values are best determined by experimentation.

The wavelength of circuit depends on the size of the coil.

Bias Battery

(4502) AHC., Escanaba, Mich.

Will you please send me a sketch as to how to place a bias battery in the Flewelling circuit when using WD-12 tubes with 100 volts B battery? Is this bias battery the regular flashlight size or No. 6 dry cell?

A.—Answering your inquiry, we advise that a C battery is merely inserted in the grid lead with the negative toward the grid of tube. Three volts are sufficient; they may be made of two small flashlight cells.

Phantom Receiver

(4480) PRL., Louisville, Ky.

On Page 12 of the July 14 issue of Radio Digest there is an article and diagram as to the phantom receiver. The article explains how to make the grid leak used. How long should be the piece of black picture binding paper tape? How much pencil marking must I use on it? Will a UV-201 do in place of a UV-201A?

A.—The grid leak may be constructed from about 1½ inches of the material named. Its resistance should be about two megohms. Pencil marking is best determined by experimentation.

A UV-201 tube will serve in place of the UV-201A specified.

Honeycomb Coils

(3753) WR, San Francisco, Cal.

I have a 3-coil honeycomb set now. Would you kindly make up a table of all the different coils to use from 120 to 25,000 meters so that I will know just what kind of coil to put in place?

A.—Answering your inquiry, we list the proper honeycomb coils for various wave lengths, as requested:

Meters	Primary	Secondary	Tickler
200-450	50	25-50	75
400-825	150	100	100
800-1850	200	150	100
1500-2750	300	200	150
2500-4200	200	300	150
4000-6350	3000	400	200
6200-14500	1250	750	400
13000-20000	750	1250	400
18000-25000	1000	1500	500

The Question and Answer Department is purely a service department and the publishers would like to have your assistance in helping to keep it up to the highest standard, therefore when asking questions please make out your query on a separate piece of paper and write on one side only. Do not mix your questions with other material, write that on a separate piece of paper. Each one must go to a different department. Then, too, we have so many who fail to put their name and address on each sheet. Please remember this when you write your letters, and also to enclose a stamped self-addressed envelope. Unsigned letters are not answered. The Radio Digest does not consider it good business ethics to furnish hook-up diagrams of any standard manufactured receiving sets.

Fastening Rotors

Did you ever have your rotors work loose and cause your adjustments to change? This is a very annoying habit of some rotors. Cut one or two round pieces of soft leather, about 1 inch in diameter, with holes in the center, from the upper part of an old shoe, and slip them over the rod between the dial and the panel, then tighten to the right tension. This will hold the adjustments perfectly.—F. O. Paschall, New York City.

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Radio Illustrated

Peggy Hopkins Joyce, famous for her beauty and divorce court activities, broadcasting the "Vanities of 1923" at WOR, L. Bambergers, Newark, N. J. All the other stars, including Joe Cook, helped put the show on the air, giving the lines as well as all the music
© Fotograms

Violet Vee (right) and Valerie Vee, the two winners of a recent six day, non-stop Radio golf contest held in Washington Heights, New York © K. & H.

Afternoons without matinees are enjoyed by the ladies from the "Passing Show," Chicago, by means of bathing beaches, hot dogs and of course a portable receiving set. The miniature life guard in the foreground also finds Radio a fine relief for bad nerve attacks
Photo by Radio Digest

Ivan Andre, well known painter in England and France, is now in this country. Already he is using a portable set
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AUG 24 1923
CLB 584147

How to Build Five Tube Neutrodyne—This Issue

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VI Copyright, 1923 R. D. P. Co. Inc. SATURDAY, AUGUST 25, 1923 No. 7

FINDS BURIED TREASURE

SCORES VICTORY IN WESTINGHOUSE SUIT

CUTTING AND WASHINGTON GIVES BIG FIRM JOLT

Buyer of Armstrong Patent Starts New Suit Attempting to Entangle Klitzen Radio Corporation

(Special to RADIO DIGEST)

NEW YORK.—Hardly had the ink dried on the decision of Judge Learned Hand of the United States District Court here in his decision favorable to the defendants, handed down in the suit of the Westinghouse Electric and Manufacturing Company versus the Cutting and Washington Radio Corporation, until the Westinghouse Company entered a suit in the Eastern District Federal Court of Wisconsin, asking for a preliminary injunction against the Klitzen Radio Corporation of Racine, Wisconsin, one of the Armstrong licensees, restraining them from selling their products through channels of distribution not named in the original Armstrong license agreement. The Westinghouse bill of complaint against the Klitzen Corporation follows closely that filed against the Cutting and Washington Company, for which only a temporary injunction was granted by Judge Hand on July 29, pending a six months' period in which the Cutting and Washington Company will have time to prepare itself to manufacture its sets under the Court's interpretation of the conditions of the Armstrong license.

Westinghouse Bill of Complaint

The complaint bill of the Westinghouse Company alleges that the Klitzen Radio Corporation sells through jobbers and dealers and has manufacturing agents to make the Klitzen sets. It also alleges a conspiracy with the Alladin Sales Corporation. The case comes up for hearing August 29 in Milwaukee. The Westinghouse Company is represented by Quarels, Spence & Quarels, attorneys of Milwaukee. The Klitzen Company by Thompson, Myers & Kearney, of Racine.

With the new Klitzen suit the Radio Corporation and Westinghouse Company now have suits pending against four of the independent Radio manufacturers making sets under the license granted them by Armstrong prior

(Continued on page 5)

Above: Virginia Pearson, famous film beauty, flirts with the WJZ microphone and the great station's many listeners in. Below is Lillian Miller listening in to stations fifty miles and further away using only a barb wire fence as an aerial. Her simple-to-operate two-tube portable set makes such stunts easy, even in the midst of the summer's heat

NEW DEVICE BARES WAY TO WEALTH

Louisiana Inventor Declares Machine Reveals Secreted Riches by Buzzing

Tests Bring $59,700

Experiments Indicate Contrivance Locates Various Metals by Varying Sound Volume

By R. A. Sullivan

BATON ROUGE, LA.—All things in time may be known to Radio, even the secrets of the ages and the mysteries hidden deep in the earth and its waters—this is the prediction of most of those who saw recently the operation of the Radio treasure-finder invented, after many troublous years, by Emmett Green of this city. By means of his machine Green is reported to have found an urn, secreted by a Frenchman more than sixty years ago, containing bonds worth now more than $58,000.

It is considered fitting that what is likely to rank soon among the wonders of the world should be tried and found not wanting in the mystic swamps and baffling bayous of the Father of Waters.

Romance and tragedy, the days of buccaneers and the Spanish Main, of proud Dons and langorous Creoles, of swashbucklers and fair women, of cringing slaves, cruel men and wily, of the clash of blue and gray—all these may be recalled by a machine that looks like the wrecked half of a toy wagon.

When the treasure-finder is perfected and marketed, hidden treasures are likely to be as safe as a bootlegger at a camp-

(Continued on page 2)

WBAP Quits Broadcasting Music Until September 17

FORT WORTH, TEX.—No more musical programs will be broadcast by WBAP, Star-Telegram station here, until September 17. Then it is planned to resume the concerts ordinarily given daily from 7:30 to 9:30 p. m., Central Standard time.

Noted Writer's Songs Form Fine Program Sent by WOR

NEWARK, N. J.—L. Wolfe Gilbert, one of America's favorite song writers, was an unusually interesting feature on the program of Station WOR, L. Bamberger and company, here recently. He gave a program entirely of his own work.

LETTERS STILL SHOW PARTS OFFER VALUE

MISSIVES FROM FAR AND NEAR INDICATE WORTH

All Points of Compass Swing to Those Who Continue to Voice Appreciation

SPECIAL REWARD OFFER

Coupon Number 13

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

The best test as to the manner in which the parts offer of the Radio Digest is received far and near continues to be the number and tenor of letters from those who have accepted the offer or ask more information concerning it.

Here are a few of the significant missives received during the last few days.

"These coupon offers are a great scheme. ————, Little Rock, Ark." Down in Ohio a young man writes that he is "well pleased" with the socket sent to him; he sent the money for more. From 'way up in Groton, N. H., a young chap sent word that he was "saving up more for some of the more costly apparatus" listed in the parts offer.

Letters from Burlington, Ia.; Toronto, Canada; Granite City, Ill., and Wichita Falls, Tex., show the wide effects of the offer and a deep appreciation therefor.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly; 3" Radion Dial, black; 2¼" Radion Dial, black; 3"x1" Radion knob with shafts, ⅜" or ¼", black; 3" Radion Dial, ribbed surface.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm; 3¼" Radion Dial, black; 4" Radion Dial, black; 4" Radion Dial, black, ribbed surface.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat; Radion Panel ⅛"x7"x9", black or mahoganite; Radion Panel ⅛"x7"x12", black.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switcth; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet; Radion Panel ⅛"x7"x12", mahoganite; Radion Panel ⅛"x7"x13", black; Radion Panel ⅛"x9"x14", black; Radion Panel ⅛"x10"x12", black.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial; Radion Panel ⅛"x7"x18" mahoganite; Radion Panel ⅛"x7"x21", black.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents $(1.80) the following will be sent; 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser; Radion Panel ⅛"x7"x21", mahoganite; Radion Panel ⅛"x7"x24", black; Radion Panel ¼"x10"x12", black; Radion Panel ⅛"x9"x14", mahoganite; Radion Panel ⅛"x10"x12", mahoganite.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate; Radion Panel ⅛"x7"x24", mahoganite; Radion Panel ¼"x10"x12", mahoganite; Radion Panel ⅛"x12"x21", black; Radion Panel ⅛"x14"x18", black.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer; Radion Panel ⅛"x12"x21", mahoganite; Radion Panel ⅛"x 14"x18", mahoganite.

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Radio Digest, Illustrated, Volume VI, Number 7, published Chicago, Illinois, August 25, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

How to Drill the Panel for the Five Tube Neutrodyne—Next week H. J. Marx will give the panel layout and further assembly instructions in Part II of his series on the construction of the remarkable Hazeltine Neutrodyne set, the greatest improvement in Radio frequency amplification since its conception.

How a Baldwin Receiver and Various Loud Speakers Operate—will be the topic of Thomas W. Benson in the second part of the fourteenth chapter of, "First Steps for Beginners in Radio." Few Radiophans understand the working of the delicate device which changes the electrical energy back into sound.

Another Single Tube Reflex Circuit—Watch next number for R.D.-95, a modification of the popular reflex hook-up which requires but one tube. This single tube set uses a loop aerial. See it next week.

Haven't You Often Wished You Could Use a Crystal Set on the Locals—and have your set arranged so you could switch over to the tube for long distance stations? Watch for this kink on page twelve of the September 1 issue.

Besides the Above, Remember the Regular Features—Flewelling Answers to Queries, Part III of the Radiophone Broadcasting Station Directory, and a Simplex Picture Diagram for the fans who recognize the pictures of the various Radio parts but do not know the symbols.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

CHINESE IN ARMS ON JAP MONOPOLY

"Fighting for Air"—American Interests Threatened

SAN FRANCISCO.—"China is literally fighting for the air," said Emmet White, former director of the insular and foreign division of the American Red Cross, who arrived here recently from the Far East.

"Throughout the country," said White, "students and other leaders of progress are holding demonstrations to prevent the monopolization of Radio communication to and from China.

"The British and Japanese are attempting in every manner to have abrogated the Federal Telegraph Company's contract with the Chinese government, which would allow Americans in the field."

Recent dispatches say that the Federal company has been definitely sidetracked by the Chinese because of Japanese pressure.

FIND BURIED TREASURE

(Continued from page 1)

meeting, say those who have witnessed tests of the device. The time may be near, they assert, when, instead of working for a living, a man, meandering in suspected places, may with Green's contrivance find a fortune in the mold. The business of safety-deposit vaults and banks should be enlarged by the new apparatus. But its greatest value is said to lie in its purported ability to find metals or minerals hundreds, even thousands of feet under ground.

Green, since the advent of Radio, has tried to apply it to the transmission of regulated signals or sounds through the earth. During the course of his experiments he learned that, in the vicinity of metalliferous bodies, his machine indicated their presence by a characteristic buzzing sound. This tendency, evinced toward metal objects above ground, was as marked toward subsurface deposits.

Finds Treasure Telling Letter

It was while Green tinkered with what his neighbors called "that contraption" that Carl David of Pointe Coupee, La., found in an old trunk a letter, written in French, telling of the burial of the urn containing the bonds. But that part of the missive which described the location of the treasure had become illegible.

David, having heard of Green and his machine, sought his aid. The two men, carrying the apparatus, plodded many a weary day over the ground formerly owned and tilled by the Frenchman. They waited for the buzz that would reveal the cache. There came many a faint murmur from the earth as if in protest to such violation. Finally there came a loud, distinct, insistent buzz. Green and David stopped and dug. They found, three feet under ground, the urn and the bonds, the latter wrapped in oiled paper.

Gold Found in Baton Rouge

Another reported instance as to the efficiency of the treasure-finder was that in which $1,700 in gold was said to have been found underground recently in Baton Rouge. This latest test was made in the presence of newspaper representatives from New Orleans and this city.

The contrivance may be described as two wheels or loops mounted horizontally at each end of a frame. These wire wound loops are called "exploring fields." A generator, placed usually about forty feet away from the loop device, produces the power. The operator uses a set especially designed for the detection of the buzz which in volume is said to vary in relation to different metals. A loud buzz means one kind, a low buzz another.

Detects Minerals Six Feet Deep

The waves impinging on the mineral bodies are detected by the sensitive receiver which then emits the buzzing sound. The buzz becomes distinct as soon as either exploring field or loop nears a metal object or area. Metal six feet underground has been found, it is said, by the machine. Its use requires two men—one to carry the exploring fields and receiving set, the other to bear the auxiliary apparatus.

Green has said that his machine has detected the presence of gold, silver and other precious metals in their native state. But he said he has not forgotten his prime object, that of sending Radio messages through the earth, from one side of the globe to another.

So intense is the interest in Green's device that a number of parties for the recovery of the treasure said to have been hidden by Jean Lafitte, the pirate who aided the United States against the British in the war of 1812, are likely to be orsoon. Lafitte's booty is believed to be buried in the lowlands of the Gulf of Mexico.

WRW Seeks Murderer

TARRYTOWN, N. Y.—The Westchester authorities broadcast through local Station WRW a general alarm recently for a negro wanted as a suspect in the murder of Dorothy Kauffman, a governess, at the home of Magruder Craighead in Greenburgh.

Throughout the United States there are nearly 600 incorporated manufacturers of Radio apparatus.

WRITES CHILD PLAY FOR BROADCASTING

WLW TELLS OF RADARIO READY FOR SENDING

Station in Cincinnati Makes Known Method of Producing Air Theatricals

CINCINNATI, O.—T. C. O'Donnell, who has written several plays and stories for children and spoken from WLW, the Crosley Manufacturing Company here, has written the first original Radario especially for children. It is called "The Magic Journey" and will be given in September from the broadcasting station.

Some new Radiophans do not know that Radario plays were originated by Fred Smith, studio director of WLW. Mr. O'Donnell, editor of Writer's Digest, which is conducting a $100 prize contest for the three best Radarios, says this about them:

What Is a Radario?

"The word Radario can best be defined by giving a brief history of the broadcasting of one-act plays, as written for and produced on the stage. It was found that with the aid of occasional interpolations by the studio director, describing the entrance and exit of characters, and with each part given by a reader with a distinctive voice, it was possible to render the play so clearly that the listener could readily follow the play.

"But—directions by the studio director did interrupt the dialogue and the action of the play—to that degree the play failed of perfectly adaption to Radio broadcasting. Fred Smith hit upon a means of obviating this difficulty. His idea was to construct the play so that the dialogue would convey to the listener the entire action.

How Entrance Is Shown

"For example, in a scene with two young women conversing about the young man whom they are expecting, on his appearance the studio director in the usual play would have said, 'At this point Reginald Fairfield enters and greets the young women.' The Radario version would go almost like this:

"'Phyllis: Oh, here comes Reggie now! . . . . Hello, Reggie!'

"'Reginald: Why, here you are! Hello, Phyllis! Hello, Dorothy!' and the dialogue would go on smoothly and the entire action be as clear to the listener as though the studio director or 'descriptionist' as he is now called had described the action.

"To this new form Mr. Smith gave the name 'Radario,' a word which has quickly become fixed in the language.

"An essential of the Radario is that it tell a complete story, in other words, that it have a plot. It must be brief, not occupying more than twenty minutes on the program. And if variety is introduced in the form of a song by one of the performers or a bit of orchestra music or a novelty such as a whistling solo, so much the better."

WSY, ONE YEAR OLD, SAYS AIM IS ETHICS

Birmingham's Station Moralizes on Its First Anniversary

BIRMINGHAM, ALA.—Radio broadcasting in Birmingham passed its milestone recently with the usual program by WSY, Alabama Power company station. A brief resume of the accomplishments of WSY during its first year of existence was given by Miss George Bryant, announcer.

She said, in part: "WSY has been dedicated to the service of Alabama, not to the service of the Alabama Power company. As it has been in the past, our policy in the future will be to keep service on the highest plane efficiency, permitting no one to use it in the furtherance of any individual's, firm's or corporation's interest. It stands for the highest ideals in music, religion and things educational."

NOT GLANDS BUT NEW VOICE ENLIVENS WBZ

SPRINGFIELD, MASS.—WBZ, the Westinghouse station here, has been rejuvenated. It has inherited WJZ's old "voice"; installation has begun. The old WJZ transmitter is twice as powerful as the one in use now at WBZ. The inherited "voice" has an antenna input of 1,000 watts, twice as much as that of the New England plant.

MISSIVE PROVES WOC IS HEARD 10,150 MILES

DAVENPORT, IA.—Station WOC, Palmer school of chiropractic, has been heard in Manila, Philippine Islands. The signals were heard several times last winter by a Major Reickel of the Radio department of the army, it was reported. The report was verified recently when a cousin of the major visited the station and exhibited a letter in confirmation.

WHY THE MOVING MEN WORK

Pearl Eaton (left) and Lois Wilde want everybody to know they have a Radio set, even the neighbors. With this in mind they have placed their loud speaker on the window sill so that the people next door will get an earful of the afternoon concerts © K. & H.

Canada Grant for Telegraph Five Times That for Radio

CALGARY, ALTA.—A grant of $55,000 has been made by the Dominion government for the establishment of Radio stations at McMurray in Northern Alberta, Fort Simpsom, on the MacKenzie River, and Dawson in the Yukon, which will displace the telegraph in use at present from McMurray north and into Dawson. A sum ranging from $275,000 to $300,000 has been voted annually for the last twenty-three years for the telegraph service.

ATLANTA JOURNAL'S NEW STUDIO BEAUTY

WSB, REMODELED, RANKED AMONG LAND'S FINEST

Equipment of Studio in Southern Newspaper's Plant Not Only Costly but Exquisite

ATLANTA, GA.—Dixie's most beautiful broadcasting studio is now the home of Station WSB, "The Voice of the South."

The Johns-Manville staff of acoustic experts has just completed the remodeling, beautifying and improving of the first sound-deadened concert chamber in the South.

The Atlanta Journal's Radio studio, although designed and constructed at a time when only two or three similar rooms were in existence, set a precedent in acoustic engineering that many of the finest stations in America have since followed.

WSB's newly remodeled, rejuvenated and redecorated studio, however, represents a further refinement and a marked advance in acoustic science. The new concert chamber will insure even better modulation and clarity.

Beautifully Arranged

And as for appearances, no studio in the South could be any prettier. The color scheme and general design follow the idea of simplicity, as was the case with the original room.

The walls are four inches thick. Alternate layers of especially prepared felt, fibre and cotton fabric occupy the space, with air pockets intervening.

The surface is finished with sound-absorbent fabric, which literally permits the music to filter into the walls instead of rebounding. The principle is exactly the reverse of a sounding board, or shell, used for amplifying and magnifying any tone that strikes it. The only sound allowed to enter the microphone is the original tone as it is sung, played or spoken.

Description of Studio

The ceiling and upper walls are snow-white. The lower walls are finished with a broad panel of cream-colored monk's cloth, a heavy, loosely-woven fabric. Snow-white paneling separates the upper and lower sections of the walls and divides the background in rectangles.

The windows are curtained with dark blue side draperies and cream-colored inner draperies. The lounge extending around two sides of the room is upholstered in blue. A heavy taupe rug covers the floor.

Decked in its new regalia, the place where WSB's army of artists play and sing for the invisible audience now stands as not only the largest, most modern and technically correct broadcasting chamber in Dixie, but likewise as a real beauty spot.

Work Starts on Second Largest Army Station

Construction Begins on Towers Near Salt Lake City

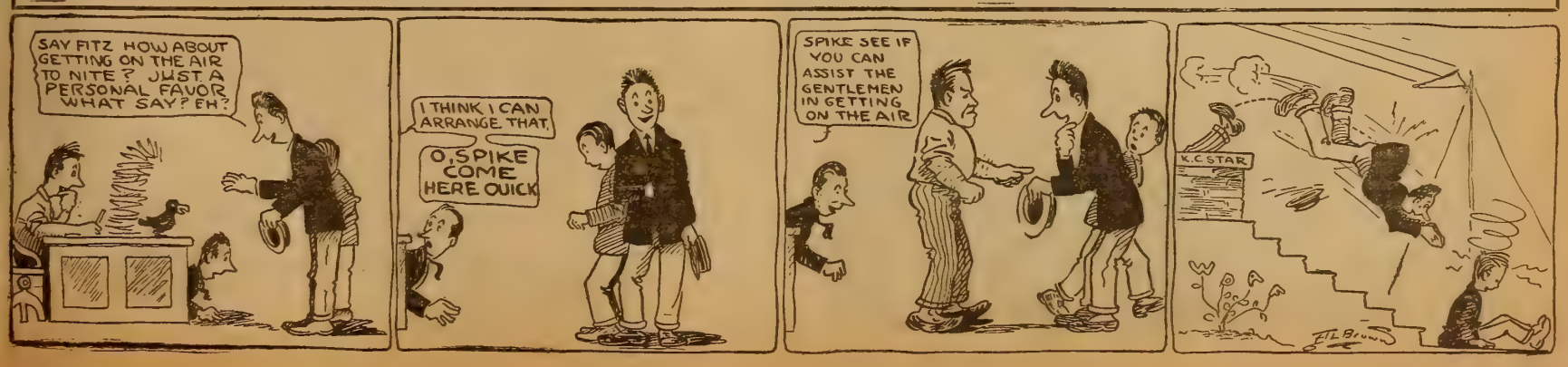
SALT LAKE CITY, UTAH.—Actual construction has begun on the towers of the second largest army Radio station in America now being erected at Fort Douglas, near this city. The towers adjoin the present towers east of Mt. Olivet cemetery. The work is in charge of Robert Loghry, Radio engineer of the army. Mr. Loghry said the new station will operate solely on continuous waves and will be designed so that broadcast receivers will not know it is in operation except under unusual conditions.

The new station will be constructed at a reported cost of $300,000. It will have a capacity of twenty-five kilowatts, with a ten-kilowatt input in the antenna.

Atlanta Gets Supervisor

ATLANTA, GA.—The Supervisor of Radio for the Fourth District, Walter Van Nostrand, Jr., has opened his office in the Federal Building.

THE ANTENNA BROTHERS — Spir L. and Lew P. — A Bit of Atmosphere



NEW DEVICE OUSTS STATIC, SAYS NAVY

WASHINGTON HAILS TESTS OF NAVY'S CLARIPHONE

More Than 10,000 Pieces Used in Construction of Contrivance Declared Successful

By Carl H. Butman

WASHINGTON.—The Scott clariphone, an acoustic device for the elimination of static, will undoubtedly be acknowledged as one of the greatest advancements in Radio communication when perfected, naval Radio experts declare. Through its selective action, the clariphone subdues mechanical sounds of a discontinuous character, sustains the continuous notes and uniformly pitched sounds, thus enabling stations transmitting long distances through static interference to be read much more easily.

Although the inventor, Chief Electrician William J. Scott, U. S. N., began work on the static eliminator eleven years ago and filed an application in the patent office in January, 1921, little except the name of the filtering device has been made public. Radio Digest first announced the device several months ago. Since successful tests at the bureau of standards and at naval Radio central in Washington, naval officials have decided to release more information regarding the unique apparatus in the interest of those who are also fighting summer static in an effort to perfect Radio communication.

Experiments Indicate Great Future

"While the clariphone is still in its experimental stage, the results obtained from the tests in Radio central seem to indicate that the entire elimination of static may be hoped for in the near future," a naval expert asserts.

Without going into the technical details (and the operation is complicated) the writer can vouch for the fact that the instrument works. While in one of the receiving stations on the third floor of the Navy building a few days ago, naval operators tuned in NPG, San Francisco, faintly through bad static. By changing from the telephone headset on the regular receiving apparatus to a pair of head phones connected with the clariphone, a remarkable improvement was at once noted; the static was reduced materially and the distant signals from San Francisco came in more clearly and sharply. Dispatches from the Naval Stations NBA, Balboa, and NPL, San Diego, were read with ease when the clariphone was connected, whereas the dots and dashes were difficult to distinguish through the phones directly on the receiving set.

How Device Looks and Operates

The apparatus consists of a large metallic chamber or tube about four feet long and eighteen inches in diameter, with adjustable ends. From the chamber eight smaller tubes or "telescopes" project radially in pairs. Each telescope contains a watch-case telephone receiver used for introducing the Radio signals into the receiving chamber. The incoming sound is then passed through the chamber acoustically, where it is broken up several hundred times, the inventor explains, by the internal arrangement.

All of the static is absorbed by more than 10,000 separate pieces used in its construction; exactly how, is not divulged. To a lesser degree, the signal sounds themselves are also absorbed in the filtering process. A weaker, but a clear, note is picked up by four microphones, two on the top of the cylinder and one on each end. The microphones are connected in parallel to the primary of a transformer, the secondary being connected to a headset where the operator receives the outcoming signals after the static is eliminated. The sound of the signals may also be heard through two acoustic phones also attached to the top of the apparatus. When the emitted sounds are found too weak, they may be amplified in the usual manner.

Whatever the internal acoustical mechanism may be the patent office recognizes it as a pioneer invention. Scott has patents pending in the United States and several foreign countries. The clariphone will operate for the elimination of static in Radio telegraphic and even in telephonic communication, it is said. Scott also hopes to be able to eliminate all interference from nearby stations using wave lengths which are close to the wave length to which the instrument is tuned.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Condenser to Eliminate Capacity

(Submitted by M. E. S., Chicago, Ill.)

Question. Quoting from your answer to G. H. D. in the July 28 issue of Radio Digest, you say: "It is a great puzzle to the writer why so many of these condensers are in use when it is so easy to purchase a type that will practically spell the elimination of hand capacity effects." Please do me the favor of telling me what condenser you are referring to and where I can get it.

Answer. Because the number of questions that we answer in this department is of necessity limited we must pick those most frequently asked in order that we may help the greatest number in the space allowed.

Flewelling evidently "started something" when he referred to the condenser. Queries similar to yours are pouring in but as we are accommodating, here is your answer: the condenser referred to cannot be named in deference to the usual policy but I am sure that you can find such a type if you will look hard enough for it, if not now then in the near future, because some manufacturer or other is going to see the value of it and make such a condenser. You have my word for it that once you find it you will use no other. The matter of body capacity effects comes within the scope of this answer because of the numerous queries concerning it. I can but emphasize previous statements that with properly designed apparatus you will have no body capacity worth bothering about.

Two More Stations for England's String of Six

British Program Directors Hit Snag in Finding Talent

LONDON.—Six broadcasting stations are operating in the British Isles. The original plan contemplated eight, and this will probably be carried out by establishing the seventh station at Bournemouth and another at Aberdeen to cover the North of Scotland.

It was expected that sufficient power could be radiated from station 5SC at Glasgow to serve Scotland, but the Grampian Mountains act as a shield for the Glasgow signals, preventing them from reaching the northeast coast with the proper strength.

The British Radio impresarios are having the same trouble as the program directors in the United States in securing talent to entertain through the air. The Society of Authors, Composers and Playwrights at a recent meeting unanimously agreed that no member of the society should permit his works to be broadcast without a fee. The theatrical interests have broken off negotiations with the broadcasting company, and concert companies have stipulated in contracts with singers that they shall not sing into the microphones.

Only Airphone Trade Link Is Routed by Subsea Cable

SAN FRANCISCO.—The only commercial Radiophone link in the world, which for the last three years has been handling telephone business between Catalina island, 30 miles off the cost of California, and the wire lines of the Bell system, has been replaced by a submarine cable. The license of the Radio "talk bridge" expired on August 1. The department of commerce has requested that its operation be discontinued, making its wave lengths available for broadcasting.

CANADA FIGHTS RACE TIPS BY AIRPHONE

DOMINION POLICE ASK AID AGAINST GAMBLING

Efforts of Authorities to Suppress "Sporting" Publications Described as Futile

TORONTO, ONT.—Provincial police authorities of Ontario, engaged in a campaign to suppress the circulation of racing "tip" publications, are seeking the cooperation of the Radio license branch of the dominion department of agriculture.

The provincial police say they have information that several racing tip publishers have already made arrangements to supply subscribers by means of Radio, and will ask that licenses of broadcasting stations sending such data be revoked.

Authorities Question Remedy

It is understood that the attitude taken by the inspectors of the dominion Radio license branch is that the revocation of Canadian broadcasting licenses would put out of business only a half dozen racing tip publishers in Toronto and Hamilton, while subscribers to Buffalo racing tip services could receive their tips with little danger of interference. Radio receiving sets are so numerous and common in Ontario, and change hands so frequently, that the Radio inspectors would be put to unreasonable work and trouble to gather all unlicensed sets owned by persons interested in betting on the races or suspected of peddling racing information received by Radio.

PATENTS ON RADIO

Can you secure a patent on your Radio invention? Does your apparatus or circuit infringe existing patents? These questions and others can be answered promptly by consulting my special library of Radio patents compiled to assist Radio inventors and manufacturers. Send for booklet on Radio patents.

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Ouray Building WASHINGTON, D. C.

A NEW
Western Electric
LOUD SPEAKER
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SEND MONEY ORDER
DEALERS WRITE!
C. W. THOMPSON COMPANY
MATTOON, ILLINOIS

CHEAPER THAN BUILDING YOUR OWN—AND BETTER

The Michigan Midget Receiver $27.00

A Long-Distance Wonder Worker

We get stations from coast to coast, including all the new wave-lengths up to 600 meters, with the "Midget," and they come in clear and strong.

Use standard 6-volt tube or any of the new low-voltage dry cell tubes.

Tho the handsome mahogany-finish cabinet is only 14½ in. long, it holds three No. 6 dry cells and one 22½ volt B battery.

Sloping front panel, with lever-tuning, is a great improvement on straight panel and knob-and-dial tuning. Easier, more accurate.

Receives through one or more head phones.

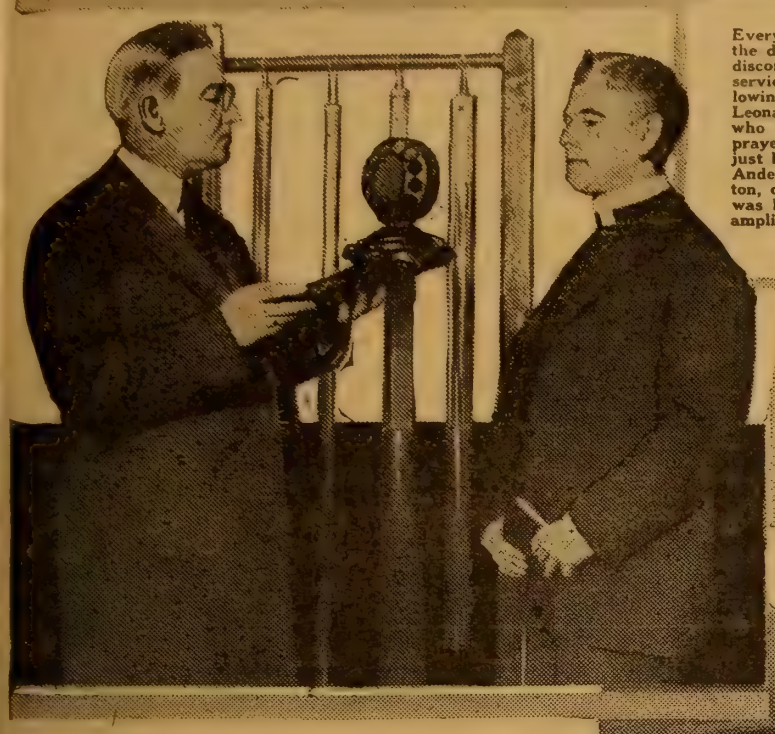
Add our two-stage amplifier for loud speaker reception.

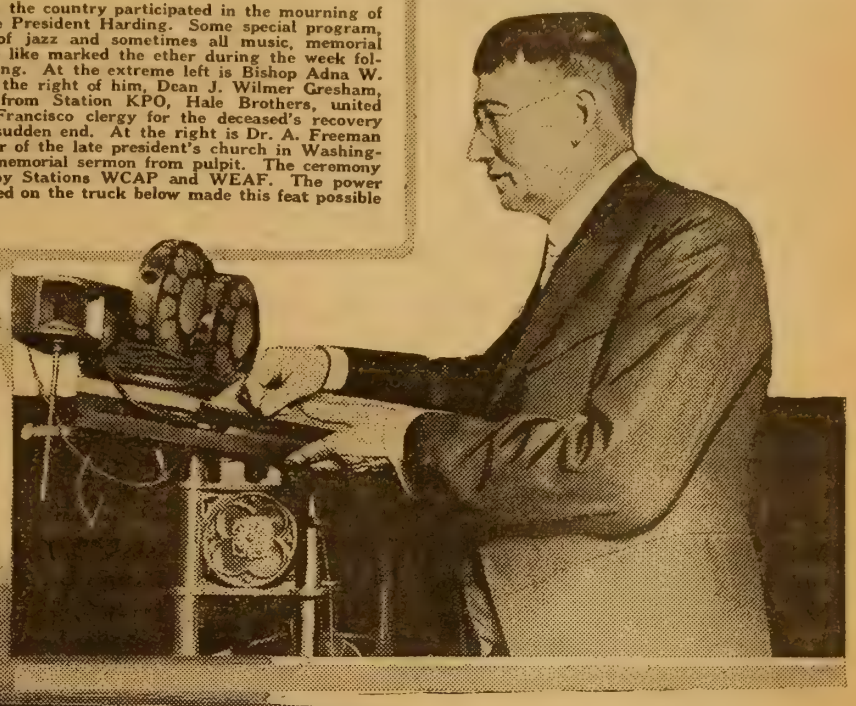
Send for the Midget circular. Give name and address of your favorite radio dealer.

DEALERS. The Midget is a quick-turnover seller and every sale creates others—a wonderful endless-chain of satisfaction.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

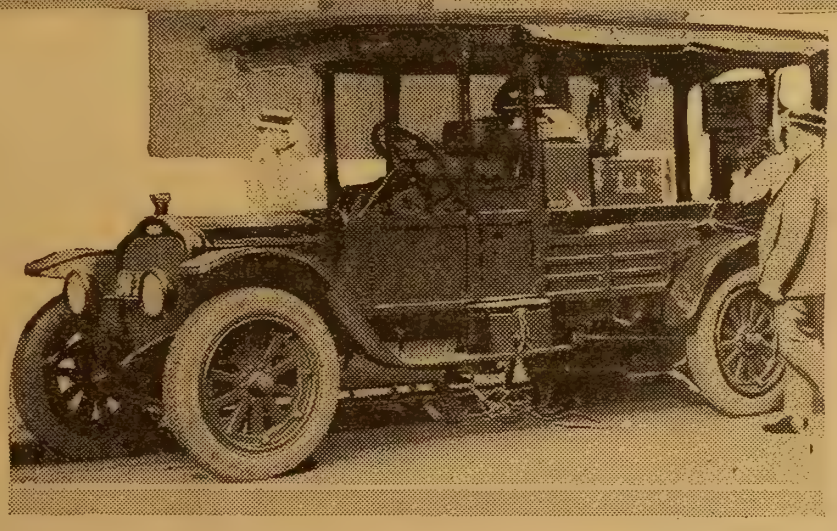
PLANTS JOIN IN MOURNING HARDING





Every station in the country participated in the mourning of the death of late President Harding. Some special program, discontinuance of jazz and sometimes all music, memorial services and the like marked the ether during the week following the passing. At the extreme left is Bishop Adna W. Leonard and to the right of him, Dean J. Wilmer Gresham, who broadcast from Station KPO, Hale Brothers, united prayer of San Francisco clergy for the deceased's recovery just before the sudden end. At the right is Dr. A. Freeman Anderson, pastor of the late president's church in Washington, delivering memorial sermon from pulpit. The ceremony was broadcast by Stations WCAP and WEAF. The power amplifier mounted on the truck below made this feat possible

Above and Right © Int.



Above © K. & H.

TWIN CITY BUSINESS BACKS STATION WLAG

PACT SIGNED FOR JOINT OPERATION OF PLANT

New Programs to Announce That Broadcasting Is from "Land of 10,000 Lakes"

MINNEAPOLIS, MINN.—Contracts for the joint operation of Station WLAG here as a Twin Cities broadcasting station and contracts for the joint maintenance of the station were signed by a group of St. Paul and Minneapolis business men recently. The consolidation has gone into effect already, as has a new Twin City program schedule. A total subsidy of $48,000 for the maintenance of the station for the fiscal year August 1, 1923 to August 1, 1924, was subscribed at the meeting.

The announcement was made by Theodore Sander, jr., industrial secretary, St. Paul association.

$16,000 from St. Paul

Two St. Paul firms and two St. Paul groups subscribed $16,000. This represents four shares at $4,000 each at par. Two additional shares will be disposed of to St. Paul firms or St. Paul groups, Mr. Sander said.

The St. Paul firms include Brown and Bigelow and the Purity Baking company. The St. Paul groups represent the wholesale and jobbing and the retail subdivisions of the St. Paul association.

Physical properties of the station will be maintained as at present at the Oak Grove hotel. A St. Paul studio is to be established soon, Mr. Sander said. Its exact location had not been determined.

"From Land of 10,000 Lakes"

Joint committees of the two cities are at work on schedules of entertainment to be provided by the station. The same committees also will be in charge of program arrangements, once the schedule of entertainment has been perfected.

The station will retain its call, WLAG, but will announce itself in programs as the Twin Cities broadcasting station "from the land of 10,000 lakes."

CUTTING GAINS VICTORY

(Continued from page 1)

to his selling his patent to the Westinghouse Company. The fireworks were started by the Radio Corporation of America, in a spring suit against J. H. Bunnell & Co., Inc., and A. H. Grebe & Co., Inc. These were followed, in turn, by suits against the Radiocraft and De Forest companies, Cutting and Washington and now Klitzen.

Claim Demoralization Aim

All these suits, friends of the small independent manufacturers of regenerative sets, who bought their license rights from E. H. Armstrong while he was practically unheard of and ignored by the Westinghouse Company, claim have been brought for the sole purpose of demoralizing the production of independent Radio sets, more than for any other purpose. It is said that these suits are part of a plan of the Radio Corporation of America and the Westinghouse Company to monopolize the manufacturing of all regenerative Radio sets under the Armstrong patent. If successful, it is said, the Radiophan would pay dearly for the legal victories of the alleged trust over the smaller set-makers who are not able to set aside such large sums of money for court fighting purposes.

"Just a trick to frighten the Armstrong licensees," said a prominent independent Radio manufacturer in commenting on the latest suit of the Westinghouse Company.

"Big Firm Heckling Licensees"

"Seems the Westinghouse people are only trying to heckle the Armstrong-licensed independent manufacturers at the opening of the Radio season, to gain a distinct advantage in sales. It is a well-known fact that the alleged trust for some time has been collecting volumes of evidence against non-licensed manufacturers, who, it is claimed, are daily infringing the Armstrong patent, yet no suit has been entered against any of these infringers. There is only one conclusion and that is that the trust is afraid to test the legality and validity of the Armstrong patent, owing to many questionable developments since the last adjudication."

"The Armstrong patent situation is similar in analogy to the Selden tie up in the automotive industry. Not until the Selden patent was broken and shown invalid did the automobile make the rapid strides that it has. Well-established rumors are afloat that the Armstrong patent is in the same fix as was the Selden. It is said that the regenerative principle was in use considerable time prior to E. H. Armstrong's sworn date of conception of his invention, and that definite proof, even the apparatus, is in the possession of certain persons who are prepared to show the Armstrong patent is not valid on priority."

When Tube Life Is Cut

Vacuum tube filaments should never be operated with a greater filament current than is absolutely necessary as the tungsten wire forming the filament evaporates rapidly when the current is increased sufficiently to render the metal white hot. Naturally this results in curtailed hours of usefulness for the filament and therefore shortens the life of the tube.

Tennis Star Broadcasts Tips from 2LO, London

Famed Suzanne Delights Thousands with Piquant Stories

LONDON.—Mlle. Suzanne Lenglen, the famous lawn tennis star, recently entertained hundreds of thousands of listeners in with a piquant talk about herself and her habits. She broadcast over 2LO, Marconi house here. In winning French manner she tripped from one thing to another, and surprised her unseen audience with her command of English. She told her admirers how she kept her stockings up in play, why she sometimes cried on the court, what is like to be a champion at Wimbledon, and what a false legend it was which depicted her as a slave of her father, who was really very kind and patient.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00				11:30- 1:30	11:00- 1:00	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Orc.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00		10:00-12:00		10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00		8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	345		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360		9:00- 1:00		9:00- 1:00		9:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WDT, New York, N. Y.	405			5:00- 5:50		9:00-10:00		
WEAF, New York, N. Y.	492		5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00		8:30- 9:30	8:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30		5:30- 6:30
WGI, Medford, Mass.	360		6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30		7:30- 8:30		7:30- 8:30		
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	
WJAX, Cleveland, O.	390		6:30- 8:30					
WJAZ, Chicago, Ill.	448		9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	4:00- 7:00
WJY, New York, N. Y.	405				5:30- 9:30	5:30- 9:30		1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360		9:25-10:55				9:25-10:55	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas.	385		9:30-10:30		7:30- 8:30			9:30-10:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00				5:45- 9:00		
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSAI, Cincinnati, O.	309		7:00- 9:00		7:00- 9:00		9:00-11:00	
WSB, Atlanta, Ga.	429	7:00-12:00	7:00-12:00	7:00-12:00	7:00-12:00	7:00 12:00	7:00-12:00	7:30- 9:00
WSY, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

UNCLE SAM TO TAP BOWELS OF EARTH

SURVEYORS TO TEST RADIO IN CANYON MILE DEEP

Party of Ten Geologists Begins Long Journey from Arizona Only with Receiver

PHOENIX.—Equipped with a special Radio receiving set, a party of ten explorers from the geological survey left Lees Ferry in northern Arizona early in August, for a 300-mile trip down the Colorado to the mouth of the Virgin River, at Rioville, Nev.

Unfortunately these modern surveyors, who are following the route first explored by Major Powell fifty-four years ago, were unable to carry a transmitting set, due to weight and space. But they are carrying a modern receiving set and will be able to hear what is going on in the world during the three months, although they will be unable to relate daily their adventures.

Arrangements have been made, however with the Radio stations of the Deseret News, KZN, Salt Lake City, and the Los Angeles Times, KHJ, to broadcast bulletins sent from trail crossings.

To Tell World of Rapids Trip

The dispatches will be relayed by runners and telephone or telegraph when the party gets far enough down the Colorado to reach the regular lines of communication. In this manner the world will be advised of the progress of the exploration in the canyon and passage of the four boats through some of the wildest rapids in the country.

The special Radio set was reconstructed by R. L. Atkinson of the survey, from a manufactured regenerative set, adapted to two stages of amplification with new tubes. The whole outfit, including the batteries, is packed in a waterproof, wooden box with sponge rubber to keep it from jarring during the long boat trip. An especially constructed antenna on a reel, capable of being erected at camp sites on the banks of the river, can be strung from short poles or from projecting rocks to a length of 150 feet.

Expect to Find "Dead" Spots

A preliminary Radio test at Lees Ferry has already been made. It is reported that the explorers received broadcasts from Los Angeles, 430 miles away, without difficulty at night. The real reception test, Col. C. H. Birdseye, in charge of the party believes, will come when they are in the lowest part of the canyon, estimated as a mile deep, near El Tovar, where dead spots and static may be encountered.

Besides the geological and topographical results achieved, the trip will also prove of material interest in the development of Radio communication, in relation to experiments undertaken by the bureau of mines and other governmental bureaus to see how far Radio will carry into the "bowels of the earth."

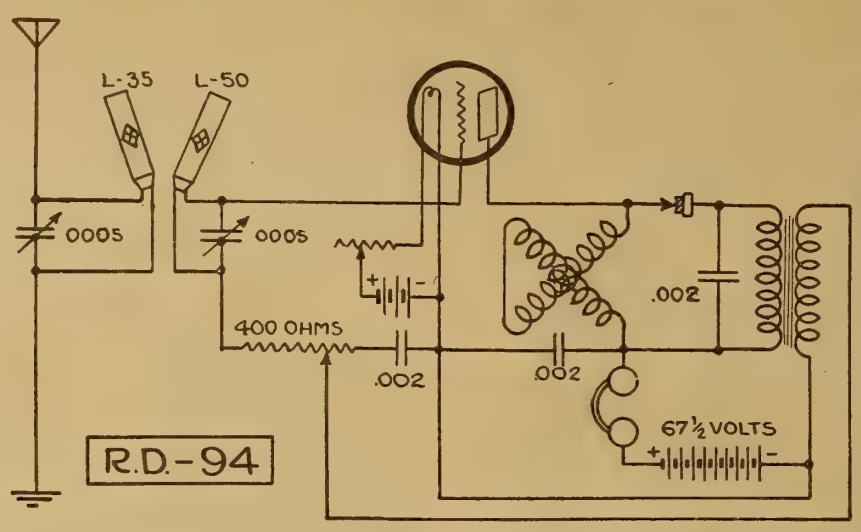
Out to Improve Air

BUFFALO, N. Y.—The Buffalo Chamber of Commerce has named a special committee to study methods of improving all forms of Radio communication in the Buffalo district. The committee consists of John F. Condon, W. T. Huber, John B. McKillen and August C. Smith.

Radio Equipment

EDISON Elements for making "B" Batteries, 6c per pair; tubes, 2c each. Nickel Wire, Insulators and Cabinets at reasonable prices. TODD ELECTRIC CO., 178 Lafayette St., New York City.

SINGLE TUBE REFLEX CIRCUIT



A SINGLE tube reflex differing considerably from the type usually seen is presented in the diagram R.D. 94. This circuit is used wth a good outdoor antenna and ground.

The tuning element consists of two inductively coupled honey-comb coils, each shunted with a .0005 mfd variable condenser, preferably with vernier control. If the antenna is high and long it may be advisable to use a .001 condenser in the primary, and to connect it in series on the antenna or ground side.

The coupling from the first tube to the crystal detector is accomplished through the use of a variometer, which should be of the type with low internal capacity. The cheaper types are by no means recommended.

The crystal detector can be of the fixed or adjustable type. Naturally care should be taken that an efficient detector is selected. Any of the average standard audio frequency transformers will serve. Three by-pass condensers of .002 mfd capacity are used. The 400 ohm potentiometer controls the reflexing of the audio frequency currents and helps stabilize the tube.

The voltage of the plate battery should be at least 67½ or even more if the tube and transformer will permit it. Many of the dry cell tubes are found to operate unsatisfactorily in reflex work so the tubes to be used should be carefully selected and tested.

This circuit is a simple one in tuning and will give very satisfactory results in relation to local and long distance receiving.

RUSONITE
CRYSTAL RECTIFIER
(Patent Pending)

THE PERFECT SYNTHETIC CRYSTAL DETECTOR, SENSITIVE OVER ENTIRE SURFACE. No Hunting for "Spots." Loud and Clear. Endorsed by thousands of satisfied users. Sensitiveness Guaranteed. Price, Mounted..... 50c

14 K. GOLD SUPERSENSITIVE RUSONITE CATWHISKER. Permanent. Will Not Oxidize. Price..... 25c

RUSONITE REFLEX CRYSTAL. Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage. Guaranteed. Price, Mounted.. $1.00

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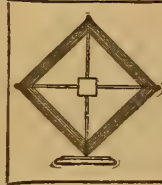
RUSONITE PRODUCTS CORP.
15 Park Row New York, N. Y.

Government Cuts Funds but New Norway Radio Succeeds

WASHINGTON, D. C.—The Norwegian government telegraph administration has received Radiophone apparatus for the plant at Bergen, Norway. Preliminary tests have been very successful but the installation has not aroused the interest that was expected, mainly because the appropriation for duplex apparatus to enable the simultaneous transmission of messages both ways was stricken from the estimates. The proposal for a new telephone line between Bergen and the Rundemanden Radio station has met the same fate.



James Curtis of Michigan writes, "I used to get 3 stations at one time until I bought a Ritter Loop; now I can tune out any station I choose."

RITTER PORTABLE LOOPS are directional. Price $1. By mail 10c extra.

RITTER RADIO CORP.
230 Canal Street, New York City

LAWS HALT GERMAN ADVANCE IN RADIO

Prohibition of Private Sets Stifles Ambition, United States Consul Reports

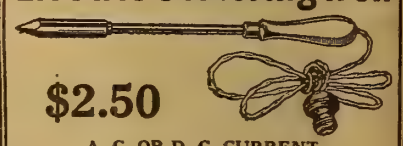
BERLIN.—The German Radio club of this city has attracted a considerable membership and is at present endeavoring to bring pressure to bear on the government to relax prohibition of private installations. All Radio is under the monopolistic control of the posts administration.

The American consul reported recently:

"It is in a sense surprising that in respect to private Radio enterprise Germany is so far behind other countries. Commenting upon this circumstance at a meeting of the Radio Club recently, a well-informed speaker interested a large gathering of members with an outline of recent Radio progress and cited the experimental work of Slaby, Braun, Graf Arco Goldschmidt, and the Meissner brothers, as deserving special appreciation. It is, he said, to the Meissner brothers that the world is indebted for the present method of amplification which makes possible the manufacture of small pocket sets now so popular in the United States.

By means of a small closed circuit (loop) antenna demonstrated by the speaker, London was easily heard. He concluded his lecture by saying. "Whereas in former times Germany was well in the front in Radio matters, it is now far behind, as a result of official opposition."

Electric Soldering Iron



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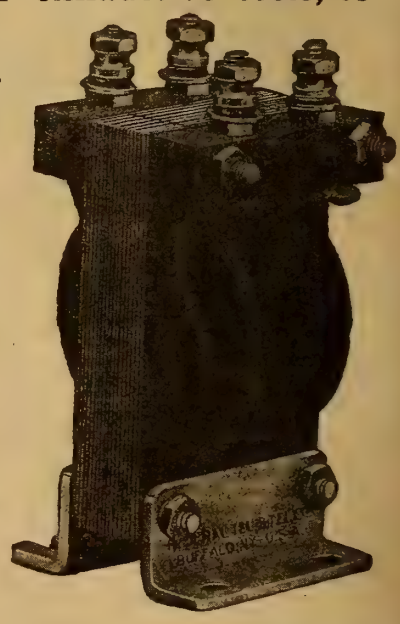

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New GREBE Broadcast Receiver

has Seven Points of Satisfaction

THESE points will be appreciated by those who have long awaited the coming of the perfect receiver.

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The Week's Advance Broadcast Programs

Tuesday, August 21

CFCA (Eastern Daylight Saving, 400), 8:00-9:00 P. M., Overture, Selection from "The Barber of Seville," Star Concert Orchestra; "Queen of the Earth, Albert Downing, tenor; "Hungarian Dances No. 2," Mannie Roth, Violinist; "Laughing Eyes," Star Concert Orchestra; "For You Alone," Albert Downing, tenor; "Espana," Star Concert Orchestra; "Viennese Melody," Mannie Roth, Violinist; "Thou Art Risen My Belored," Albert Downing, tenor; Selection from "Gypsy Love," Star Concert Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee musicale, 6:45-7:30, Children's hour, presenting Phyllis Jones, pianist, nine years of age, and Edwin Peters, reader; 8:00-10:00, De Luxe Program, Sir Frank Popham Young, in readings.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:55, Children's Period; 7:20, Concert by the Lion's Club.

KGW (Pacific, 492), 10:00-11:00 P. M., Dance music by George Olsen and his orchestra.

KSD (Central, 546), 8:00 P. M., Musical program.

KPO (Pacific, 423), 8:00-10:00 P. M., Marian Patricia Cavanaugh, pianist; Samoset Glee Club, Musaeus Trio; Alice Bradley, soprano; Mme. Durine, accompanist.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, Leon & Healy Concert Dept.; 5:50, Children's Bedtime Story; 7:00-7:58, Musical program, courtesy of Giovanni Gennaro's School of Italian Bel Canto; Cope Harrey's orchestra, College Inn, Herbie Mintz, pianist; Sallie Menkes, accompanist.

WBZ (Eastern, 337), 5:45 P. M., Organ recital, Mrs. Elsie Robbins Gross, organist; 6:30, Bedtime story for children; 7:00, Concert, Ruth Drummond, soprano; Nina J. Feriole, baritone; Pauline Cabrelli, pianist and accompanist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcade Cafe Concert Orchestra; 2:00-3:00, Musical program, 4:30-5:55, "Affairs of the Heart," Betsy Logan; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT (Eastern, Daylight Saving, 405), 12:00-12:30 P. M., Vocal selections, "Hop, Skip and Jump," "Deeze, Doze and Dem," "I Don't Care Whose Mama You Are," Harry Pease and Ed Nelson, composers and singers; "Wonderful One," "Swinging Down the Lane," "Fancy Nancy Clancy," Jimmy Flynn, Jack Val, accompanist; "Carolina Mammy," "Cut Yourself a Piece of Cake," "Crying for You," Lewis Piotti, Jack Val, accompanist; "Blue Hoosier Blues," "Hi-Lee Hi-Lo," "Runnin' Wild," Bob Miller, Jack Val, accompanist.

WFAA (Central, 476), 8:30-9:30 P. M., Mrs. Wade Williams, French harpist; Louise Jarman, pianist; 11:00-12:00, Kidd Springs Orchestra, Paul E. Ashley, directing.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital; 7:00-7:30, Safety talk, Stanley Cowman; 8:00, Boy Scout Radio Corps, under auspices Boy Scouts of America; 8:30, Song recital; 10:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI (Eastern, 360), 12:00 Noon, Organ recital on the Estey Reed Organ, Mr. E. Lewis Dunham; 7:30 P. M., Concert, arranged by Charles L. H. Wagner, poet and composer.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard at the Wurlitzer, Hotel Statler; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 6:30-7:00, George Albert Bouchard at the Wurlitzer, Hotel Statler; 7:00-8:45, Digest of the day's news, topics of scientific interest; Evening (time indefinite), banquet and reception, National Association of Insurance Agents, Hotel Statler; 11:45, Second weather forecast.

WGY (Eastern, 380), 7:45 P. M., Shakespearean program, Orchestra selection, "Songs from Shakespeare's Time," including "British Grenadiers," "The Hunt Is Up," "Come Again, Sweet Love," "You Gentlemen of England," "The Knitting Song." Greenwood Orchestra; Reading, "Love Looks Not with the Eyes," from "Midsummer Night's Dream," Ruth Schilling; "Merchant of Venice," Edward H. Smith and Frank Oliver; Orchestra selection, "Morris Dance"; Reading, "Romeo and Juliet," Ruth Schilling and Edward H. Smith; Selection, "Danse Bretonne"; Reading, "Merchant of Venice," E. H. Smith, assisted by Frank Oliver; Selection, "Shepherd Dance," from "Henry VIII"; Reading from "Twelfth Night," Ruth Schilling, E. Smith and Frank Oliver; Orchestra selection, "Wedding March," from "Midsummer Night's Dream."

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; 7:30-9:00, Concert by Bits Orchestra.

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Musical selections; 6:00, Dinner music, WIP Concert Orchestra, Dick Regan, director; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talk; 8:15, Song recital.

WJAX (Eastern, 390), 7:30 P. M., Special musical program, Cleveland News Leader.

WLW (Eastern, 309), 10:00 P. M., Selections, Circle Dance Orchestra and Police Quartet, Fred Orth, tenor; H. Edward Dean, 2nd tenor; Edward Boeneke, baritone; Arlington Beebe, bass.

WOC (Central, 484), 12:00 Noon, Chimes concert; 5:45 P. M., Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports.

WWJ (Eastern, 517), 9:45 A. M., Fred Shaw, pianist and songster, and Vera Collins, pianist, presenting "Ironing Day" program; 12:05 P. M., Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 7:00, Concert, Detroit News Orchestra.

Wednesday, August 22

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Overture, "The Marriage of Figaro," Star Concert Orchestra; "The Watchful Lover," Elcho Fiddes, tenor; "Berceuse," Jacques Sterin, cello solo; "Entrance of the Boyers," Star Concert Orchestra; "Song of Exile," Elcho Fiddes, tenor; Intermezzo from "Cavalleria Rusticana," Star Concert Orchestra; Largo from F Major Sonata, Jacques Sterin, cello solo; "My Kingdom for a Smile," Elcho Fiddes, tenor; Selection from "Il Trovatore," Star Concert Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Music; 2:30-3:30, Matinee musicale, Luella Leon, pianist; 6:45-7:30, Children's hour, Helene Pirie, six years of age, reader; Bedtime program; 8:00-10:00, De Luxe program, Grace Senior Brearley, pianist.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Little Symphony Orchestra, Victor Saudek, director; 6:45, Children's period; 7:20, Concert, Little Symphony Orchestra, Thomas A. Sullivan, tenor.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, Westinghouse Band, T. J. Vastine, director; 6:45, Children's period; 7:20, Concert, Westinghouse Band.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, music and story by Aunt Nell; 8:00-9:00, Musical program, by Genevieve Gilbert, assisted by G. Randolph Thomas; 10:00-11:00, Dance music by George Olsen and his orchestra.

KSD (Central, 546), 8:00 P. M., Musical program of Fashion Show, broadcast from Municipal theater.

KWY (Central, Daylight Saving, 345), 5:50 P. M., Children's Bedtime story; 7:00-7:58, Musical program, Elsie Ferguson Calvin, soprano; Louise Carter Richardson, pianist; John Stamford, tenor; Cope Harvey's orchestra at College Inn, Harry Geise, pianist.

PWX (Inter-colonial, 460), Concert, General Statt Band of the Cuba Army.

WBZ (Eastern, 337), 5:30 P. M., Dinner concert, "Morning, Noon and Night," "Le Reve," "Sobre las Olas," "Divertisement," piano solo, "Loin du Bal," "Love Song," "Orientale," "Panquita," "Guardmont Patrol"; 6:30, Bedtime Story for the Children; 6:50, Humorous program; 7:00, Concert by Grace Loomis Kempton, soprano; Elmer Paddock, baritone; Marion Abbott, pianist; Fabriola Richardson, soprano, assisted by the WBZ trio, "Rakocsy," "Andante Sostenuto" (cello solo), "Epithalame," "Scherzo," "Minuet."

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcade Cafe Concert Orchestra; 2:00-3:00, Musical program, Arcade Cafe Concert Orchestra, Feri Sarkozi, director; 4:30-5:30, Song recital; 7:30, Bedtime stories, Dream Daddy; 8:30, Dance music and special features, Howard Lanin and Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Concert, Roosevelt Garden Orchestra, direction Aldo Ricci; Songs by Will Donaldson and Sam Coslow; Vocal selections, Sam Wallace; 7:00-8:00, Walt Stevens, tenor; "The Viking," "Honey Babe," Cliric Quartette; "Barbier De Seville," W. S. Stuber, baritone; "A Perfect Day," Clyric Quartette; "Love Sends a Little Gift of Roses," W. S. Struber.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 6:30, Concert, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's hall hour, Stories by Cousin Sue.

WGI (Eastern, 360), 12:00 Noon, Organ Recital, E. Lewis Dunham, on the Estey Reed Organ; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 6:45, Girls' Hour, Eunice L. Randall, "Camp Fire Girls," by "Big Smoke"; 7:30, Concert, Dean Winslow Hanscom, Dramtic Tenor.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports.

WWJ (Eastern, 517, 12:05 P. M., Concert, Detroit News orchestra; 3:00, Concert, Sheman's band; 7:00, Concert, Detroit News Orchestra.

Thursday, August 23

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selection from "The Mikado," Star Concert Orchestra; "In Love," Star Concert Orchestra; "Songs My Mother Taught Me," Mannie Roth, Violinist; Selection, Ina Lockart, Contralto; "Poupee Valsante," Star Concert Orchestra; "On Wings of Song," Harry Adaskin, Violinist; "Chant Sans Paroles," Star Concert Orchestra; "March Lorraine," Star Concert Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee musicale; 6:45-7:30 P. M., Children's hour; 8:00-10:00, De Luxe program.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Grand Symphony orchestra; 6:45, Children's Period; 7:20, Concert, "G Minor," "Schon Rosmarin," "Meditation," "Traumerei," Theodore T. Taylor, pianist, Ralph E. Banks, baritone.

KGW (Pacific, 492), 3:30-4:00 P. M., Child Training program; Reading from the writing Angelo Patri; 10:00-11:00, Dance music by George Olsen and his orchestra.

KPO (Pacific, 423), 8:00-10:00 P. M., Program arranged by W. E. Haynes, and organ recital.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Concert, Lyon & Healy; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Lyon & Healy; Cope Harvey's orchestra at College Inn, Herbie Mintz, pianist, Sallie Menkes, accompanist; 8:05, "Twenty Minutes of Good Reading," Rev. C. J. Perrin, S. J., head of English Dept., Loyola University.

WBZ (Eastern, 337), 5:45 P. M., Organ recital, Capitol Theatre, Mrs. Elsie Robbins Gross, organist; 6:30, Bedtime story for the children; 7:30, Musical program, Frank Albano, accordionist and Frank Ciccareli, baritone and guitarist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Short talk, Betsy Logan; 4:30-5:55, Song recital; 7:30, Bedtime stories by the Dream Daddy.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Jazz concert, Harry Roberts Pekin Cafe Orchestra; Recital, Bucks Franzen, piano accordionist; "I Passed Your Window," "Until," "Somewhere a Voice Is Calling," Myrtle Mangham, soprano; "My Own," "Mose," "Remember the Waltz," Sam Wallace, Vaughn De Leath, pianist.

(Continued on page 9)

What Time Is It?

Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

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For your Radio-frequency circuit. Our circuit developed for the Royal Air Force, gives amazing results on only two tubes. It is easy to build, and easy to operate. Regenerative sets can be converted to the wonder circuit in a few minutes. Here in the Canadian Northwest we hear Raleigh, N. C., Havana and Porto Rico. Atlanta heard on the loud speaker. Now look at the map and see where we are located. Circuit and full constructional details sent prepaid on receipt of a dollar bill. No further charges.

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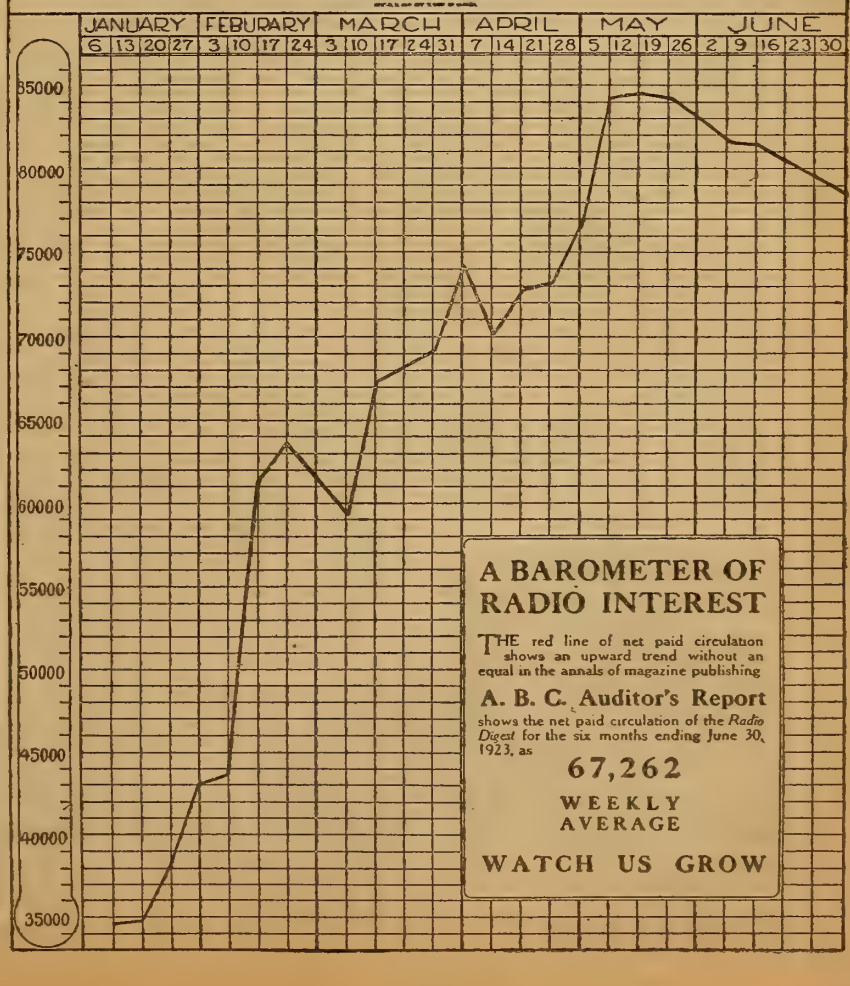

A BAROMETER OF RADIO INTEREST

THE red line of net paid circulation shows an upward trend without an equal in the annals of magazine publishing

A. B. C. Auditor's Report shows the net paid circulation of the *Radio Digest* for the six months ending June 30, 1923, as

67,262
WEEKLY AVERAGE

WATCH US GROW

Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the third part will appear next week.)

KUO, San Francisco, Calif. 360 meters. 1,500 mi. San Francisco Examiner. Slogan, "The Voice of the West." Daily ex Sun, 9-10 am, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 m, 6:45 pm, weather reports. Sun, 9-10 am, 5-6 pm, news. Pacific.

KUS, Los Angeles, Calif. 360 meters. 300 mi. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, Fri, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 360 meters. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Calif. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 360 meters. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 360 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYQ, Honolulu, Hawaii. 360 meters. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 345 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, 3:30 pm, 7, church services. Central, Daylight Saving.

KZM, Oakland, Calif. 360 meters. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 360 meters. 1,000 mi. Desert News. Slogan, "The Center of Scenic America." Daily ex Sun, 8-9:30 pm, music, news, bedtime stories, etc. Mountain.

KZV, Wenatchee, Wash. 360 meters. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 435 meters. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3 (Tues. only), Dept. Interior: 3:25-4:40, 5:05-5:20, markets, weather 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 meters. 1,500 mi. International Tel. & Teleg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAAB, New Orleans, La. 268 meters. Valdemar Jensen.

WAAC, New Orleans, La. 360 meters. Tulane Univ. Mechanics Inst. No regular schedule.

WAAD, Cincinnati, O. 360 meters. 200 mi. Ohio Mechanics Inst. No regular schedule. Central, Daylight Saving.

WAAF, Chicago, Ill. 286 meters. 300 mi. Chicago. Daily Drovers Journal. Daily ex Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Central.

WAAH, St. Paul, Minn. 360 meters. 500 mi. Commonwealth Elec. Co. Slogan, "From the Land of Ten Thousand Lakes." Temporarily discontinued.

WAAK, Milwaukee, Wis. 280 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 11 am-2 pm, 8-10:30, music. Eastern.

WAAN, Columbia, Mo. 254 meters. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAW, Omaha, Neb. 278 meters. 500 Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 12:45-1:15, 8, market reports; 8:15-9 pm, music. Central.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABC, Anderson, Ind. 229 meters. Fulwider-Grimes Battery Co.

WABD, Dayton, O. 283 meters. Parker High School.

WABE, Washington, D. C. 283 meters. Y. M. C. A.

WABF, Mt. Vernon, Ill. 234 meters. Mt. Vernon Register-News Co.

WABG, Jacksonville, Fla. 248 meters. 50 mi. Arnold Edwards Piano Co. Daily ex Sun, Thurs, 3-4 pm, concert. Wed, Sat, 9-10:30 pm, music. Mon, Thurs, 8-10 pm, concert. Eastern.

WABH, Sandusky, O. 240 meters. Lake Shore Tire Co.

WABI, Bangor, Me. 240 meters. Bangor Ry. & Elec. Co.

WABJ, South Bend, Ind. 240 meters. The Radio Laboratories.

WABK, Worcester, Mass. 252 meters. First Baptist Church.

WABL, Storrs, Conn. 283 meters. Connecticut Agri. College.

WABM, Saginaw, Mich. 254 meters. F. E. Doherty.

WABN, La Crosse, Wis. 234 meters. Waldo C. Grover.

WABO, Rochester, N. Y. 252 meters. Lake Ave. Baptist Church.

WAI, Dayton, O. McCook Field, U. S. Army.

WAJT, Marshall, Mo. 360 meters. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. 360 meters. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Irregular schedule.

WBAD, Minneapolis, Minn. 360 meters. Sterling Elec. Co.

WBAF, Moorestown, N. J. 360 meters. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. Wireless Phone Corp. Slogan, "The Silk City of America." 244 meters. 200 mi. Wireless Phone Corporation. Daily ex Sun, 9-11:30 am, 12:30-5:30 pm. Sat morn, only. Sun, 10-12 am, 2-5 pm, 7:30-10:30. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram. Club, "Radio Truth League." Daily ex Sun, 9-9:15 am, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 4-4:15. markets; 5, 6:30, 7:30, baseball results; 9:30, sports, news, road reports. Sat, 7-7:30 pm, bible lesson. Sun, 11 am-12:15 pm, church; 5, 6:30, 7:30, baseball. Central.

WBAU, Hamilton, O. 258 meters. Republican Pub. Co. Temporarily discontinued.

WBAV, Columbus, O. 390 meters. 500 mi. The Ernor Hopkins Co. Slogan, "We Broadcast a Variety." Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. 246 meters. Marietta College. Temporarily discontinued.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBBA, Newark, O. 240 meters. Newark Radio Lab.

WBBC, Sterling, Ill. 229 meters. Sterling Radio Equipment Co.

WBBD, Reading, Pa. 224 meters. Barbey Battery Service.

WBL, Anthony, Kans. 261 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun 11-12 am, music; 1-2:15 pm, reports; 2:15-2:30 pm, music, reports. Tues, Thurs, Sat, 7:30-9:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Slogan, "Queen City of the South." Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 286 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7:30 pm, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Mon, Wed, Fri, 6-7 pm, concert. Sun, 8 pm, church service. Eastern.

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 462 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 268 meters. 200 mi. Clyde R. Randall. Mon, Thurs, 8-9 pm, concert. Central.

WCAH, Columbus, O. 286 meters. 500 mi. Entrekin Elec. Co. Slogan, "The Heart of Ohio." Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 8 pm, Children's Hour. Thurs, 8 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Slogan, "Where Eighteen Railroads Meet the Sea." Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. No definite schedule.

WCAM, Villanova, Pa. 360 meters. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-1 pm. Mon, Wed, 8-9 pm. Eastern.

WCAP, Washington, D. C. 469 meters. Chesapeake & Potomac Tel. Co.

WCAR, San Antonio, Tex. 360 meters. 1,500 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 360 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Slogan "From the Flour City of the World." Mon, 9:30-11 pm, music, lectures. Mon, Wed, Thurs, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 240 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 286 meters. 500 mi. Durham & Co. Daily 11:45 am. Tues, Fri, 7:30-8 pm, concert. Sun, 10:55 am, church services. Eastern Daylight Saving.

WCAV, Little Rock, Ark. 360 meters. J. C. Dice Elec. Co.

WCAX, Burlington, Vt. 360 meters. Univ. of Vt.

WCAY, Milwaukee, Wis. 261 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 8:30-9:30 pm, music. Tues, 10:30-11:30 pm, dance music. Sun, 7:30-9 pm, church services. Central.

WCBA, Allentown, Pa. 280 meters. Chas. W. Haimbach. Wed, Sat, 2-12 pm. Sun, 2-4 pm, 8-10. Eastern.

WCBB, Greenville, O. 240 meters. K. & K. Radio Supply Co.

WCBD, Zion, Ill. 345 meters. 1,500 mi. Wilbur Glen Voliva. Slogan, "Where God Rules, Man Prospers." Mon, Fri, 8-10 pm, concert. Wed, Fri, 2:30-3:45 pm, concert. Sun, 9-9:45 am, Bible school; 2:30-5:30 pm, church services. Central daylight saving.

WCE, Minneapolis, Minn. 360 meters. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 50 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. 360 meters. Univ. of Tex.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Slogan, "The Call of the Motor City." Club, "Red Apple Club." Daily ex Sun, 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, 4:30, 4:50, 6:15, markets, music. Daily ex Sat, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert, Tues, 10-12 pm, Club, Sun, 10:30 pm, 7:15 pm, church services. Central.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Club, "Nighthawks." Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Central.

WDAG, Amarillo, Tex. 263 meters. J. Laurance Martin. Tues, Thurs, 8-9:30 pm, music. Central.

WDAH, El Paso, Tex. 360 meters. Trinity Methodist Church South. Wed, Thurs, Sun, 7:30-8:30 pm. Mountain.

WDAI, Syracuse, N. Y. 246 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Eastern.

WDAJ, College Park, Ga. 258 meters. 2,000 mi. A & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 261 meters. 150 mi. The Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-4:30 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex., 360 meters. 300 mi. Automotive Elec. Co. Daily, 1-1:30 pm, 7:15-8. Central.

WDAP, Chicago, Ill. 360 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, Sat, 10 pm, concert. Sun, 9 pm, 10, concert. Central Daylight Saving.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros. Club, "Good Morning Glory." Daily ex Sun, 12-12:55 pm, music; 2-3 pm, 4:30-6, music, talks; 7:30-8 pm, Dream Daddy. Wed, 8-11 pm, entertainment. Fri, 8-10:50, entertainment; 1 am, Club. Eastern Daylight Saving.

WDAS, Worcester, Mass. 360 meters. Samuel A. Waite

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern Daylight Saving.

WDAX, Centerville, Iowa. 268 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert. Central.

WDAY, Fargo, N. D. 244 meters. 300 mi. Fargo Radio Electric Co. Slogan, "The Biggest Little City in the World." Daily ex Sun, 9:30 am, weather, 6 pm, baseball. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church services. Central.

WDBC, Lancaster, Pa. 258 meters. Kirk Johnson & Co., Inc.

WDBF, Youngstown, O. 261 meters. Robert G. Phillips.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York City, N. Y. 405 meters. Ship Owners Radio Service. Daily ex Sun, 12-1 pm, concert. Wed, 7-7:50 pm, concert. Fri, 11-12 pm, concert. Eastern Daylight Saving.

WDZ, Tuscola, Ill. 278 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm. Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. 280 meters. 200 mi. Fallain & Lathrop. Slogan, "The Vehicle City." No definite schedule.

WEAB, Fort Dodge, Ia. 360 meters. 600 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 8:40 am-12:20 pm; 5:15 pm, 7-8 music. 9:45, weather. Sun, 10:30 am, 7:30 pm, church services. Central.

WEAD, Atwood, Kan. 268 meters. N. W. Kansas Radio Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. 360 meters. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Slogan, "The Voice to the Millions." Tues, Wed, Thurs, Fri, 11-12 am, 4:30-5:30 pm, 7:30-10. Sun, 3:30-4:30 pm, 7:30-10. Eastern Daylight Saving.

WEAG, Edgewood, R. I. 231 meters. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 244 meters. 500 mi. Wichita Board of Trade. Daily ex Sun, 8:40 am, 9, 10, 11, 12 pm, 1, reports. Wed, Sat, 8 pm, concert. Every third Sun, 8 pm, concert. Central.

WEAI, Ithaca, N. Y. 286 meters. Cornell Univ.

WEAJ, Vermilion, S. D. 360 meters. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Daily ex Sun, 5:15-6 pm. Central.

WEAM, North Plainfield, N. J. 252 meters. 75 mi. Burough of N. Plainfield. Daily, 7:30-8 pm, music, police news, etc. Eastern.

WEAN, Providence, R. I. 273 meters. 50 mi. The Shepard Stores. Daily ex Sun, Mon, 12-1 pm, 4-5, 6-7, music, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern Daylight Saving.

WEAO, Columbus, O. 360 meters. 500 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 360 meters. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAU, Sioux City, Ia. 360 meters. 300 mi. Davidson Bros. Co. Slogan, "The Heart of the Corn Belt." Daily ex Sun, 9 am, 10, 11, 1 pm, 5, markets, news. Mon, Wed, Fri, 8-9 pm, concert. Sun 7-9 pm. Central.

WEAY, Houston, Tex. 360 meters. 1,500 mi. Will Horwitz (Iris Theater.) Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Wed, Fri, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Tues, 9-10:30 pm. Wed, 8-9:30 pm. Sat, 7:30-9 pm, 11 pm-1 am. Central.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 261 meters. 200 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Slogan, "Working For All Alike." Daily, 10:30 am, reports; 12:30-1 pm, address; 2:30, 3:30, 4:30, 5:30, reports, news, baseball; 6:15-7, bedtime story, baseball; 8:30-9:30, concert, weather (silent Wed). Tues, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 6:45-7 pm, baseball; 9:30-11 pm, music. Central.

WFAB, Syracuse, N. Y. 234 meters. 100 mi. C. F. Woese. No definite schedule.

WFAF, Poughkeepsie, N. Y. 273 meters. H. C. Spratley Radio Co. Temporarily discontinued.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 360 meters. 300 mi. Hutchinson Elec. Service Co. Slogan, "The Gateway to the Ten Thousand Lakes of Minn." Daily, 11:57-12:20, time, weather. Tues, Wed, 8:30 pm, concert. Sun, 2:30 pm. Central.

WFAQ, Cameron, Mo. 360 meters. 300 mi. Cameron Radio Co. and Mo. Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 500 mi. Daily Argus Leader. Daily ex Sun, 9:15 am, 11:15, 12:30 pm, 1:30, reports, music; 7:30, baseball, music. Central.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10 am, 12:40 pm, weather. Thurs, 8 pm, concert. Central.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sat, Sun, 10 am, reports; 1 pm, news; 2, music; 3-4:30, concert; 7-7:30 children's hour. Tues, Thurs, 8 pm, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital, alternating 10:30 am, 7:30, church services. Eastern Daylight Saving.

WGAF, Tulsa, Okla. 360 meters. Goller Radio Service.

WGAL, Lancaster, Pa. 248 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of U. S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAN, Pensacola, Fla. 360 meters. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 5:30-6 pm, 8, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. 360 meters. Southwest America.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. 261 meters. 300 mi. Ernest C. Albright. Slogan, "The home of the world's largest railroad shops." Tues, Wed, 9-11 pm, music. Sun, 9-10:30 pm, music. Eastern.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 4:30, news. Mon, Thurs, 8:30 pm, concert. Sun, 3 pm, music. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 360 meters. Register and Tribune. Slogan, "The Convention City." Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Slogan, "Amrad, the Voice of the Air." Daily, 5-6:45 pm, Children's Hour, reports, codes. Daily ex Sun, Mon, 8:30 pm, concert. Tues, Fri, 3 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 9, concert. Eastern Daylight Saving.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Irregular schedule.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 319 meters, 1,000 mi. Federal Tel. & Telg. Co. Slogan, "The City of Opportunity." Daily ex Sat, 12:15 pm, weather; (Mon, Thurs, agriograms); 2:30, 3:30, 5, music, reports; Mon, Wed, Fri, 8-10 pm, concert. Sun, 3 pm, vesper services. Eastern Daylight Saving.

WGV, New Orleans, La. 350 meters. 400 mi. Interstate Elec. Co. Slogan, "Where the Mighty Mississippi Makes a Crescent Near the Gulf." Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 11:30-12 m, 5, reports, time, sports. Mon, Tues, Thur, Fri, 1-1:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 9:30 am, 6:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Mon, Wed, Fri, 7:30 pm, lectures, news, agriograms. Central.

WHAA, Iowa City, Ia. 263 meters. 200 mi. Univ. of Iowa. No regular schedule. Central.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Fri, 8 pm, entertainment. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 150 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 280 meters. 1,000 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAG, Cincinnati, O. 222 meters. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 360 meters. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. 360 meters. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 248 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. 360 meters. Univ. of Rochester.

WHAP, Decatur, Ill. 360 meters. 100 mi. Otto & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 242 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. 231 meters. Paramount Radio & Elect. Co.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the State." No definite schedule.

WHAY, Huntington, Ind. 360 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m-12:30, weather, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Staion Located at the Oldest School of Engineering." Club, R. P. I. Mon, 9-10:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Electric School. Slogan, "Heart of America." Daily ex Sun, 8:25 am, 9:25, 10:25, 11:25, 12:25 pm, 3, reports. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 360 meters. 300 mi. Warren R. Cox. Daily ex Sun, 8:30-9 am, test; 1:30 pm, 4-4:30, music; 6-6:30, news, music. Wed, Sun, 8-9:55 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Associated Broadcasters, Inc. Slogan, Station of the Sunrise Trail." Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 252 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm. music. Mon, Thurs, 8-9 pm. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 360 meters. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 254 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAF, New Orleans, La. 234 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 200 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Sun, 10:45-12 m, church services. Central.

WIAI, Springfield, Mo. 253 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news, weather. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. 360 meters. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 200 mi. School of Engineering. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, news; 7-7:30, music. Central.

WIAQ, Marion, Ind. 226 meters. Chronicle Pub. Co.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Slogan, "Howdy Folks, This is WIAR, a real Live Wiar." Daily ex Sat, Sun, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. 360 meters. Leon T. Noel.

WIAU, Le Mars, Ia. 360 meters. Am. Trust & Savings Bank.

WIAY, Washington, D. C. 224 meters. 200 mi. Woodward & Lothrop. Daily ex Sun, 10-11 am, 2-3 pm, music. Tues, Fri, 6:45 pm, reports. Mon, Sat, 8-10 pm, concert. Eastern.

WIL, Washington, D. C. 360 meters. 100 mi. Continental Elec. Supply Co. Daily 5:30-7 pm. music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun, 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 11 am, church services, starting June 3, every alternate week; fill in weeks, 4:30 pm, concert. Eastern Daylight Saving.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Slogan, "WJAK, of the Buckeye State." Mon, Thurs, 11 am, 4 pm, news, music. Thurs, 9-10:30 pm, dance music. Sat, 4 pm, bible lesson. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 50 mi. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 9 am, 10:30, 12:15, markets, reports. Tues, Wed, Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAP, Duluth, Minn. 360 meters. 200 mi. Kelley Duluth Co. Mon, Thurs, 8-9:30 pm, music. Mon, Thurs, Sat, 10:30-12 midnight. Sun, 11-12 m, pipe organ, 12-1 pm, 7:30-9 pm, church service. Central.

WJAQ, Topeka, Kan. 360 meters. 200 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House. Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 1,000 mi Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45, 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8:15-10:30 pm, entertainment Eastern.

WJAZ, Chicago, Ill. 448 meters. 1,500 mi. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex Sun, 10 pm-2 am, music, entertainment. Sun, 5-8 pm, concert. Central Daylight Saving.

(The third part of the station schedules will appear next week.)

ADVANCE PROGRAMS

(Continued from page 7)

WFAA (Central, 476), 8:30-9:30 P. M., Tell Me This Orchestra; Dramatic Club program.

WFI (Eastern, Daylight Saving, 395), 1:30 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano and song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 8:00, Short talks and song recital.

WGI (Eastern, 360), 12:00 Noon, Organ Recital, E. Lewis Dunham on the Estey Reed Organ; 7:00 P. M., "Bits of Wisdom," George Brinton Beale, prominent newspaper editor; "Mrs. Pat and the Law" by the Amrad Players, given through courtesy of Walter Baker & Company, publishers of Boston.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, Boy Scout Radiograms, Employment Bulletin; 11:45, Weather.

WGY (Eastern, 380), 7:45 P. M., Musical Program, Rogers Whitmore, violinist; Ellsworth Page, bass, Theodore Von der Blick, trumpeter; Violin solos, "Chanson Meditation," "Spanish Serenade," Rogers Whitmore, Earl Rice, accompanist; Bass solo, "Song of the Turnkey," Ellsworth Page, Earl Rice, accompanist; "The Secret," Theodore Von der Blick, Asa O. Coggeshall, accompanist; Violin solos, "Introduction and Rondo Capriccioso," "Songs My Mother Taught Me," Rogers Whitmore; "Invictus," Ellsworth Page, bass solo; "My Regards," Theodore Von der Blick, trumpet solo; Address, "Forest Fires Put the Wreck in Recreation," by Willis Baker; Violin solos, "Tambourin Chinois," "The Rosary," Rogers Whitmore; "Then Let Me Rest," Ellsworth Page, bass solo; "Columbia Polka," Theo. Von der Blick, Trumpet solo; "On Wings of Song," "From the Canebrake," Rogers Whitmore, Violinist.

WHAS (Central, 400) 4-5 P. M., Concert by the Mary Anderson Theatre orchestra; Ollie Jones, conductor; **7:30-9 P. M.,** Concert by the Memphis Syncopators.

WIP (Eastern, Daylight Saving, 509), 1:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Artist recital; 6:45, Final baseball scores; 7:00-7:30, Bedtime stories by Uncle Wip; 8:00, Short talk; 8:30, Dance music, Ace Brigode and Ten Virginians from Hotel Walton Roof.

WJAX (390, Eastern), 8:00 P. M., Concert, Melody-Lane Dance Orchestra, Everette Tyron, director.

WLW (Eastern, 309), 4:00, Selections, Adelaide Apfel, pianist; 10:00, Selections, Jack Keefer's Hotel Alms orchestra; Vocal selections, Master Justus Herman, Ida Grote, accompanist; Vocal selections, Alice Sheehan; Harry J. Plogstedt, monologist.

WOC (Central, 484), 12:00 noon, Chimes concert; 5:45 P. M., Chimes Concert; 6:30 P. M., Sandman's visit.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News orchestra; 3:00, Concert, Schmeman's band; 7:00, Concert, Detroit News orchestra and Schmeman's Band.

Friday, August 24

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Overture, "The Magic Flute," Star Concert Orchestra; "Sea-Fever," Frederick Manning, baritone; chestra; "Sea-Fever," Frederick Manning, baritone; outte," Star Concert Orchestra; "Sylvia," Frederick Manning, baritone; "Beautiful Spring," Star Concert Orchestra; "Caprice Viennois," Harry Adaskin, violinist; "The Wreck of Julia," Frederick Manning, baritone, "In the Tavern," Star Concert Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30 Matinee musicale; 6:45-7:00, Children's program, Marshall Stedman and pupils; 7:00-7:30, Organ recital, Methodist Episcopal Church, Arthur Blakeley, organist; 8:00-10:00, De Luxe program, featuring Masonic Glee Club of Long Beach, Calif.; Bedford Finney, baritone.

KDKA (Eastern, 365), 5:15 P. M., Dinner concert, Grand Symphony orchestra; 6:45, Children's Period; 7:20, Concert, The Call Trio, June Call, violinist, Rex Call, violinist, Edith Hall, pianist, "Under the Double Eagle," "Melody in F," "Amorosa Mazurka," "March Militaire," "Minuet in G," "La Paloma," "In Autumn," "Memories of the South."

KSD (Central, 546), 8:00 P. M. Musical program.

KGW (Pacific, 492), 8:00-8:15 P. M., Vocal Solo, Lola Kernan, soprano, Ruth Heinrich, accompanist; 8:15-9:00, George Olsen and his orchestra; 10:00-11:00, Dance Music, George Olsen and his orchestra; 11:00-12:00, Hoot Owls.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 10:00-11:30, Musical program.

WBZ (Eastern, 337), 5:30 P. M., Dinner concert, WBZ trio, "I Lombardi," "Marionette," "Reve d' Amour," "Butterfly Dance," "Serenade," "In a Canoe," "Song of the Volga Boatmen," "Elsa's Dream," "Bon Vivant," "Romantique"; 6:30, Bedtime Story for Children; 7:00, Concert, James Morton, tenor, George Bradley O'Connell, pianist and accompanist, assisted by WBZ trio.

WDAR (Eastern, Daylight Saving, 395, 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 2:00-3:00, Dinner music, Arcadia Cafe Concert Orchestra; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00-12:00, Special Stanley Theater features; Dance music, Arcadia Cafe Dance Orchestra.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Recital, Vincent Soragba, violinist; Songs, Marie Palermo, assisted by G. Forraro; Cello solos; 11:00-12:00, Orchestra concert; Harry Arcts and Al Beiler, in their latest song hits; Jack Smith, pianologue.

WFAA (Central, 476), 8:30-9:30 P. M., Piano program, Leland Johnson, player and composer.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital; 4:00, Short talk and musical program; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's half hour, Stories by Cousin Sue.

WGI (Eastern, 360), 12:00 Noon, Organ Recital, E. Lewis Dunham on the Estey Reed Organ; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 7:30, Concert, Instrumental Trio, Ida Mauch, Director.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange, Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, road reports; 9:00-11:45, Tokio Dance Orchestra; 11:45, Weather.

WGY, (Eastern, 380), 7:45 P. M., Musical Program; "Impromptu, Opus 90, No. 3," Daniel W. Murphy, pianist; "Solveig's Song," Mrs. George Gretser, soprano, Mrs. Louis Rask, accompanist; "Hungarian Rhapsody," Master Adelbert Purga, violinist (thirteen year old violinist); "I Hear You Calling Me," R. Herbert Massey, tenor; Address, "National Consequences of Timber Depletion," Colonel W. B. Greeley; "Valse in D Major," Daniel W. Murphy, pianist; "Love Like the Dawn Came Stealing," "You'll Get Heaps O'Lickin's," Mrs. George Gretser, soprano; "Melody," Master Adelbert Purga, violinist; "Magusha" (request), "For You Alone," R. Herbert Massey, tenor; "Robin, Robin, Sing Me a Song," Mrs. George Gretser, soprano; "Rondo Capriccioso," Daniel W. Murphy, pianist; 10:30, Musical program, "Valse Arabesque," Irene Nettles, pianist; "Ouvre tes yeux bleus," "Lesais tu," Alexander Bouchard, tenor, Earl Rice accompanist; "Return March," Pietro Della Ratta, Accordion solo; "Such a Little Fellow," Irene Nettles, soprano; "Memories," Alexander Bouchard, tenor; "Polka de Concert," Irene Nettles, pianist, "Mazurka," Pietro Della Ratta, Accordion solo; "A Winter Lullaby," "Obstination," Alexander Bouchard, tenor, Earl Rice, accompanist; Medley from "Wildflower," Irene Nettles, pianist.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre orchestra; Ollie Jones, conductor; 7:30-9:00, Concert, given by Helen Eichenberger, pianist, Mary Ernest Poore, violinist, Howard Koch, violinist.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Musical selections, WIP Instrumental trio; 6:45, "Radio Baseball Dope," by Monte Cross, old time players; 7:00, Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 8:00-10:00 P. M., Program arranged especially for the inaugural parade of the Cincinnati Fall Festival; Aichle Novelty orchestra; General Protestant orphanage band.

WOC (Central, 484), 12:00 noon, Chimes concert; 5:45 P. M., Chimes concert; 6:30, Sandman's visit.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports; 7:45, Dinner music, Hotel Adelphia Roof Garden, A. Candelori, director; 8:30 Address; 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra; Ray Miller director; 11:10, Continuation of Dance Music.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News orchestra; 3:00, Concert, Schmeman's band; 7:00, Concert, Detroit News orchestra and Schmeman's Band.

Saturday, August 25

CFCA (Eastern Daylight Saving, 400), 8:00-9:00 P. M., Overture, "Phedre," Star Concert Orchestra; "I'm a Sunbeam at Morn," Eileen Law, contralto; "Spanish Dances," Star Concert Orchestra; "Air," Jacques Sterin, cello solo; "Serenade," Star Concert Orchestra; "The Sandman," Eileen Law, contralto; "Somewhere a Voice Is Calling," Star Concert Orchestra; "Orientale," Jacques Sterin, cello solo; "Kathleen Mavourneen," Eileen Law, contralto; Serenade "Espagnole," Star Concert Orchestra.

KGW (Pacific, 492), 3:34-4:00 P. M., Children's programme. 10:00-11:00, Dance music, George Olsen and his Orchestra.

KSD (Central, 546), 8:00 P. M., Post Dispatch Milk and Ice Fund Benefit performance at Orpheum theater.

KPO (Pacific, 423), 8:00-12:00 P. M., Music, Art Weidner's Dance Orchestra.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program, courtesy W. W. Kimball Co.; Cope Harvey's College Inn Orchestra; 8:05, "Under the Evening Lamp," furnished by the Youth's Companion.

PWX (Inter-colonial, 400), Paquita Elias, soprano.

WBZ (Eastern, 337), 6:00 P. M., Dinner concert, Hotel Kimball trio; 6:30, Bedtime story for children.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Orchestra selections; "Man, Man, Don't Do That to Me," "Gulf Coast Blues," Trixie Smith; "Farewell Blues," "Molasses," Thomas Waller, pianist; "Where the Sacramento River Flows," "If Winter Comes," "Pickles," Duke Ellington, Vocalion Record artist and orchestra; "Don't Let Me Find You Here When I Get Back," Joe DeLisle, singer; Roland Irving, pianist; "Stop Messin' with My Man," "Cotton Belt Blues," Rosa Henderson, singer; Fletcher Henderson, pianist; "Laughing Crying Blues," "Taint Nobody's Business," Lena Wilson, Victor artist; Porter Grainger, pianist; "My Own," "Mose," "Papa, Watch Your Step," Duke Ellington and orchestra.

WFAA (Central, 476), 8:30-9:30 P. M., Concert of old-time music, Marie H. Bolack, pianist; Charles M. Cornett, violinist.

WGI (Eastern, 360), 7:30 P. M., Concert, John F. Camera, tenor; Armand Arena, pianist; Mrs. John F. Camera, accompanist.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange, Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news; 11:45, Weather.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor; 7:30-9:00, Concert by the Courier-Journal Quartette.

WOC (Central, 484), 12:00 Noon, Chimes concert; 5:45 P. M., Chimes concert; 6:30, Sandman's visit; 9:30-10:30, Dance program, P. S. C. Orchestra.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News Orcestra; 3:00, Concert, Schmeman's Band; 7:30, Concert, Schmeman's Band.

Sunday, August 26

KHJ (Pacific, 395), 10:00 A. M., Sacred service; 10:30, Organ recital, First Methodist Episcopal Church, Arthur Blakeley, organist; 7:00-7:30 P. M., Organ recital, First Methodist Episcopal Church, Arthur Blakeley, organist.

WFAA (Central, 476), 2:30-3:30 P. M., Bible class, Dr. William M. Anderson, half hour study, half hour song; 9:30-10:00, Choristers and soloists from Oak Cliff Presbyterian Church; 10:00-11:00, Concert, Sherly Lee Allen and orchestra.

WGI (Eastern, 360), 4:00 P. M., Twilight program, "Adventure Hour," conducted by the Youth's Companion; Concert program, Edison Laboratory Phonograph; Stories, Arturo; 8:30, Musicale, Catherine Chisholm, pianist and teacher.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 3:00, Vesper service; 6:30-7:00, George Albert Bouchard, organist; 11:45, Weather.

WGY (Eastern, 380), 9:30 A. M., Service from First Methodist Episcopal Church, Schenectady N. Y.; Organ Prelude, "Song of Sorrow," Mrs. Albert Kinum; "How Firm a Foundation," Hymn; Apostle's Creed; Prayer; Response; Lord's Prayer; "O Master, Let Me Walk With Thee," Mayfred Spooner, contralto; Psalter; Gloria Patri; Scripture Reading; Offertory, "The Penitent," Fred Heacox; Doxology; "Faith of Our Fathers," Hymn; Sermon, by Dr. F. P. Corson, Elmhurst Community Church; "Come Thou Almighty King," Hymn; Benediction; "O Sanctissima," Mrs. Albert Kinum, Organ Postlude.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00, Church services under the auspices of the Central Christian Church, Rev. Dr. Albert Nichols, pastor; 4:00-5:00, Concert, under the auspices of Alice Montague.

WHK (Eastern, 360), 8:00 P. M., Operatic selections by WHK Orchestra and vocal soloists.

Monday, August 27

KPO (Pacific, 423), 8:00-10:00 P. M., Organ recital, Gladys Salisbury; Music, Stanislaus Bem's Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, Feri Sarkozi, director; 4:30-5:55, "Affairs of the Heart," Betsy Logan; musical program; 7:30-8:00, Bedtime stories, Dream Daddy.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:45, Short talks; Song and piano recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's half hour, Stories by Cousin Sue.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30, George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange, Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news; 9:00-11:45, Concert; 11:45, Weather.

WGY (Eastern, 380), 7:45 P. M., Concert program, "A Chip of the Old Block," S. Robert Curtis, baritone; "Dedication," Mildred Swart, pianist; "The Shoogy Shoo," Ada Webster, soprano; "Molly Ochone," S. Robert Curtis, baritone; "Novelletten," Mildred Swart, pianist; "In May Time," Ada Webster, soprano; Address, "Mosquitoes and Their Control," Russell W. Glas; "I Know a Little Girl," "Cradle Song," Ada Webster, soprano; "Through Enchanting Meadows," Mildred Swart, pianist; "Oh, for a Breath o' the Moorlands," S. Robert Curtis, baritone.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45, "Radio Baseball Dope" by Monte Cross, old-time player; 7:00-7:30, Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 4:00 P. M., Musicale, Jennie Kehrt; Program from Cincinnati Fall Festival at Music Hall; Franklin Bens, boy soprano; Roger Hill Dance Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sport results and police reports; 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30, Popular selections, WOO Orchestra; Robert Golden director; 9:30, Organ recital.

Amplifiers Liven WMAF Dead Spots

But Millionaire's Loud Speakers Are Silenced by Neighbor's Protest as to Noise

NEW BEDFORD, MASS.—Colonel Edward H. R. Green is to establish soon on his estate at Round Hills the Radio school with free tuition, announced some time ago in an article in Radio Digest. A large electrical manufacturer has assured Colonel Green that he will take care of every graduate of the school, as the demand for Radio experts is growing constantly.

Colonel Green's new 500-watt broadcasting station, WMAF, is now working; it is broadcasting simultaneously to New England fans the full program of WEAF, New York, nightly by telephone line relay.

Amplify Over Dead Spots

In analyzing the use of the five special telephone lines to convey the program to WMAF it was found that at various intervals between New York and South Dartmouth, Mass., where the station is, there were "dead spots" across which the current refused to flow unaided. After consultation by an engineer speech amplifiers were inserted in the lines at these point. The concerts as now broadcast were the result.

Temporarily the huge loud speakers in the tower at Round Hills are silent, owing to the complaint of a summer resident at Nonquitt that they disturbed him. But as soon as a way can be found to prevent the sounds from being carried to the little colony, they will be in operation again.

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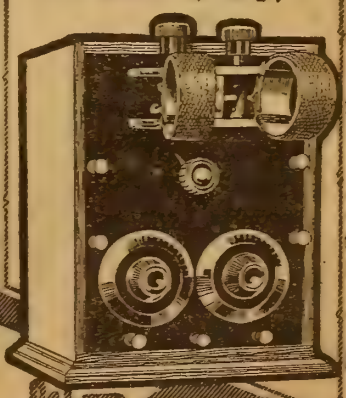

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Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

Member of the Audit Bureau of Circulations
58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies 10 cents.

Vol. VI Chicago, Saturday, August 25, 1923 No. 7

Lectures Alone Not Satisfying

It Takes Real Music to Hold the Attention of the Fan

THE navy department, which has been broadcasting concerts from NAA, has declared its intention of discontinuing them and using the government equipment only for lectures, "because more persons will listen to the lectures than to the concerts."

Perhaps their assertion is correct but if it is it certainly does not apply to all localities. Lectures are right when sandwiched with good musical programs but a steady diet of lectures soon palls the appetite of the ordinary Radiophan.

New Field for Radio

Arctic Explorers Find Air Communication of Benefit

THE use of Radio for arctic work is new and untried; the results of the plan of communication, designed jointly by Captain MacMillan and officers of the American Radio Relay League, are expected to pave the way for future expeditions under vastly improved circumstances as to the morale of the explorers and the advancement of science.

Should some sudden emergency overtake the exploring party and their rescue brought about, then the weeks spent in preparation, the painstaking care in which Radio equipment was assembled, will not have been in vain and Radio will have proved its value in the new field.

Freak Effects in Reception

Localities Seem to Suffer from Jumps in Waves

IT is a widely known fact that some places are very unsatisfactory for Radio transmission and reception. The range of a broadcasting station may be many hundreds of miles, yet within fifty miles are localities over which the radiated electro-magnetic waves seem literally to hop, coming down at points farther along. At the same spot, however, over which waves from one station skip, waves from more distant stations may readily be picked up.

These conditions give rise to much speculation as to the cause. The characteristics of the land, whether hilly or flat, wooded or cleared, moist or dry, over which these waves have passed are thought by many Radiophans to be conditions which contribute to freak effects.

Let the Knocker Be Knocked

Nothing Gained by Kicking About Something Free

SOME of the Radio broadcasters are complaining about inappreciative audiences and about the number of "knocks." Few persons realize the pains to which the broadcasters go to furnish amusement free of cost.

It is impossible to satisfy such a vast audience as that of Radio. The impulsive or enthusiastic listener is always ready either to register a "kick" or a "boost" as he is touched by this or that part of a program. While you may not like a certain portion sent from a certain station that is no sign others have the same dislike. A little patience will carry you further and help the broadcasting station to arrange a program that will suit the greater part of a Radio audience.

Managers of broadcasting stations should not take "knocks" from impulsive individuals seriously, nor take them as a standard by means of which to judge others of the audience. There are many satisfied listeners who never think of sending in a "boost"; these are the persons who really benefit by the entertainment.

"Knockers" must remember that it is an expensive matter to maintain these stations. One of the great broadcasting stations employs fifty-six persons. Vacuum tubes used in these stations cost even at wholesale almost one hundred dollars and they have a habit of burning out even faster than the smaller tubes do.

RADIO INDI-GEST

Which Goes for Many Other "Records"

MY FRIEND SPANISH SOLO
BILKINS I HEARD
WAS BRAGGING WAS THE
ABOUT THE TOREADOR SONG
WONDERFUL FROM CARMEN."
LONG DISTANCE "HAH HAH,
RECEPTION HEH HEH,"
HE HAD HAD I CHUCKLED
LAST NIGHT. PUNCTURING
SAID HE, HIS HOPES.
WHY, I EVEN "THAT SONG
HEARD CUBA. WAS FROM
I KNOW STATION PDQ
IT WAS CUBA RIGHT HERE
BECAUSE THE IN THE CITY."

GOO GOO.

An Electromagnetic Cerebellum, as 'Twere

Dear Indi: 'Sno use, they've all got it—Radio on the brain. Witness the following between Ma and me:

"Wire you in-su-late?"
"Been out with my Gal-ena."
"Did you have a quarrel with Maggie Ohms?"
"No. She had a date with Reggie Eneration."

And so the moon turned pale. MIKE ROFARADS.

A-B-C Lessons for Indigest Beginners

Chapter X—J Also Stands for Jay Walker

BY GOSH

J IS for the Jumble
That you hear on busy nights,
When you're tunin' broad as Broadway,
And static blinks the lights.

And So the Limerick Contest Starts

Dear O. M. Indi: Three weeks ago you introduced Mike and Izzy and assured us that they would play a minor part in the game of Radio confusion. Then to make good your word you never mentioned them since. I can't forget their happy dissatisfied look as they seem to fail to get the drift of what wasn't going on, so I want to suggest something.

You know limericks, don't you? (*No; who Izzy?—Indi.*) Then why not exact a prize of anything from a microfarad to a milhenry from the Radio squab who writes the worst limerick about Mike and Izzy. Disposition of the prizes is to be left to your indiscretion, but would suggest that they be exchanged for a last year's bird's nest, which may be used for a housing on a leaky variometer.

To start the ball on the downward curve, here's my limerick; who can do worse?

Two monks, one Mike and one Izzy,
With wire and sundries got bizzy.
They built up a loop,
Put spaghet in the soup—
Er somethin' which made 'em both dizzy.

Or you might reject this one for the benefit of those who don't want to read hefty stuff:

Friend Izzy he built up a circuit,
And Mike tried his durndest to workit.
He tuned in for "BLAH"
With never a flaw.
Now there isn't a job but he'll shirkit.

Have some misguided individual write a limerick every week for several years. Besides being filling for the column it may inspire some Radioninny to discover a new ultra extraordinary superfluity which will revolutionize the shape of the modern binding post. Nobody reads the dope, so I believe you will be doing yourself a favor by accepting a prize from the worst limerick offered. One peck of marks sent herewith as pay for my suggestion. Please announce through BLAH, the Walla Walla broadcasting station, that you got my letter and tell the kinfolks that we will hold an ice cream social for the benefit of our Limerick Club Friday of next year.

Yours on 360 meters. GESS HOO.

Lying below is
Allocious DeMarving,
Who listened so long
He died by starving.

My Radio

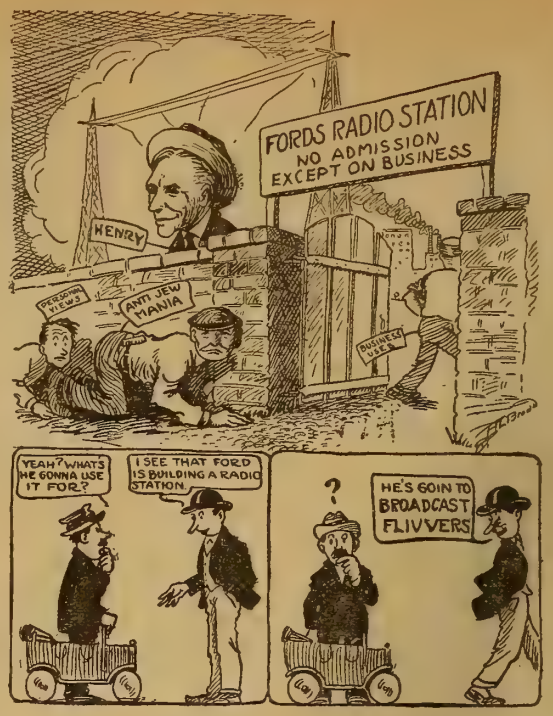
The hours I spent with thee, dear heart,
Are fraught with joy & bliss, altho'
At times I'd like to kick apart
My Radio, My Radio.

Each word a shriek, each song a blare
But still I tune and tune in vain
I listen in unto the end, and there
You screech again.

"B" batteries and ampliphone
Oh, tuning coil that makes me cross
I wish that I could cure your static groan
But you're a loss, sweetheart, a total loss.

H. C. GUMP.

"Blame those new cuff buttons you bought for me," muttered Paw. "I can't get 'em to work at all," he grunted. And then he wondered why the family laughed when he rolled back his coat sleeves to show two beautiful nickel-plated binding posts.



Condensed

By DIELECTRIC

When the telephone and telegraph wires were overloaded with news of President Harding's sudden death, Radio again served in its unique capacity. News of this character spreads rapidly by whatever medium it be carried, but isolated farms, lumber camps, ships at sea, for example, knew the sad tidings far in advance of such time as pre-Radio days would have enabled. It is said that Dr. Harding was apprised of his son's demise by a neighbor who received word from a broadcasting station. Events of almost immediate occurrence may be known by many thousands in this day of Radio transmission.

The widely known broadcasting station in Atlanta, Ga., WGM, has found a new feature to present to its many listeners in that state. Sessions of the local legislature are being sent out as a regular part of the programs, so that all debates on all subjects may be followed and campaign speeches may be checked with what the voter has learned first-hand of the candidate's stand on measures passed or defeated. A better informed citizenry should result.

When those six convicts escaped from their enforced lodging in the city of Philadelphia they might not have considered the unseen agency which carried news of their leaving to cities, towns and even farm houses all along the way. Station WOO broadcast information respecting suspects who had "borrowed" a boat in Maryland to go cruising. Chances of escape from capture are very slim indeed with so many folks informed quickly over a large territory.

It is pretty generally admitted that daytime reception of broadcasting does not compare favorably with night reception. Yet a recent test made by Station WDAP showed very little difference between them. Instead of the three hundred mile range, the station was found to have a daytime transmission range of twice that. The test proved a power amplifier transmitter to be the most efficient. It is the pursuance of these practical tests which greatly aid progress.

Except for a violin in the hands of a youthful student, I know of no sound produced on a musical instrument so distracting as the harsh piano tones carried by so many broadcasting transmitters. We have WGY to thank for making it possible to hear piano music in our headsets and loudspeakers "true to life." Engineers at that station have succeeded in producing a device to catch overtones and the natural singing quality of the instrument, and to give to the lower notes of a piano their true value when heard through a loud speaker.

The proposed action of the marine bureau of Japan to equip fishing ships with Radio apparatus for use in case of accident to the ships or to report a catch has been tried by other nations and found valuable. This "plaything" is coming near to being a necessity in many business transactions; that fact is borne out almost daily. There is already a sizable list of practical uses.

Now our friend Howard Thurston is broadcasting again on the subject of interplanetary gossiping. He is duly recorded as predicting that "unearthly" forces will soon hobnob with us without the expensive aid of professional mediums. Well, I for one, prefer to see all efforts directed toward improving the sending and receiving of Radiophony, economizing in code usages, application of Radio to ship movements and the like before we wander so far afield for new thrills.

First Steps for Beginners in Radio

Chapter XIV, Part I—Headsets and Loud Speakers

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XIV, Part II—Headsets and Loud Speakers.
Chapter XV—Filament Batteries.
Chapter XVI—Plate Batteries.
Chapter XVII—Using Alternating Current on Tubes.
Chapter XVIII—Testing Radio Instruments.
Chapter XIX—Locating Trouble in the Set.
Chapter XX—Useful Information and Formulas.

FEW Radiophans realize the importance of the headset in the operation of a Radio set. The headset is one of the most important links in the chain between the original sounds striking the microphone at the broadcasting station and the reproduction of those sounds miles away. When one considers that their function is to convert the changing electric currents, picked up with difficulty and nurtured through stages of amplification, into audible sounds, their importance may be more easily recognized. Furthermore a poor headset will cut down the range of set hundreds of miles; many DX records are made or marred in the headset.

Perhaps the common use of wire telephones has led many to neglect the headset, thinking it but a compact telephone receiver that will keep on working perfectly indefinitely and will stand careless handling without harm. True, a Radio receiver is just a telephone receiver but a good headset is a refined scientific instrument and should be treated as such. A well designed Radio receiver will give an audible sound on a current of .00000000016 amperes. To convert such a minute current into sound demands the best of materials and workmanship in the instrument in the first place and the instrument demands consideration and care to retain its efficiency.

When one unscrews the cap from a Radio receiver and sees but two tiny coils of wire and a few pieces of steel they may well wonder where all the scientific instrument idea comes from, for it all seems so simple. But behind that simplicity lies a long story of research and experiment.

The Theory of the Receiver

Briefly the theory of the telephone or Radio receiver is as follows: a thin metal diaphragm is rigidly mounted a fraction of an inch away from a pair of pole pieces. These pole pieces are made of soft iron but are magnetized by one or more permanent magnets mounted in the shell. Around the pole pieces are wound many turns of fine copper wire. The diaphragm is normally under tension from magnetism in the pole pieces. When a current flowing around the windings changes in value the magnetic pull on the diaphragm will be varied and the diaphragm will vibrate, giving rise to sounds.

Simple in theory but the details demand attention. The iron in the pole pieces must be of the softest grade so that the magnetism will change rapidly with the least change in the current in the coils. The diaphragm must be of a certain exact thickness for it must vibrate to the high notes of the violin and respond as well to the cello. A tiny dent or the least bend in the diaphragm will give rise to distortion or make the telephone more sensitive to one frequency than another. The distance betwen the pole pieces themselves and between the pole pieces and diaphragm are of great importance. All these factors must be taken care of to assure proper operation.

Resistance of the Receiver

Now we come to the important part, namely, the resistance. There is a mistaken idea that the resistance determines the sensitiveness of a receiver. A 3000 ohm phone is not more sensitive than a 200 ohm phone because it has a higher resistance but solely because it has more turns of wire on the pole pieces.

In designing electromagnets the practice is to make the thickness of the winding twice the width of the pole piece. The size of coil in the receiver then is fixed by the size of the pole pieces used. The pull of an electromagnet depends on the ampere turns, that is, the number of turns multiplied by the amperes flowing in the coil. Therefore the more turns we can get into a given space the greater the magnetic flux. In order to get sufficient turns on the pole of a receiver the manufacturers use very fine wire, for that reason the resistance of a Radio receiver is high.

However, another factor enters the use of receivers with tubes. It is a well known law in electrical practice that the impedance of the output circuit of any device should equal the impedance of the device itself. Therefore the impedance of the receivers should equal the plate impedance of the tube. Impedance as we have learned is the resistance offered to the flow of alternating currents by an inductance as well as the direct current resistance. Therefore the impedance of a 2200 ohm phone for instance is 22,000 ohms on an alternating current of 800 cycles. For higher frequencies the impedance is still greater; it varies with the frequency. In order to meet the above conditions it is common practice to design receivers and transformers with an impedance equal to the plate impedance of the tubes with which they are to be used.

Resistance Does Not Affect Sensitiveness

Realizing then that resistance has little to do with sensitiveness we will consider the important factors in the purchase and care of Radio receivers. The best guide is the reputation of the manufacturer. A cheap 'phone is seldom worth all it costs; so don't hesitate to pay a little more for the best. See that the cases are carefully made, all threads well machined and the caps fit snug and tight, that the diaphragms are perfectly flat and rest on smooth edges of the shell, that the coils have been protected by a covering and the permanent magnets will support the diaphragm on edge. If they fail to hold the diaphragm they are weak and should not be accepted. The simple test for a Radio receiver is to place a piece of paper moistened with the tongue between a nickel and a penny and to touch the 'phone tips to the coins. The current generated by this simple battery should give a click in the phones. If no sound is heard they are useless for Radio work.

Care of Receivers

Having purchased 'phones let us take good care of them so they may give long and satisfactory service. Handle them carefully and do not knock or jar them excessively. Vibration will weaken the magnetism in the permanent magnets and reduce the sensitiveness of the receivers. Do not test the 'phones by connecting the cord tips with a B battery, for strong currents in the wrong direction tend to demagnetize the magnets. Since the pole pieces are kept magnetized, a current in one direction in the windings will assist the permanent magnets but a strong current in the opposite direction tends to reduce the magnetic effect and demagnetize the magnets. For this reason the receivers are fitted with marked cords, the cord with the red thread being connected to the positive 'phone terminal. The current in the plate circuit will then tend to help the permanent magnets and the 'phones will retain their sensitiveness. With crystal detectors this is not important, the 'phones may be connected either way.

Should it be necessary to remove the diaphragm at any time do so by sliding it off carefully. Do not attempt to lift it with the finger nails for it will be bent and the efficiency of the instrument reduced. In replacing the diaphragm slide it into place to prevent bending it.

The 'phones should not be pulled around by the cords. The conductors are made from tinsel; excessive pulling or twisting causes the tinsel to break. In time loose contacts will develop that cause annoying sounds by reason of the current being made and broken with each movement of the cord.

Single 'Phones for Loud Speakers

Many fans make a practice of using a headset as a loud speaker by mounting it in a horn. The heavy currents they are called upon to handle will often render them unfit for DX work despite the ruggedness of the receiver under ordinary conditions. It is better practice to reserve the headset for long distance reception; for loud local reception, make use of a single receiver similar to the Baldwin mounted in a horn. To reduce the amount of current in the headset use is made of jacks but one should be careful in wiring in the jacks to see that the same spring in all the jacks is positive and that the cord with the red thread is so connected into the plug that it will make contact with the positive spring when the plug is inserted in the jack.

When putting the receivers away do not throw them into a box or drawer with other objects that may strike the diaphragm and dent it and then expect the 'phone to do good work.

(TO BE CONTINUED)

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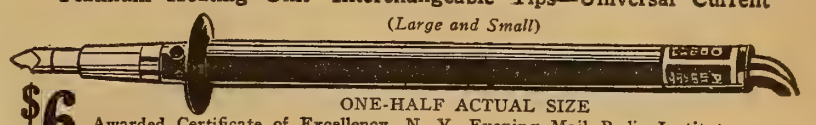

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43 Plate	5.00	2.25
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17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
43 Plate Vernier	7.50	3.95

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Some Ideas for the Amateur Workman

Homemade Devices for Use in Receiving Sets

Many amateurs who construct their own sets readily appreciate, no doubt, the kinks constantly appearing in publication. The author presents here a group of his own ideas which he hopes will prove beneficial to the Radio fraternity.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

"Economy" is the watchword of the amateur with the small purse; for the reader who may be under such circumstances Figure 1 shows a kink which at some time may prove valuable. If you have a dial that is stripped or that is broken so that it is useless you can easily make a neat scale from it by cutting it with a jig saw, and drilling as shown by the dotted lines in the illustration.

Vernier variable condensers have become quite popular because of the fine adjustment which they make possible. In many instances, good condenser adjustments are worth remembering. We have a dial to indicate the position of the condenser itself, but what about the vernier, which is quite important. A simple remedy for the situation is to mount a pointer on the vernier knob, using the dial as a scale. It is true that the dial is not always in the same position but this will not prevent your keeping a record of good adjustments. For example, the illustration (Figure 2) shows the condenser adjustment as 50 degrees, and the vernier as 80 degrees.

To solder taps on switch points in some cases is quite difficult, although it insures a good connection. A small Fahnstock binding post will be found quite useful in such cases, for connections. By mounting one in back of each tap (as shown in Figure 3), the work in wiring is much simplified, and secure connections can be made, eliminating the solder.

Figure 4 shows a compact, back-mounted inductance switch. The knob of the switch projects through a slot cut in the panel, and the top of the switch is numbered, in conjunction with the taps. The switch and the switch points are mounted on a piece of hard rubber, supported by a bracket. This saves panel space, and presents a neat appearance.

Honeycomb and other inductance coils are quite awkward when mounted on the front of the panel. Though there are many ways of back mounting these coils very few are satisfactory. The standard mounting can be easily changed to back mounting, as shown in Figure 5. A slot is cut in the panel, and the mounting is reversed, allowing the coils to be inserted through the slot. Small arrows engraved on the knobs, indicate the position of the coils.

There is no need of discarding the old condenser if you want a vernier condenser, for it can be changed quite easily at small cost. Figure 6 shows the simple arrangement. A pinion gear is mounted on the condenser shaft, and a worm gear on a shaft which is controlled by a dial. The ratio of the gears makes accurate vernier adjustment possible. This method can also be applied to variometers or variocouplers.—Carl Masson, Jamaica Plain, Mass.

SIX SHORT CUTS ON HOME SETS

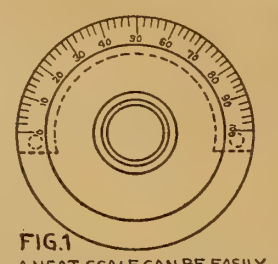


FIG.1 A NEAT SCALE CAN BE EASILY MADE FROM AN OLD DIAL BY SAWING AND DRILLING AS SHOWN BY THE DOTTED LINES

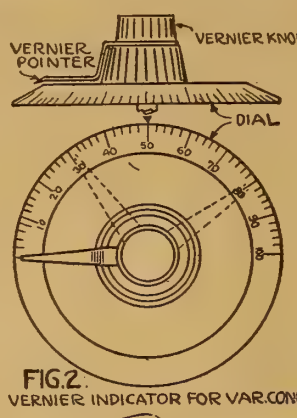
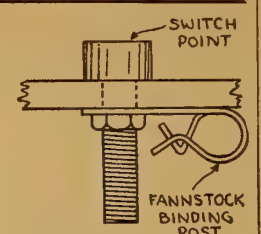


FIG.2. VERNIER INDICATOR FOR VAR.COND.



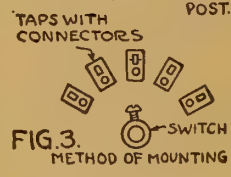


FIG.3. METHOD OF MOUNTING

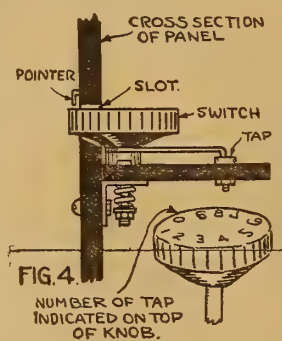


FIG.4. NUMBER OF TAP INDICATED ON TOP OF KNOB.

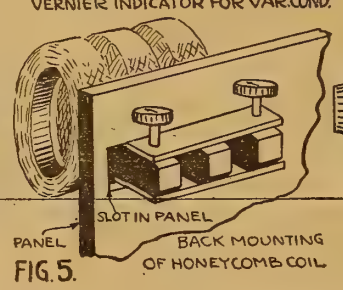


FIG.5. BACK MOUNTING OF HONEYCOMB COIL

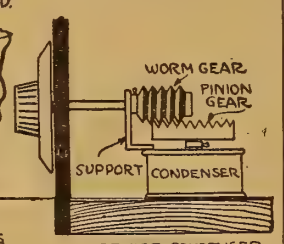


FIG.6. ALL VERNIER CONDENSER

From time to time the aerial should be lowered, and the insulators should be cleaned off to avoid leakage.

Soldering Brass and Copper

For all Radio work, when copper and brass are to be soldered, only rosin should be used. Any paste or liquid will inevitably corrode the metals; it is difficult to remove all the paste after the joint is made. For this reason, use only rosin-core solder wire. This is a tube of solder filled with rosin; and no cleaning is necessary afterward.

Concerning Rebuilt Phones

Rebuilt headphones lose magnetism in the permanent magnets if no attention is paid to the direction in which the currents employed in them flow.

How to Plan and Make Your Fixed Condensers

Radiophans are divided into many classes. Some are familiar with all of the various electrical stunts while others are not versed in the solution of mathematical formulae. This article is to give some information to the latter class.

For example: It is desired to make a fixed condenser of a capacity of .00025 mfd. using tinfoil for plates and mica as a dielectric. What should the area of each tinfoil plate be and how many will be required?

The capacity of this "problem" condenser is small and only two plates will be required, separated by one piece of mica. In this case C equals the capacity desired which is .00025 mfd. T equals the thickness of the dielectric in decimal parts of an inch, which is .01 and K equals the dielectric constant for mica which without further explanation may be taken as 6.

$$\text{The Area} = \frac{C\ T \times 10^{10}}{2248\ K} \text{ or, substituting,}$$

$$\text{Area} = \frac{.00025 \times .01 \times 10{,}000{,}000{,}000}{2248 \times 6} = 2 \text{ sq. in.}$$

Taking the square root of 2 square inches gives 1.41421 inches. Therefore, two plates will be required, each plate measuring 1½ inches (approximately) on each side. Remember this the lapping area.

The plates are placed between two pieces of formica ⅛ in. thick with the mica be-

(Continued on page 14)

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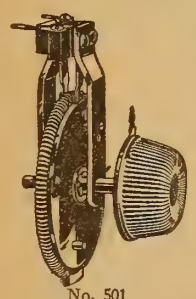

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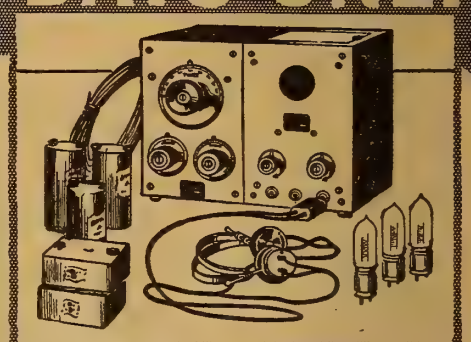

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Five Tube Neutrodyne Receiving Circuit

Part I—The Circuit and List of Parts

By H. J. Marx

SINCE the announcement of the development of the Hazeltine Neutrodyne Circuit, patented March 27, 1923, under United States Patent No. 1450080, every Radiophan has been itching to try it. It was possible to give circuit diagrams, but real constructional data of a tested circuit and set were not available. Rather than furnish details blindly in an effort to supply the demand, time was taken to construct and assemble carefully a set of this type. The final tests having been completed, and the operation of the circuit giving thorough satisfaction, it is now presented to the fans with the knowledge that if instructions and details are carefully followed there will be no difficulty in operation.

It would be well to say here that the efficiency of operation depends much on the quality of apparatus, carefulness and accuracy of construction, and the experience of the operator. Until the approximate dial settings for various wavelengths are determined, tuning is difficult. Each stage of Radio frequency must be tuned to the proper wavelength; as these adjustments are rather critical, no reception will be had until each step is tuned in. There is no long whistle to inform you of a carrier wave; reception has a habit of slamming in on you so suddenly that it makes the ears sing for a while. The volume is more than sufficient; the clarity of tone is exceptionally good and, once the tuning knack is acquired, distance appears to be unlimited. But let it be said again—all these points are only the reward of great care in construction and the selection of apparatus.

Special Circuit Features

From the flood of requests for neutrodyne circuit details, a number of special features in popular demand were selected and incorporated in the circuit. Such features may be omitted by the constructor if they are not desired.

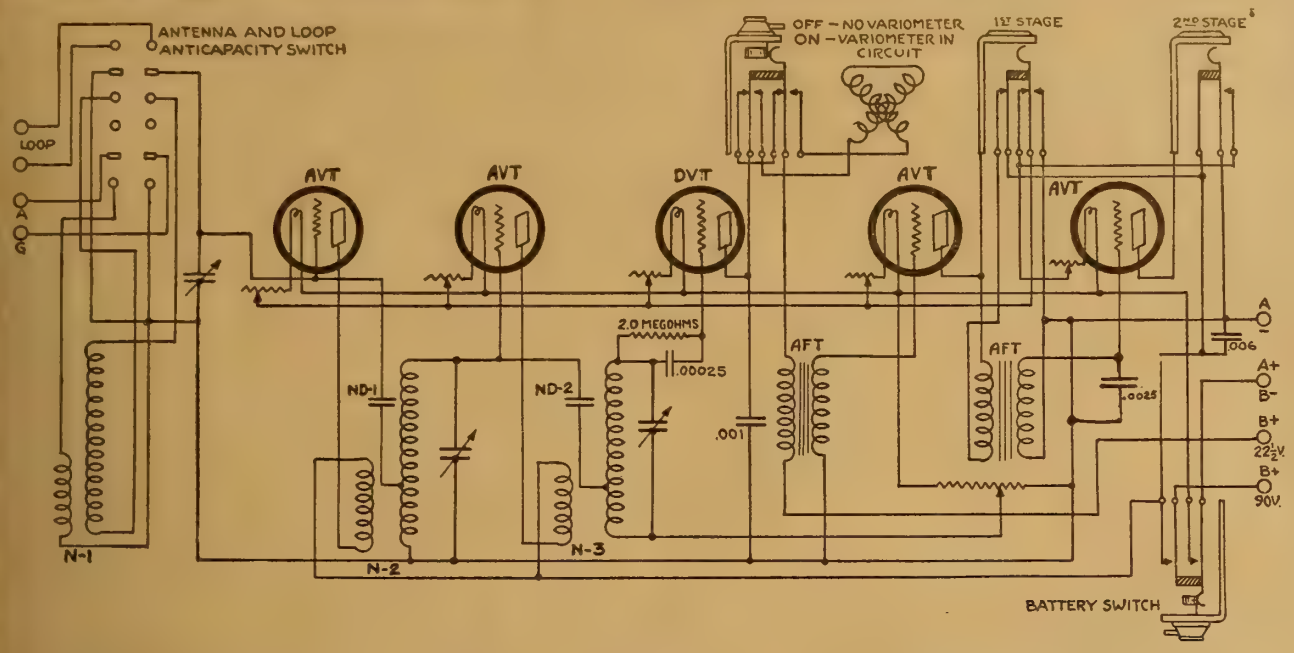
Some wanted a loop antenna circuit; others wanted to use their outdoor antennae; many wanted to use both. For this reason the circuit calls for four binding posts, two for antenna and ground and two for loop aerial connections. An anti-capacity switch connects the antenna and ground to the first neutroformer when the lever is on the one side; when on the other side the loop is connected direct to the grid and negative filament with the condenser of the neutroformer shunted across it. If the lever is in the center or neutral position all aerial and ground connections are open.

A battery switch has been added. This switch opens and closes both the A and B battery circuits.

A variometer has been added in the plate circuit of the detector tube. This may be cut out by means of the variometer switch. It will be noticed that this switch cuts it out entirely, leaving no dead end connections as is sometimes the case.

Jacks are used in the first and second audio stages only. No connections are made for the detector stage, as all tuning may be done by plugging in on the first stage of audio frequency amplification.

All binding posts are mounted in the back of the panel, so no unsightly wires need be run to the front of the set.



The Circuit

The circuit covers two stages of Radio frequency detector and two stages of audio frequency amplification. Transformer coupling is used in all stages. The regular Radio frequency transformers cannot be used since the ratio and neutrodon tap are of special inportance in the proper operation of this type of circuit. In addition these transformers, called neutroformers, are of the air core type. They consist of the transformer windings on tubes, mounted on the proper variable condensers. The illustrations, to be shown later, will reveal the appearance and assembly of these parts.

A potentiometer, added for grid control of the detector tube, was found to be of considerable advantage, especially when using different tubes for the detector. In using 201-A tubes neither a straight positive, nor negative grid return connection gave best results, but the potentiometer was the means of adjusting to the best operating point.

The two jacks are of the filament control type; when the rheostat adjustments have been made they need not be altered except to account for variations in battery discharge.

The audio frequency transformers were of a small compact type, taking up a minimum amount of space. In spite of the apparently large panel there was but little surplus room and the panel layout required considerable study to avoid interference.

List of Parts

The list of parts gives completely the various pieces required for the assembly of the set which as constructed used 20-ohm rheostats. Either UV-Z01A or C-301A tubes were contemplated for use in the circuit. All tubes to be used should be carefully selected and tested. The resistance of the rheostats may be changed to suit the use of any other tubes under contemplation.

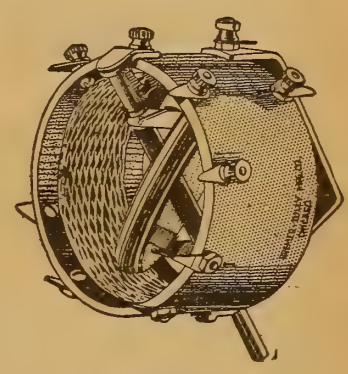
(TO BE CONTINUED)

LIST OF PARTS

1—Main Panel 7⅞"x23¾"x3/16"
1—Sub Panel 8"x9"x3/16"
3—Neutroformers
2—Neutrodons
5—Rheostats 20 Ohms
2—Panel Mount Sockets
3—Base Mount Sockets
1—Anti-Capacity Switch, 12 terminals
1—Jack Type Battery Switch, double circuit
1—Jack Type Switch, 6 spring
1—Filament Control Jack, 5 spring
1—Filament Control Jack, 3 spring
2—Audio Frequency Transformers
1—Variometer
8—Binding Posts
1—Grid Leak, 2 megohms
1—Grid Condenser, .00025 mfd.
1—Fixed Condenser, .001 mfd.
1—Fixed Condenser, .0025 mfd.
1—Fixed Condenser, .006 mfd.
1—Potentiometer, 200 ohms
4—Dials ¼", Hole 3" Diameter
50 ft. Square Bus Bar Wire

Care of the Filament

Although the normal life of the average filament is considerably more than 1000 hours, it requires but an instant to destroy this delicate filament when excessive voltages are applied to its terminals.



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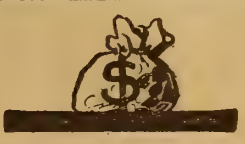

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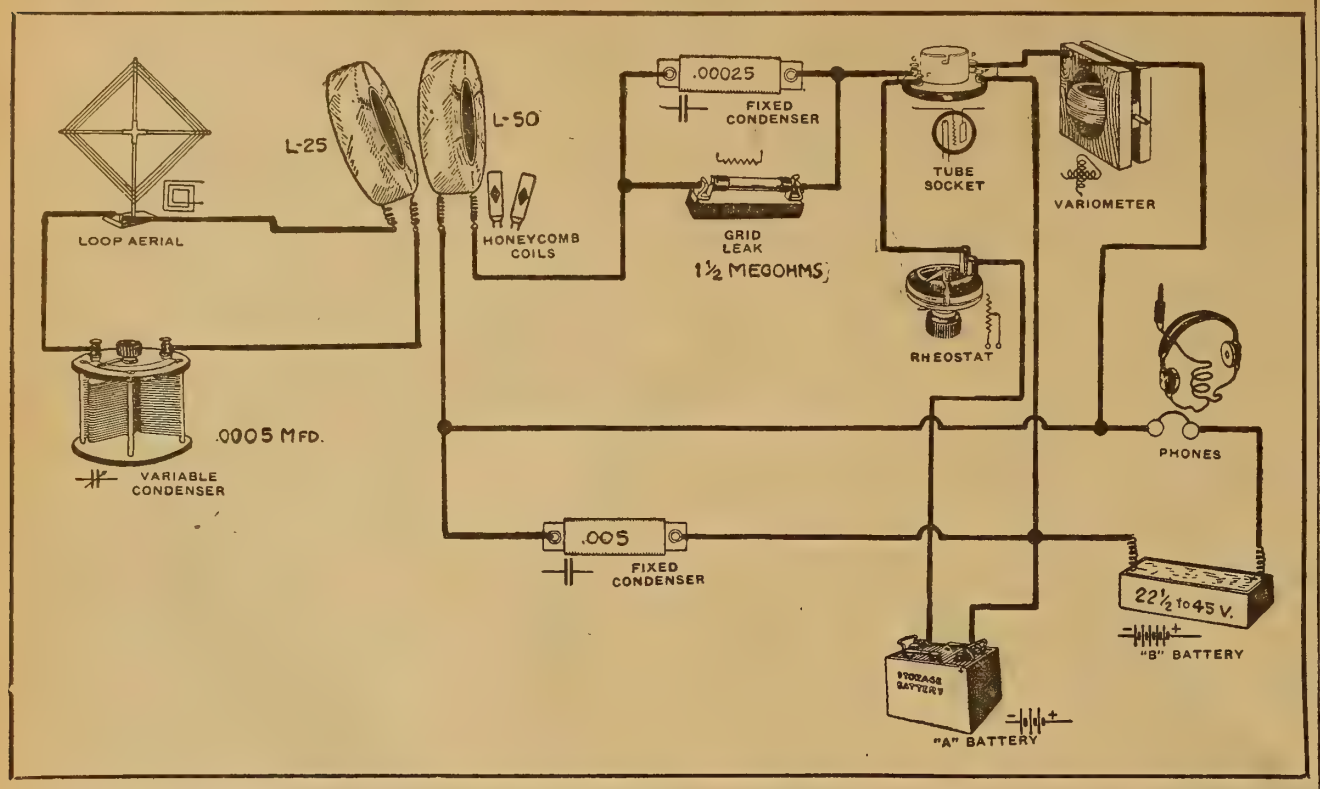
REAL TWO-COIL LOOP AERIAL CIRCUIT



HERE is a simplex circuit somewhat similar to the Flewelling. It is well adapted either to loop or the outdoor aerial. Tuning is taken care of by means of the honeycomb coils and the variable condenser. The variometer in the plate circuit controls regeneration. For variations in wave length other coil values may be substituted.

The circuit is simple to operate and cheap as to construction expense. It will give very efficient results.

The plate battery voltage is dependent on the type of tubes used, and is best ascertained by test under operation. Any of the dry cell tubes can be used if desired, substituting the proper rheostats and dry cells as necessary. An improvement on this circuit would consist of the addition of another .0005 mfd. variable condenser connected across the secondary honeycomb coil for closer tuning.

When an outdoor antenna is used the aerial is connected to the coil and the ground to the rotating plate terminal of the variable condenser.

CONDENSER MAKING

(Continued from page 12)

tween makes a very accurate grid condenser. It makes no difference if the mica is a little larger in area than the tinfoil. Copper foil can be substituted for the tinfoil. German silver may be used if it is ⅓ inch thick, but the dielectric must be .01 thick.

Second Example

Another example: What capacity would a condenser have using 7 sheets of mica 2¾ inches square and .01 inch thick and having 8 tinfoil plates 2½ inches square? Wherein 6 = K = dielectric constant, 2½ × 2½ = A = area of one plate, and N = number of tinfoil plates = 8.

$$\text{Capacity} = \frac{2248\ K\ A\ (N-1)}{T\ 10^{10}}$$

or substituting;

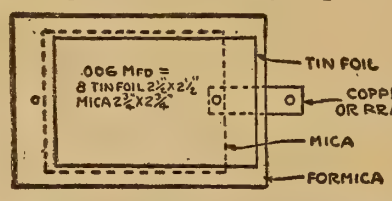
$$\text{Capacity} = \frac{2248 \times 6 \times 2.5 \times 2.5 \times (8-1)}{.01 \times 10{,}000{,}000{,}000}$$

=.0059 mfd. or approximately .006 mfd.

This means that such a condenser has an approximate capacity of .006 mfd. The formulae, the use of which has just been explained, may also be transposed to find the number of plates required for a given condenser. The formulae then reads:

$$N = \frac{C\ T\ 10^{10}}{2248\ K\ A} + 1$$

In the example previously considered, capacity = .006 mfd. Thickness of the mica = .01 inch. Dielectric constant = 6. Area of tinfoil plates = 2½ by 2½, or 6.25 square inches. Everything but the



number of plates is known. Then with N = the number of tinfoil plates we get by substituting:

$$N = \frac{.006 \times .01 \times 10{,}000{,}000{,}000}{2248 \times 6 \times 6.25} + 1 = 8 \text{ tinfoil plates.}$$

This means 7 separating mica plates, and with one on top and bottom the total number reaches 9. The exact value of a condenser can be only determined by measuring the value of the completed condenser, but this is out of the question with the ordinary fan.

The formula for figuring the .006 mfd. condenser is used when the condenser consists of more than two plates.

Third Example

Example Three: Using same size tinfoil, 2½ by 2½ inches, and mica .01 inch thick measuring 2¾ by 2¾ inch. Problem: To make a condenser of .004 mfd. capacity, how many plates are needed?

Substituting:

$$N = \frac{.004 \times .01 \times 10{,}000{,}000{,}000}{2248 \times 6 \times 6.25} + 1 = 6 \text{ tinfoil plates approximately.}$$

Reviews of Books

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

One reason for the problem of a condenser of .006 mfd. capacity is that this condenser has been in great demand in the Flewelling set. Using the foregoing formula you can work out any size condenser you desire to make.

The illustration shows a condenser actually constructed by the foregoing formula. The formica is ⅛ by 3 by 3¾ inches. Two small holes are drilled through both pieces of formica with the idea of fitting the mica sheets between the two bolts inserted therein. The dotted lines indicate the limits of the mica. Switch posts may be used for the bolts as the formica is not thick enough for countersinking the holes for the heads of the posts, it is recommended that a small wooden washer or fiber piece be countersunk through which the head of the posts will pass. This is to be placed on the outside of each end of the formica and serves to keep the metal free from surrounding objects.

No glue should be used on the mica. The tinfoil is arranged so that each end is somewhat longer than the active condenser area, thus affording a contact with the posts. A piece of old inner tube from an automobile tire is laid on the completed condenser affording a means of uniform compression.

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Multiple Point Inductance Switch with knob and dial (15 points)	1.45
Reinertz coil, increased wave length	1.55

Honeycomb coil, mounted 50 turns	$0.95
Honeycomb coil, mounted 75 turns	1.00
Freshman var. grid leak and cond.	.75
Freshman variable grid leak	.60
V. T. Socket	.40

CONDENSERS

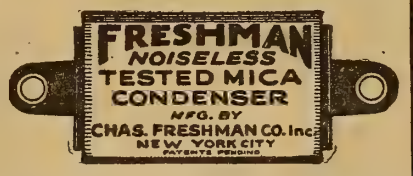
3 Plate Variable, value $1.75	$1.05
13 Plate Variable, value 2.50	1.20
23 Plate Variable, value 3.50	1.35
43 Plate Variable, value 4.50	1.95
13 Plate Vernier, value $5.50	3.75
23 Plate Vernier, value 6.00	4.00
43 Plate Vernier, value 6.50	4.25

Ball bearing inductance switch	.25
Single circuit jack, list 65c	.30
Double circuit jack, list 90c	.45
Lightning arrester, approved by underwriters	.90
3" dials, high finish, heat resisting	.30
2" dials, high finish, at	.25
Filament rheostat, 6 ohms	.65
Filament rheostat, 20 ohms	.80
Filament rheostat, 50 ohms	.90

Rheostats with 2" dial, 15c extra

Every article we sell is guaranteed by the manufacturer and us—Mail orders filled immediately—Postage prepaid on all orders of $5.00 or more, east of the Mississippi River only. All others include postage.

The Condenser Sensation of Modern Radio



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Capacity	Each	Capacity	Each
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.00015	.35	.0025	.50
.0002	.35	.003	.60
.00025	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	2.00
.0015	.40	.025	2.50

The **FRESHMAN** is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

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Questions and Answers

Reinartz Wave Length

(4175) OEW, Lonoke, Arkansas.

Will you please advise how to raise the wave length of a standard Reinartz hook-up fronm about 500 meters to 600? The set has the usual coil with two condensers, one 23 and one 13 plate. I tried a coil with 75 turns but it would not oscillate at all. I took this coil out and tried another with about 45 turns but it still does not oscillate.

A.—The circuit may be loaded to accomplish a new allocation of wave lengths by inserting a 25-turn honeycomb coil in the antenna and secondary circuits respectively. This will not affect the oscillation of the circuit and will tune to about 600 meters wave length.

Wave Length on Flewelling

(4158) AIA, Austin, Minn.

In the circuit detailed in your pamphlet on the Flewelling circuit I take it that the honeycomb coils of 50 and 75 turns are approximately correct for the reception of the wave lengths used in Radiophone broadcasting up to this time.

What other coils and combinations should I have available in order to receive on the new wave lengths allotted these same stations?

What coils should be used to receive the 200 meter waves of the amateur telegraph senders?

What coils should be used to receive the code sent by ships?

What coils to receive Arlington time?

What coils to receive transatlantic code?

A.—Honeycomb coils of 75 and 100 turns should be used for primary and tickler, respectively, on wave lengths up to 650 meters.

For reception of amateur transmission, coils of 25 and 50 turns are indicated. For transmission from ships the 75 and 100 turn coils will serve.

It is advised that a super-regenerative circuit loses its effectiveness entirely on any wave length more than 800 meters, so that Arlington time signals could not be received. By elimination of the super feature and the use of the circuit as a straight regenerative it may be possible to receive this station by employing coils of 600 and 200 turns.

It is doubtful if the transatlantic code could be accomplished with the circuit under discussion.

Super Heterodyne

(4217) GW, Berwyn, Ill.

Can I use the UV-199 tube, with the super heterodyne receiver for the Radio frequency, and UV-201-A for the audio frequency, with good results? Please give me the most effective combination of tubes for this set. I now have one storage A battery, and would not care to purchase another one. Therefore, I wish to use the same storage battery to light all tubes. Could I use dry cells to light the UV-199 tubes, and use the large battery to light the others, in the same set?

Please send me the super-heterodyne circuit using three Radio and two audio frequency, transformer coupled amplifiers, one describing all the necessary parts. Also I would like your opinion as to the best make of variocoupler, Radio and audio frequency transformers, etc., that would be most effective in this circuit.

A.—The UV-199 and UV-201A tubes can be used, as suggested, but we are recommending a better combination in that of UV-201 for Radio frequency amplifier and detector and UV-201A for oscillator and audio frequency amplifiers. The same battery can be used on all tubes.

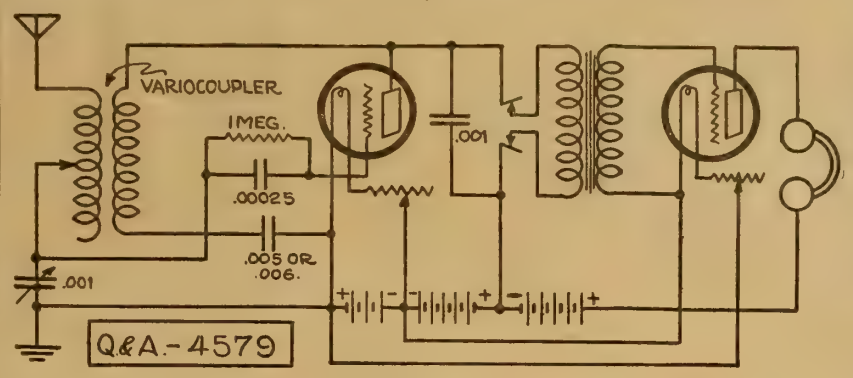
We are unable to comply with your request for a diagram of this circuit other than as it appears in February 24th issue of Radio Digest, which can be secured for ten cents, should you fail to have it at hand.

We are advising further that any standard impedance coupling of the Radio frequency will prove more effective than transformer coupling. For audio frequency any standard transformer of rugged construction will serve.

RD-86

(4579) EGB, Mount Vernon, O.

I have made a RD-86 as given in Radio Digest of June 23, 1923. I would like to put on a 1-step audio frequency amplifier.



Will you give me a hookup for this amplification?

A.—Complying with your request, we are presenting a diagram of RD-86 with one stage of audio frequency.

Transformer Core

(3678) AJG, Wichita, Kans.

Seeing your diagram of a rectifier for charging storage batteries in your issue of April 21, I would like to know the exact dimensions of the iron core, and other details. This is taken from Q&A 2956.

A.—Answering your inquiry with reference to a rectifier for a battery charger as described in the April 21 issue of the Radio Digest, we suggest that the core be made of silicon steel .018 thick, which may be obtained in any sheet metal shop. About ten pounds will be needed. To make the core, cut 170 pieces 5¾ by 1¼ inches and 170 pieces 2¾ by 1¼ inches. This will make a core 1¼ inches square, inside dimensions 4½ by 1½ inches. The A battery in the diagram shows the polarity reversed. The negative side should be connected with the plate of tube.

High Antenna Capacity

(4229) PEH, Dunsmore, Fla.

Why is it my Flewelling circuit will not work when the aerial is connected? Is it due to the location of the 23-plate condenser? I find that when the aerial wire is brought close to the antenna terminal so as to give a coupling effect, or if a fixed condenser is in series I can get some results but to have the wire attached kills the set.

This set is noisy and after I pick up the carrier wave and begin to get the voice loud enough to hear the tearing noise also gets so loud it drowns the voice. Would changing the number of turns on the 75 turn tickler coil help or will the change I am making, that is, putting on a Pudlin leak and condenser and a mica .006 instead of a paper condenser help?

In my other set with the tapped coupler I get results on the regenerative side but get nothing on the super. I had to bank wind the rotor to get 100 turns, is this correct? I can think of nothing to change except the paper .006 condenser for a mica as above.

In the first set (see diagram) how should a ground be connected if I want to insert a two point switch in the tickler circuit to make a straight regenerative circuit?

A.—Referring to the Flewelling circuit, we are of the opinion that the difficulty encountered is due to too high an antenna capacity, which may be overcome by the employment of an eleven-plate antenna series condenser.

It will probably not be necessary after attention is given to the above detail to change the size of the honeycomb coil, however, the use of a good variable grid leak and a .006 mica condenser will be of great help.

Bankwinding on the rotor to accomplish the required number of turns will be all right.

Storage Battery Charging

(4195) EC, Ozawkie, Kas.

I have a 32 volt farm lighting plant. Please tell me whether if I connect my storage battery with it, will it charge too fast? The dynamo is rated at 40 volts and 15 ampere hours. My storage battery is a 90 ampere hour battery and charges at the rate of 8 amperes. If the charge is too fast please tell me how I can charge it with my plant.

A.—A storage battery can be charged from a thirty-two volt lighting plant merely by connecting the positive side of the 32 volts to the positive side of the storage battery and the negative side of the storage battery to a resistance, such as an electric iron, a heater or bank of lights, the other side of the resistance to the negative side of the 32 volts system. The resistance prevents the storage battery from charging too rapidly. Resistance may be varied so that the desired charging rate may be used.

Directional Effects

Changing the direction of the antenna may increase the signal strength. If it is built like a T, the ends should point toward the station that the operator desires most to hear. If it is like an inverted L, the elbow where the flat top and the lead-in wire join should point toward the sending station for the loudest results.

POSITIVE RESULTS

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for the

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The remarkable features which are making this circuit (4 circuit tuner) more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

COMPLETE ASSEMBLED SET OF B, C AND D COILS—PRICE.. **$2.75**

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is a special three-electrode condenser for balancing the grid charge on the amplifying tubes. Stops all local oscillations without detuning the amplifier. Shielded against hand capacity disturbance.

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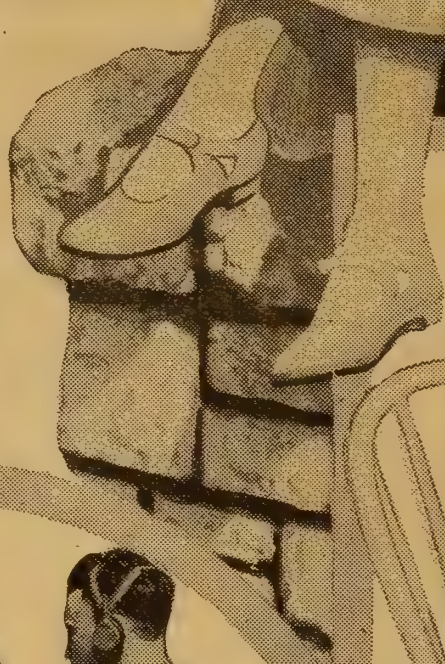

Gladys Smith, pretty St. Louis miss, takes her portable set to Forest Park, in the "show me" city, and finds that she can hear Station KSD with neither aerial nor ground

Rita Kaplan, age fourteen months, certainly does like her afternoon Radio concert! But one of the phone terminals came loose and the concert stopped. You'd cry, too, in a similar predicament. She kept up the wail, too, until the kind-hearted photographer connected the phones again © Fotograms

After a day's tramping through the woods, a cooling plunge in the stream and the lesson in woodcraft, these Boy Scouts at Camp Spence, Bear Mountain, N. Y., listen in to Radio concerts and receive instructions in making sets from Harry Schwartz (right) © U. & U.

This is one time when "Gypsy" Smith hears the "call" in a hospital. The well-known evangelist is Radio convalescing in an Edinburgh, Scotland, nursing home, where he underwent an operation © P. & A.

©CB584740

New Reflex; Neutrodyne Set Plans; Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, SEPTEMBER 1, 1923 | No. 8

RELEASE NEW SONG HITS

INVENTOR SEES END TO NOISY SENDING

NEW DEVICE STOPS TROUBLESOME JAMMING

Use of Low Frequency Tubes Precludes Message Interference, Frenchman Declares

LONDON.—An instrument which, it is said, marks an important advance in Radio telegraphy, is described by its inventor, a Frenchman named Yves Marrec, as eliminating jamming and interference and reducing the cost of messages by at least one-third.

The new device receives and prints Radio messages on a tape.

M. Marrec employs a supplementary apparatus consisting of a series of low-frequency vacuum tubes, which eliminates all obtruding sounds one by one, with the result that the message for which the machine is tuned in comes out as clearly as if there were only one station operating in the world. Besides suppressing "parasitic" noises, the apparatus completely eliminates every interfering message sent out from other transmitting stations.

Makes Low Power Plants Practicable

In an official test for the British government recently, the French inventor submitted his machine to the most severe conditions. He received messages from the powerful station near Port Jefferson, Long Island, free of all interference or jamming. He chose for the test an ordinary office in one of the noisiest parts of London, with electric trains and motor traffic running all around and under it. Moreover he had no outside aerial. The "purified" messages were received so loudly that they were heard several yards from the earpieces.

In messages from the United States M. Marrec declares, each letter has now to be repeated three times and each word twice, after which they still require to be deciphered by a keen expert. Under the new system, according to the inventor, a message need be sent only once, and it is recorded in ink on paper.

The ostrich feather bedecked young lady above is Miss Hope Vernon, song artist and vaudeville star, featured often over KGB, Tacoma, Wash. Then at the left is Chief One Star, Cherokee Indian, who told WDAR, Philadelphia, listeners in about American Indian customs and the Buffalo when it roamed the Western Plains. Pearl Hossack Whitcomb (right), mezzo contralto, is well known to KPO, San Francisco, fans. She conducted the first complete opera to be broadcast from there

ASSOCIATION SECURES ITS OWN MUSIC

National Organization Determines to Continue Broadcasting Independently

Listeners Need Not Worry

U. S. Ruling Against Station WOR Doesn't Block Work of Combined Plants

(Special to RADIO DIGEST)

NEW YORK.—Many new popular song hits will be on the air soon. Jazz music will still be part of the broadcasting programs, despite the adverse decision in the music copyright fight handed down recently by Judge Lynch, of the United States District Court, in Newark, was the gist of a statement here by Paul Klugh, executive chairman of the National Association of Broadcasters. "The American public can be assured of not only popular music but better song hits than they have been receiving over the Radio. The music bureau of our association is releasing for broadcast each week many tuneful melodies that soon will be on everybody's lips throughout the country.

Not Worried by Court Opinion

"Not only is the National Association of Broadcasters not worried by the opin-

(Continued on page 2)

JACK, CRYSTAL AND LEAK SOUGHT MOST

ORDERS FOR PARTS SHOW THREE LEAD OTHERS

Demand in Answer to Radio Digest's Offer Causes Enlargement of Distributing Force

SPECIAL REWARD OFFER

Coupon Number 14

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

More requests have been received, in relation to the parts offer of the Radio Digest, for jacks, crystals and grid leaks, than for any other parts. The demand for these devices grows larger with the receipt of every mail.

So steady and insistent has been the call for parts from all sections of the country and from foreign lands that the distributing force of the Radio Digest has been enlarged. This will enable the continued prompt shipment of all parts. Just remember that when you follow the instructions printed below you will receive the parts you want without delay.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, 002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly; 3" Radion Dial, black; 2¼" Radion Dial, black; 3"x1" Radion knob with shafts, 3/16" or ¼", black; 3" Radion Dial, ribbed surface.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm; 3¼" Radion Dial, black; 4" Radion Dial, black; 4" Radion Dial, black, ribbed surface.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat; Radion Panel 3/16"x7"x9", black or mahoganite; Radion Panel 3/16"x7"x12", black.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Basco Mahogany Cabinet; Radion Panel 3/16"x7"x12", mahoganite; Radion Panel 3/16"x7"x18", black; Radion Panel 3/16"x9"x14", black; Radion Panel 3/16"x10"x12", black.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial; Radion Panel 3/16"x7"x18" mahoganite; Radion Panel 3/16"x7"x21", black.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80), any one of the following articles will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser; Radion Panel 3/16"x7"x21", mahoganite; Radion Panel 3/16"x7"x24", black; Radion Panel ¼"x10"x12", black; Radion Panel 3/16"x9"x14", mahoganite; Radion Panel 3/16"x10"x12", mahoganite.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate; Radion Panel 3/16"x7"x24", mahoganite; Radion Panel ¼"x10"x12", mahoganite; Radion Panel 3/16"x12"x21", black; Radion Panel 3/16"x14"x18", black.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer; Radion Panel 3/16"x12"x21", mahoganite; Radion Panel 3/16"x14"x18", mahoganite.

SEND NEW SONG HITS

(Continued from page 1)

ion of Judge Lynch that the broadcasting of popular songs is a violation of copyright laws, but the association is not even interested," Mr. Klugh asserted. The decision was the outcome of the suit, sponsored by the American Society of Composers, Authors and Publishers, of the M. Witmark Publishing Company of this city against Station WOR, the L. Bamberger department store of Newark.

"Since July 1 of this year," Mr. Klugh continued, "members of the National Association of Broadcasters have received music as good in quality and variety, in the opinion of many, as that controlled by the American Society of Composers, Authors and Publishers. The work of the broadcasters' association thus has relieved its members and the listening in public from the exactions of organized composers and publishers."

To Encourage Song Writing

Among the objectives of the National Association of Broadcasters, which was organized last April in Chicago "to secure freedom from unjust and unlawful exactions" and "to encourage and aid the development of musical and literary genius," was the establishment and operation of a bureau of musical release.

"The bureau," Mr. Klugh continued, "has invited the writers and publishers of songs to send them to the offices of the National Association of Broadcasters (1265 Broadway, New York City).

"The invitation was extended by means of display advertisements, articles in the various periodicals read by composers and publishers, announcements by Radio, and thousands of letters. As a result, thousands of musical compositions of varying worth were received. These were subjected to thorough test. Less than ten percent were declared acceptable. When the songs indicated that they would become popular they were released by the bureau and broadcast to millions of persons.

Independent of A. S. C.

"In this way the National Association of Broadcasters became independent of the Society of Composers, Authors and Publishers and the public was given that to which it was entitled without hindrance, without license, tax or other imposition."

Raymond Walker, widely known composer and publisher of popular songs, is in charge of the bureau of release.

In the opinion of those who have reviewed the opinion of Judge Lynch, he had in mind the Shanley-Victor case in which Justice Holmes of the United States supreme court decided that although Shanley, noted restaurateur of New York city, charged no admission to the vaudeville which featured his estab-

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Looking Ahead

Wiring the Set in the Five Tube Neutrodyne—H. J. Marx in the next issue gives correct wiring details on the Neutrodyne. Rear views of this popular and workable set will be shown to emphasize details of correct wiring and mounting of apparatus.

An Inexpensive Single Tube Set for Loop Aerial Work—Get the September 8th number and look over Diagram R. D.-96.

Something New in a Triple Honeycomb Coil Circuit—Sent in by a Digest reader. It will surprise you. Hit the newsstands first to be sure to get your copy next week.

Description of Filament Lighting Batteries—Both wet and dry batteries will be discussed by Thomas W. Benson in his fifteenth chapter of "First Steps for Beginners in Radio." Batteries are important to good reception. Better let an expert tell you how next week.

Coming Soon—A Sensation, "The Miloplex"—Something brand new in single tube circuits has been perfected by an old Radiophan. It's a bearcat for volume and selectivity. Get the Digest each week from now on so you will not miss this new bet.

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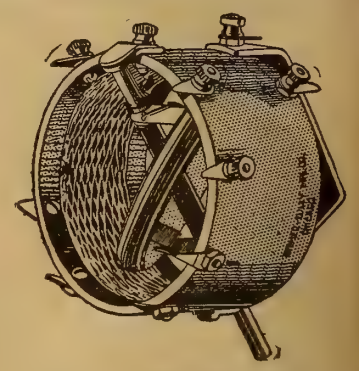

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532 South Canal Street CHICAGO

NEW WAY TO WORK PROBLEMS OF WAR

AIRPHONES SEEN AS AIDS IN THEORETICAL COMBAT

Navy Chief Plans to Co-ordinate All Arms by Relaying Tactical Reports

WASHINGTON. — Franklin Roosevelt, assistant secretary of the navy, has a unique idea for the use of Radio in army and navy war games. He proposes the joint study and solution of a problem involving combat operations, such as an overseas expedition, by the war colleges of the army and navy simultaneously, every move being Radioed to umpires meeting in the war or navy departments near their Radio central offices.

War games are old but Colonel Roosevelt's idea is to bring the land and sea postgraduate war schools into a closer relationship during peace when they have time to solve problems involving both arms. Military and naval forces would be operated theoretically on paper, just as they would co-operate in time of war.

Would Co-ordinate Activities

Since the naval war college is at Newport, R. I., and the war college of the army in the capital it would be expensive and difficult to bring all the students into one large hall. Therefore, Roosevelt suggests that the students remain in their respective class rooms where all facilities are available and, as fast as orders, plans and movements of troops or ships are made, to Radio the action to the board of judges sitting in Washington.

The army and naval officers serving as umpires would have two charts in their meeting place and plot every move made by the students at each school.

Would Aid Both Arms of Defense

Upon the completion of the game, which might require a week or ten days, the umpires would decide which of the schools had solved the problem correctly or to the best advantage and announce the result by Radio to the students.

It would not be a contest between the army on one side and the navy on the other, but would involve the handling of sea and land forces. The naval class would be divided, one handling the red forces, the other the blue, while the army school would also fight the same problem, dividing against itself. Such studies, naval officials believe, would tend to familiarize the naval officers with the military end of war problems and army students with the marine phase of such conflicts, effecting closer cooperation and understanding of the combined national defense.

AIR BETRAYS TWO ESCAPED FELONS

Same Set Which Sends Missouri Convicts' Memorial Music Trails Them

ST. LOUIS.—Amateur Radio operators of Missouri joined recently in a hunt for two convicts.

Charles Stevens and Alva Bachelor, serving 25 and 20-year sentences, respectively, in the state prison at Jefferson City, had escaped.

The pair were members of the prison band, which was playing in a memorial to President Harding in the state capitol.

Their escape was broadcast by Radio through the middle west. During the concert the two "trusties" slipped away, obtaining civilian clothing from two women, and fled.

Over the same Radio which had broadcast the prison band music a report of the escape and a description of the convicts were sent out.

Two amateurs in St. Louis caught the message and relayed it to the police two hours before the authorities received official notice of the escape from Jefferson City.

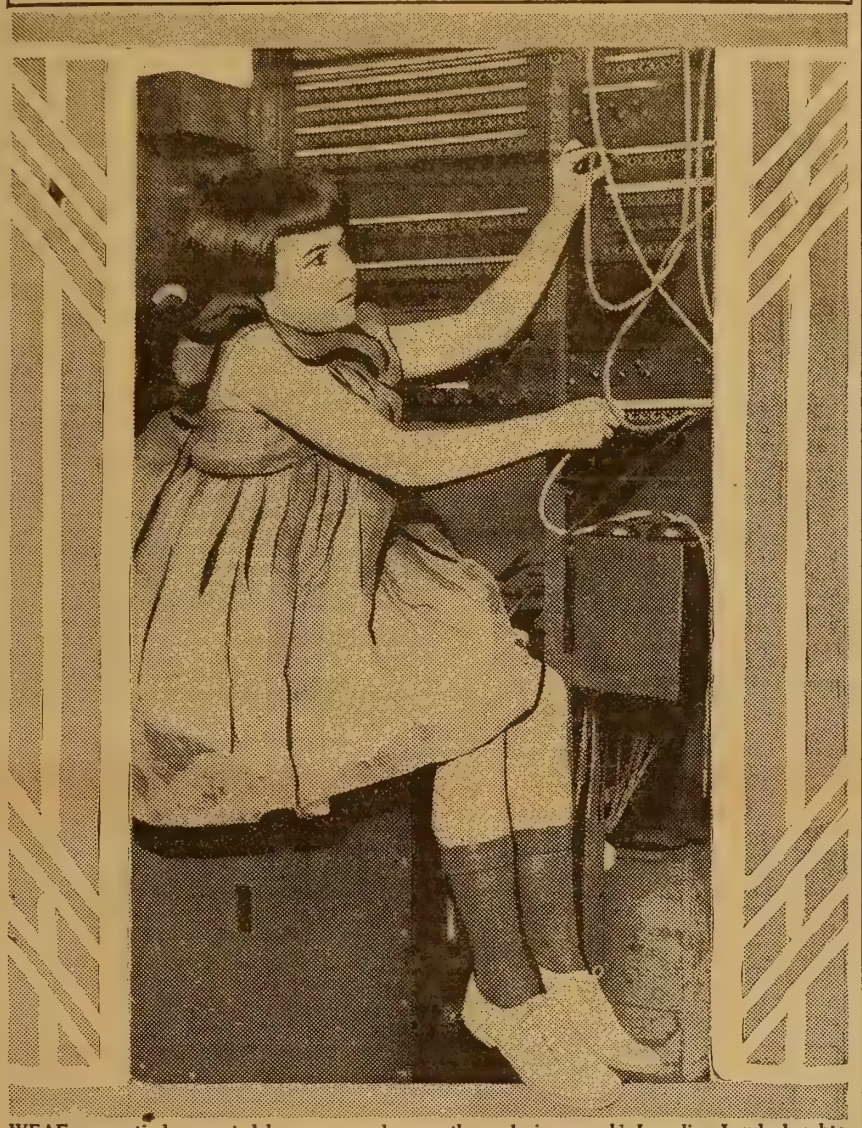
FIRST LAKE AIRPHONE BEACON AT DETROIT

DETROIT.—A Radio telephone, first to be installed in lake lighthouses, has been added to the equipment of the Marquette lighthouse, near here. The light stations on Manitou and Passage Islands will be similarly equipped, it is reported by the commissioner of lighthouses. A number of the keepers have had receiving sets, but this is the first time a Radiophone transmitter has been installed.

ANTENNA 326 FEET UP MARKS PAPER PLANT

OAKLAND.—The new $1,000,000 Oakland, Calif., Tribune tower, twenty stories in height, surmounted by a searchlight visible for 100 miles, will be complete about October 1. On the twentieth floor will be the Tribune's 500-watt Radio broadcasting station. The antenna for this station will be strung from the top of the building, 326 feet high; it will be the second highest in the United States.

BEGINNING YOUNG AT WEAF



WEAF was entirely operated by women only recently, and six-year-old Jaqueline Land, daughter of the big plant's hostess, did her bit. She is shown at the "long distance panel," connecting WEAF direct with other cities and stations, such as WNAC, Boston, and WCAP, Washington. It is through this switchboard that connections are made for simultaneous station broadcasting ©K. & H.

Ship Near Ceylon Hears Amateur in Galveston

Message Sent Half-way Around Earth Breaks 5IM's Record

GALVESTON, TEX.—A ship operator about 100 miles southeast of Ceylon in the Indian ocean recently heard an amateur Radio station of this city approximately half-way around the world.

This is a new long distance amateur record, since the Texas station 5IM, operated by Edward W. Rouse, covered 11,000 air miles. Other stations as to which reception was reported, but not confirmed, are 6KA, operated by Thomas E. Nikirk, Los Angeles Cal.; 6ZZ, H. L. Gooding, Douglas, Ariz.; 8ANB, C. P. Goetz, Cincinnati, Ohio, and 4EB, E. W. Cochran, Palmetto, Ga.

House of God Now Utilizes Air to Broadcast His Word

CARTHAGE, ILL.—The Presbyterian church here is now Federal Licensed Station WTAD for Radiophone broadcasting. The plan is to broadcast at least one service each Sunday. For this purpose the people of the church are co-operating in establishing the station and installing and operating the equipment.

Chicago leads all other cities with a total of 3,729 amateur stations.

AIR PICTURE SHOWS HARDING'S FUNERAL

STATION WJAZ PRESENTS OBSEQUIES BY RADIO

Each Phase of Sad Procession in Nation's Capital Broadcast from Chicago to Thousands

CHICAGO.—So that the mental vision could comprehend that which the ear alone ordinarily could understand, so that millions of the people could by eulogy and melody mourn in unison, Station WJAZ of this city, by means of what was termed tonal illustration, recently re-enacted at night the sad solemn events of the funeral procession in Washington of Warren Gamaliel Harding, 29th president of the United States.

The important sound phases of the cortege as it proceeded in Pennsylvania avenue to the capitol were revealed to listeners by means of an invocation, a quartet, an orchestra and chimes. All the various episodes of the sorrowful event were imaged and broadcast. The program was in fact an aerial picture.

Tolling Bells Are Heard

As the procession made it way from the White House to the capitol, as it passed the grief-stricken thousands, and as it finally halted to enable loving hands to place the coffin on its catafalque in the rotunda, N. A. Fegen of Station WJAZ verbally described each momentous act.

When the procession started toward the building, draped in black, which housed the bier, the bells of St. John's Episcopal chuch in Washington began to toll and from Station WJAZ there came, in like manner, the awesome peals.

As the cortege passed the District of Columbia building, city hall of Washington, 3,000 wide-eyed school children, saddened by the nation's loss, sang "Nearer, My God, to Thee," one of the favorite hymns of the executive, and strewed flowers in the path. And from Station WJAZ was broadcast the strains of the sacred song.

Repeat Songs Over WJAZ

Slowly the procession moved onward. As it came abreast of the Marine Band the hushed throngs heard, to the beat of muffled drums, the dolorous yet dulcet tones of "Onward, Christian Soldier." And from Station WJAZ the same inspiring song was sent.

Step by step, the measured tread of the cortege was sounded in harmony with the Funeral March (Chopin) and as the coffin was carried up the broad steps of the capitol there came to thousands far away the song, "Lead, Kindly Light," in repetition of that played by the Army band. As the group of notables under the great dome in the capitol reverently bared their heads the male quartet of Calvary Baptist church (Washington) voiced "Lead, Kindly Light." And from Station WJAZ came like chords.

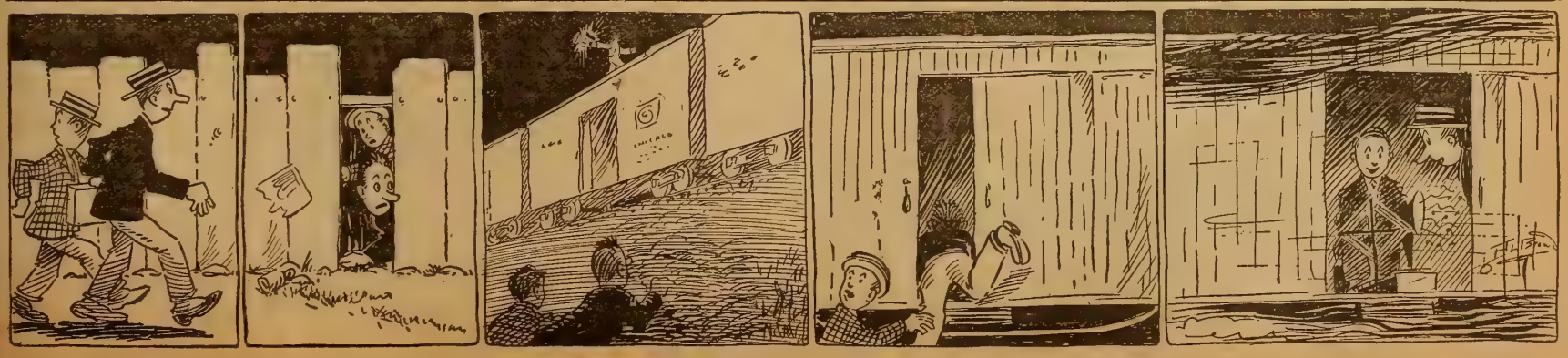
As the words of an encomium and of prayer uttered by the Reverend Freeman Anderson of Washington stirred those around the catafalque, Mr. Fegen, in Station WJAZ, delivered an invocation.

Data Show 1,126 More Stations Than in 1922

Department of Commerce Statistics Reveal Total of 21,967

WASHINGTON.—The end of the fiscal year shows a gain of 1,126 Radio stations of all kinds in the United States, according to the department of commerce figures just compiled. On June 30, there were 21,967 ship and land Radio stations; a year ago there was a total of 20,841. The increase represents added interest among amateurs and broadcasters who have received station licenses during the last twelve months. Amateur stations increased from 15,504 to 16,570 on June 30, showing a gain of 1,066. Broadcasting stations number 191 more today than a year ago, having increased from 382 to 573.

THE ANTENNA BROTHERS Spir L. and Lew P. Aboard the Radio Rattler



POLICE BROADCAST FINDS STOLEN CARS

REPORT OF STATION KOP AIDS MICHIGAN TROOPERS

Highway Officer, Warned by Detroit, Nabs Fugitive as He Passes Receiving Set

By F. L. Huntley

DETROIT.—The Detroit police department, KOP, has proved the value of Radio broadcasting. One of its most interesting reports comes from South Rockwood, Mich., where a local post of the Michigan state police is stationed.

While the state troopers there were recently installing a new receiving set and completing the wiring a policeman started to tune the set. The first station he brought in was KOP, at a time when a report of stolen cars was being broadcast.

The trooper noted the numbers of the cars as they came over the Radio. A few moments later, as he stepped onto the road, he was surprised by a car bearing the license number of one that had been reported, during the police broadcasting, as stolen.

Driver of Stolen Car Arrested

The driver was immediately arrested and with the car given into the custody of the Detroit police.

Another instance of the efficiency of the police Radio was that which involved two boys who had escaped by means of an automobile from the industrial school in Lansing. A resident of Washington, Mich., about ninety miles east of the state's capital, had received from KOP reports as to stolen cars. As he left his home recently he saw in a nearby ditch a wrecked automobile bearing one of the license numbers he had noted. The car was that in which the boys had fled.

Inspector H. G. Parker, in charge of the automobile recovery squad, Detroit police, declared recently that the work of KOP is of inestimable value and predicted that as the use of Radio becomes general many more cars and other kinds of stolen property will be recovered. Great advantages are claimed for the system of locating cars, and Inspector Parker soon hopes to see all cities' police departments similarly equipped with Radio.

WBAP Preacher Now Member of WDAF Nighthawk Club

FORT WORTH, TEX.—The Rev. John W. Bergin, First Methodist church, whose Sunday sermons are broadcast regularly by WBAP Star-Telegram station here, has been dubbed an "enemy of sleep" and given life membership in the Nighthawk Club of the Kansas City Star, station, WDAF.

"Every preacher ought to be able to wake 'em up, but folks don't always give you a medal for it," was the distinguished minister's comment on receiving the badge of membership. The Rev. Mr. Bergin has received notices from hearers in all parts of the United States, Mexico, Canada, South America and from aboard ships. Indications that collection boxes have been passed, also come in.

YOU DON'T NEED Tubes to get out of town. Even in the summer I hear Omaha, Kansas City, Fort Worth and Davenport on my crystal set without amplification. Works over 1,000 miles in winter. Send self-addressed envelope for further information or $1.00 for complete copyrighted drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED.
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FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Finding the Whistle

(Submitted by E. L. F., Phoenix, Ariz.)

Question. I have built a Flewelling super set and have followed your various articles and instructions very carefully. I am sure that my set is wired correctly and according to the specifications published, yet I cannot get the whistle or rushing sound that is referred to. Will you tell me why?

Answer. If everything in your set is correct even to having the tickler coil working in the right direction then with one exception you should have no trouble in securing the proper action. The one exception is a point that I should like to call to the attention of all Flewelling fans as it has a very great influence on the action of the hook-up. The grid condenser that has the leak connected around it has always been specified as of .00025 mfd. capacity. While this has been, in most cases, the correct value, we have recently found that superior results are often (now don't mistake me) secured by the use of a large sized condenser at this point. At present the writer is using a super set in which the grid condenser is one of the usual fixed types using a mica dielectric and having a capacity of .001 mfd., certainly a large size for a grid condenser. This set gives good results on all sizes of grid condensers from .001 mfd. up to .012 mfd. but does not seem to function at its best on the lower values. My advice to the fans in general is to try various sizes for the grid condenser and larger sizes perhaps in the place of the .006 mfd. condenser in the filament side of the inductance. Neither of them is critical in value but both seem to work better on the larger sizes than on the smaller.

ISOBARS DETERMINE AIR WAVE THEORY

Experimenter in Minneapolis Declares Barometric Pressure Affects Transmission

MINNEAPOLIS. — Radiophans may have to add a barometer to their equipment so as to study maps issued by the weather bureau to determine their range of transmission or reception if the theory that Radio waves tend to follow isobars, or lines of equal pressure area, advanced by Donald C. Wallace, assistant division manager of the American Radio Relay League, is correct. From experiments made recently at his amateur station in this city, Mr. Wallace is convinced that Radio reception may be foretold with a fair degree of reliability.

The subject is comparatively new. The most that can be said for it is that it makes a start at explaining why reception is poor at certain times and why stations at various points of the compass are heard with changing strength regardless of their actual distance.

Beloit on Air in Fall

BELOIT, WIS.—Failure of concerns that manufacture Radio equipment to make deliveries to Beloit college for the new broadcasting station to be erected here in conjunction with Fairbanks Morse & Company, has caused the formal opening of the new station to be postponed until fall. The equipment will be received and assembled soon for the opening of school in September. The call letters are unassigned.

Broadcasting Station For Sale

Station is a 1,000-watt transmitter, composite type, built by our own engineers. The station, located in Chicago, is now broadcasting daily programs.

Box 200, RADIO DIGEST
123 W. Madison Street, Chicago

OLDEST SOLOIST, 85, ON WHAZ'S PROGRAM

Widely Known Baritone Grants Encore to Eager Listeners

TROY, N. Y.—Probably the oldest singer ever heard by Radio, Calvin Dater of this city, eighty-five year old baritone, sang three numbers from the studio of Station WHAZ at the Rensselaer Polytechnic Institute here recently. Mr. Dater, who was for many years a well-known soloist and chorister, expressed a desire to be heard over the broadcasting medium. He recalled the days before most of the modern means of communication, telephone, telegraph, railroads, electric apparatus, automobiles, airplanes, and the like were in existence. Mr. Dater's voice was strong and remarkably firm and steady; after he sang "Madeline" and "Silver Threads Among the Gold," so many telephone and telegraph requests came to the studio for an encore that he sang the more dramatic solo, "The White Squaw."

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NEXT RADIO SHOW AT CHICAGO NOV. 20

SECOND ANNUAL EXPOSITION FOR FANS, TOO

Exhibition Although Primarily for Manufacturers Will Hold Contests for Amateur Makers

CHICAGO.—The second annual Chicago Radio show will be held in the Coliseum beginning Tuesday, November 20 and closing at 11 o'clock the following Sunday evening, according to U. J. Herrmann, managing director. James F. Kerr will again be manager.

Plans for the second show are elaborate. The principal change in policy from last year's show will be the throwing open of the exhibit space to distributors, jobbers and retailers, although the show will continue to be primarily for manufacturers.

To Hold Contests

The basic program for the show as already outlined will include talks by well-known Radio engineers. Leading hook-ups will be explained by their inventors; master models will be shown. This plan is expected to bring many amateurs.

Contests for unusual sets, smallest sets etc., are being arranged. These contests will be divided into classes which will carry prizes for high school students, amateurs in general and perhaps manufacturers.

Demonstration stages will be erected at both the north and south ends of the great building and the broadcasting studio will be on an elevated platform in the center.

French speaking residents of Canada are learning English by listening to United States broadcasting stations.

WD-11 and WD-12 TUBES REPAIRED

WD-11 or WD-12	$3.50
C-300 or UV-200	2.75
C-301 or UV201	3.00
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C-301A or UV201A	3.50
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Moorehead Amplifiers	3.00
DV-6 or DV-6A	3.00
Also the new UV-199	3.50
NEW DX 1½ VOLT TUBES	4.00

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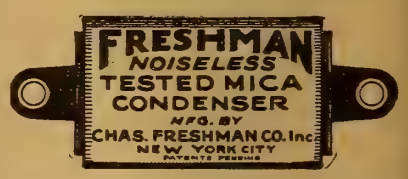


Through the accuracy and dependability of Freshman Condensers, hook-ups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

These little Storers of energy and rectifiers of Radio Current are the very heart of a well-built radio set.

The proper fixed condenser will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	$0.35	.002	$0.40
.00015	.35	.0025	.50
.00025	.35	.003	.60
.0002	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	2.00
.0015	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

At your dealers, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue NEW YORK

AIR SOUNDS WAR, YOUTH, AGE, LOVE

Cornelius Cole, Los Angeles, age 101, confrere of Lincoln, formerly U. S. senator and abolitionist, told, on Gettysburg Day, his experiences as Richard Headrick, six, film star, sat on his knee before an enthralled audience of KHJ

WOR will not sound again the gentle voice of the woman who made the station famous, for she has taken a life contract and has resigned her position as announcer and director. Who was the lucky man second party in the contract with the former Miss Jessie Koewing? Above right at the left of her—B. Carlton Brown, formerly of Gloucester, Mass., now of New York City

Dancers Now Hear Music of Spheres

WSB, Atlanta, Broadcasts Instructions Through Teachers in 1,000 Cities All Over the World

ATLANTA, GA.—The newest dance-steps of 1923, including the latest furore, "The Prince of Wales" fox trot, are now being demonstrated in a practical understandable fashion in a series of Radio lessons prepared for WSB's circle by Arthur Murray, founder of the famous Atlanta social organization, the Club de Vingt, now head of the National Institute of Social Dancing, New York city.

Mr. Murray is teaching dancing via broadcast from the Atlanta Journal plant, WSB, in a simplified series of six lessons that the veriest beginner will have no difficulty in following. The great dancing master employs methods similar to those he has in force in conducting the biggest correspondence institution of its kind in the world.

Illustrate Lessons

WSB's dancing lessons, arranged by Mr. Murray, are illustrated by special sketches published in the Radio columns and accompanied by published directions.

Through the use of loud speakers or by attention to the instruction received through headphones, would-be dancers may learn the newest steps simultaneously with their release through dancing teachers in more than a thousand cities of America, England, Scotland, Ireland, China, Alaska, Australia and other foreign lands.

WIFE HUSTLES WJZ BASEBALL SCORES

Helpmeet Threatens While Spouse Loiters Over Set; Station Saves Both

NEW YORK.—Station WJZ averted a serious domestic crisis a few days ago. The time was 6:20. The bedtime story had been on the air for fifteen minutes, when the telephone at the studio rang wildly. A feminine voice choked with rage demanded:

"Will you please hurry up that story and broadcast the baseball finals? My husband refuses to eat his dinner until he hears how the Yankees made out, and if he doesn't sit down in five minutes both he and the Radio set are going on a long, long journey."

Action was imperative and the story-teller hastened through the last few paragraphs with such speed that the result of the Yankee game was on the air in three minutes. Two days later a letter was received, which read as follows:

"Thank you for your prompt response to my S. O. S. on the baseball scores the other evening. My wife has decided that if you can be so obliging she can time her dinners to fit your schedule, and both myself and the Radio set are once more firmly ensconced in the family circle."

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	9:00- 1:00	.....	9:00- 1:00	.....	9:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-10:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 8:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	.....	8:30- 9:30	8:30- 9:30	8:30-12.00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	.....	.....	.....	.....
WJAZ, Chicago, Ill.	448	.....	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	5:00- 8:00
WJY, New York, N. Y.	405	.....	.....	.....	5:30- 9:30	5:30- 9:30	.....	1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:25-10:55	.....	.....	.....	9:25-10:55	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5.15- 6:30	6:00- 9:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00 12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

A. E. F. Radio Operators Plan Meeting Labor Day

NEW YORK.—Former members of the Radio and Radio intelligence service attached to general headquarters, A. E. F., during the world war, are to convene at Camp Alfred Vail, Little Silver, N. J., on September 1, 2 and 3.

Mexico Adopts Continuous Wave for World Contact

MEXICO CITY.—The Mexican government intends to change the apparatus used in its Radio stations from spark to continuous wave. With the present spark sets the Mexican stations can communicate only with two European stations, one at Nauen, Germany, and the other, Lafayette, at Bordeaux, France. Equipment for four modern transmitting stations of the continuous wave type has been ordered from Germany at a cost of $200,000. This will be installed at Mexico City, Merida, Veru Cruz and Tampico. The old spark stations will be transferred to the Islas Marias, Lapaz, Lower California, Guadalajara, Jaliasco and Acapulco, Guerro.

RADIO VIA PARCEL POST AT N. Y. PRICES

Standard Parts Only, in Original Packing

NO SALVAGED GOODS SOLD

Where "Money Back Policy Prevails"

	For Ins.	Parcel Post Add
PHONES		
Dietzen 3,000 Ohm	$3.75	$0.12
Brandes	5.75	.14
Dictograph	5.75	.14
VARIABLE CONDENSERS		
Dietzen 14-Plate Vernier	2.65	.14
Dietzen 24-Plate Vernier	2.95	.16
Dietzen 46-Plate Vernier	3.45	.18
TRANSFORMERS (Audio Frequency)		
Dietzen	3.45	.12
Ames 4½ to 1	2.95	.12
TRANSFORMERS (Radio Frequency)		
Cotoco	2.45	.12
Owl	.95	.10
MISCELLANEOUS		
Reinartz Coils	1.25	.08
Sta-Put Plug	.40	.06
Freshman Grid Leak & Cond. combined	.85	.12
Dietzen Single Circuit Jack	.40	.06
Aerial Insulators	.10	.02
Ritter Portable Loop	1.00	.10
Argus Lightning Arrester	.95	09
Welsh Peanut Tube	2.00	.08
Peanut Tube Socket	.50	.03
Switch Lever, Fada Type	.19	.06
Ammeter Testing B Battery	.49	.08
Hydrometers	.49	.08
Double Phonograph Attachment	.95	.08
Cockaday Coil	2.25	.14
2 Coil Honeycomb Mounts	2.95	.12
Wave Trap	4.95	.15
Electric Soldering Iron	3.95	.15
100 Feet Copper Antenna Wire	.39	.08
RHEOSTATS		
Dietzen, 6 ohm	.39	.06
Dietzen, 30 ohm	.45	.06
SOCKETS		
Bell V. T. & W. D. 11	.89	.10
V. T. Bakelite	.50	.10
DIALS		
2-inch	.25	.06
3-inch	.35	.08
4-inch	.49	.08

Modells ESTABLISHED 1884

191 Fulton St., Dept. F-28, New York City

9 New York Stores

America's Greatest Radio Mail Order House

ALKALI SALT TRIODE SENSITIVE DETECTOR

SUPPLANTS NEED FOR AMPLIFIER, REPORT

C. T. Knipp, University of Illinois Professor, Introduces Tube with Low Rate Voltage

URBANA, ILL.—The latest kind of what is termed the "alkali vapor tube," has been brought out by Hugh A. Brown, associate of the department of electrical engineering, and Charles T. Knipp, head of the physics department of the University of Illinois. It is a detector tube made so sensitive as practically to obviate the necessity of using amplifying tubes.

The injection of a potassium sodium alloy into the tube during the process of evacuation is said to be the whole principle on which its construction is based. It is a complicated and extremely delicate process, however, and therefore costly.

Some Advantages

According to its inventors, the tube has the following characteristics and advantages:

It acts as a sensitive detector at any plate voltage up to 60 volts, although it produces best results between 8 and 10 volts.

It is more than three times as sensitive as the ordinary detector tube.

Adjustment is less critical, therefore much easier, than on an ordinary tube.

Besides being more selective in wave length, and steady, the tube is said to give "absolutely distortionless reception." This has long been one of the bugaboos of Radio reception, the correction of which will be received with glee by every Radiophan.

The voltage is higher than on the ordinary tube, to raise the temperature of the filament to a point at which the potassium sodium alloy vapor can become active.

Result of Recent Test

When the new tube was tested recently in the vicinity of Urbana and Champaign, Ill., the receiving fans who used the tube in their sets reported having heard Kansas City, Atlanta, Schenectady and Pittsburgh on an ordinary regenerative hook-up with no amplifier, with the antenna 12 feet above ground and 40 feet long.

By raising the antenna to a height of 40 feet, broadcasting stations as far away as Los Angeles could be heard. These stations, the inventors reported, could have been heard even without a B battery and with the plate circuit return connected to the negative filament lead.

AIR COMPASS POINTS TROUBLE TO AMATEUR

Commerce Department Finds Operator Breaking Rules

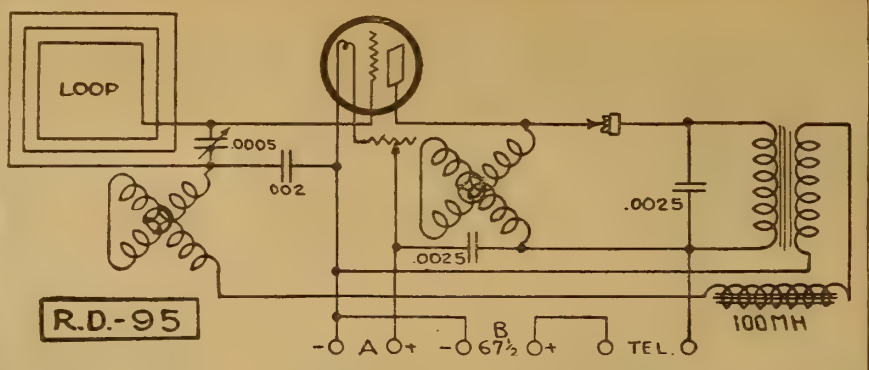
BOSTON.—As a result of operating his amateur transmitting station in violation of a department of commerce Radio regulation, Waldo J. Kelley, of 26 Windsor street, Watertown, Mass., is in trouble.

Recently many letters have been received at the office of Charles C. Kolster, government supervisor of Radio for the first Radio district, complaining of repeated interference (telegraph signals) from a station in Watertown.

Under the direction of Supervisor Kolster two assistants from his office went to Watertown with Radio direction finders and spent the evening recording interfering signals during the period in which all amateurs are instructed to remain silent. Many data were collected regarding the station under observation.

Another trip was made to the vicinity. This time the inspectors with an automobile equipped with a Radio compass drove to a point one block from Station 1-CPI, where they stopped and recorded signals for nearly an hour. At 10:15, local standard time, Kolster left the other inspectors in the car and went to the door at 26 Windsor street. At this time, it was said, Kelley was operating his Radio telephone transmitter, which was picked up with such audibility that when Kolster rang the doorbell he distinctly heard the loud-speaker.

ONE TUBE LOOP AERIAL CIRCUIT



ANOTHER form of single tube reflex well adapted to loop aerial reception is presented in the diagram R.D.-95. This circuit is exceptionally selective and is well suited to those localities where broadcasting stations are numerous and high degree of selectivity is necessary. Because of its unusual selectivity very good distance work is possible.

There are four adjustable controls, two of which control wavelength tuning, one for the filament, and the other permits accurate tube control.

A .0005 mfd. variable condenser, preferably with vernier, tunes the grid circuit of the first tube. The plate variometer tunes the coupling between the tube and the crystal detector. The rheostat controls the filament current; its resistance is dependent on the type of tube and the A battery used.

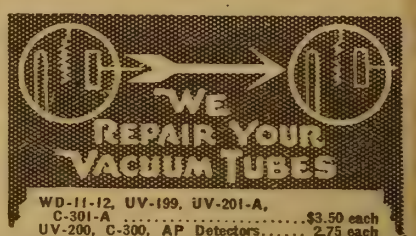
The 100 milhenries choke coil acts as a check valve to stray Radio frequency currents from the grid circuit of the first tube. The other variometer controls the reflexing of the transformed audio frequency currents to the grid of the first tube.

The B battery should consist of at least three 22½-volt units or their equivalent.

Any standard audio frequency transformer will do, but higher ratios than 5 to 1 are not recommended.

Three by-pass condensers, mica dielectric type, are necessary, one of .002 mfd. capacity and two of .0025 mfd.

A hard or amplifier tube must be used. The set requires no shielding, as no body capacity effects are noticeable.



WD-11-12, UV-199, UV-201-A, C-301-A ..... $3.50 each
UV-200, C-300, AP Detectors..... 2.75 each
UV-201, C-301, AP Amplifiers..... 3.00 each
DV-6, DV-6-A ..... 3.50 each
UV-202 ..... 4.00 each

And Guarantee Them Equal to New

QUICK SERVICE—Include with your order remittance to cover repair plus parcel postage for one pound per tube. If preferred, tubes will be returned C. O. D. repair charges.

ABALENE RADIO, 14 Vesey St., New York, N. Y.

PREMIER
"HEGEHOG"
TRADE MARK
AUDIO
FREQUENCY TRANSFORMER

PAT. PEND.
HALF SIZE

MAXIMUM VOLUME
MINIMUM DISTORTION
100 PER CENT SHIELDED
MOUNTS ANYWHERE

PRICE $3.50

RATIOS—1 to 3, 1 to 4, or 1 to 5

The Most Efficient, Compact Transformer ever designed. Ask Your Dealer for the Premier "Hegehog."

Full Specifications on Request

Premier Electric Company
Est. 1905
3810 Ravenswood Avenue, CHICAGO, ILL.

CARTER
NEW
15 POINT
Inductance Switch

Self-contained. Only one panel hole. Easy to install. Pig-tail connection eliminates sliding contacts. Westinghouse Micarta insulation prevents leakage. Solder terminal and contact one piece. Adjustable stop pin. New type dial knob eliminates panel numbering. Can be used as "B" battery tap switch.

Price: $2.00

Ask Your Dealer
Write for free Jack-switch hook-ups

CARTER RADIO CO., 205 South State Street CHICAGO

AMSCO
COMPENSATING CONDENSER

is a special three-electrode condenser for balancing the grid charge on the amplifying tubes. Stops all local oscillations without detuning the amplifier. Shielded against hand capacity disturbance.

$3.00 Complete

For Use with Tuned Radio Frequency Receivers

At All Good Dealers

AMSCO PRODUCTS, INC.
Broome & Lafayette Sts., New York City

CHEAPER THAN BUILDING YOUR OWN—AND BETTER

The Michigan Midget Receiver $27.00

A Long-Distance Wonder Worker

We get stations from coast to coast, including all the new wave-lengths up to 600 meters, with the "Midget," and they come in clear and strong.

Use standard 6-volt tube or any of the new low-voltage dry cell tubes.

Tho the handsome mahogany-finish cabinet is only 14½ in. long, it holds three No. 6 dry cells and one 22½ volt B battery.

Sloping front panel, with lever-tuning, is a great improvement on straight panel and knob-and-dial tuning. Easier, more accurate.

Receives through one or more head phones.

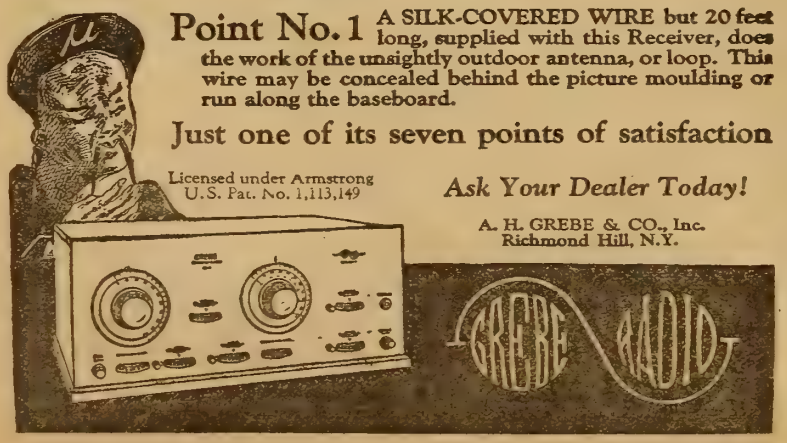
Add our two-stage amplifier for loud speaker reception.

Send for the Midget circular. Give name and address of your favorite radio dealer.

DEALERS. The Midget is a quick-turnover seller and every sale creates others—a wonderful endless-chain of satisfaction.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

The New Grebe Broadcast Receiver



Point No. 1 A SILK-COVERED WIRE but 20 feet long, supplied with this Receiver, does the work of the unsightly outdoor antenna, or loop. This wire may be concealed behind the picture moulding or run along the baseboard.

Just one of its seven points of satisfaction

Licensed under Armstrong U.S. Pat. No. 1,113,149

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The Week's Advance Broadcast Programs

Tuesday, August 28

CFCA (Eastern, 400), 8:00-9:00 P. M., Selections, "The Tales of Hoffman," "Espana," "Serenade," "La Czarine," "Forget-Me-Not." Star Concert Orchestra; "Roadways," "A Barque at Midnight," "Where the Avana Flows," Florence Moore, contralto; "Hungarian Dance," "Serenade," Maude Roth, violinist.

KDKA (Eastern, 326), 11:30 A. M., Music, victrola, S. Hamilton Co.; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, The children's period; 7:20, Concert, Mrs. Geo Regestsurzer, soprano; Chester A. Orcutt, baritone; Hilach Diamond, violinist.

KGW (Pacific, 492), 10:00-11:00 P. M., Dance music by George Olsen and orchestra.

KHJ (Pacific, 395), 2:30-3:30 P. M., Matinee musicale; 6:45-7:30, Children's program, bedtime story, Uncle John; 8:00-10:00, De Luxe program, Flournoy's Californians, Naomi Sweeney Brown, whistler.

KPO (Pacific, 423), 8:00-10:00 P. M., Program arranged by Wiley B. Allen Company.

KSD (Central, 546), 8:00 P. M., Orchestral concert, organ recital, vocal and instrumental specialties, Missouri Theater.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Afternoon musicale, Lyon and Healy Concert Dept.; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Frances Dwyer, soprano; Elise Colgram Mellus, contralto; Theo. S. Bergey, baritone; Ewald Winters, tenor; Elva Sprague, pianist; Cope Harvey's College Inn Orchestra.

WBZ (Eastern, Daylight Saving, 337), 6:45 P. M., Organ recital, Elsie Robbins-Gross, organist; 8:00, Musical concert, Mme. Alfred Duquette, mezzo-soprano; Frederick Roy, tenor; Esther Forristall, pianist and accompanist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:45 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Children's hour, talk on "Care of Children"; 4:30-5:55, Musical features; Betsy Logan will talk on "Affairs of the Heart."

WDT (Eastern, Daylight Saving, 405), 12:10-12:55 P. M., "Ten Ten Tennessee," "Pickles," Billy Newsome, soloist; Jimmy Clark, accompanist; "My Sweetie Went Away," "Harlem Street," Tom Waller pianist; "That "Old Gang of Mine," "You Know You Belong to Somebody Else," Joe Griffeth, soloist; Jimmy Clark, pianist; "Am I To Blame?" "Wet Your Thumb," Tom Waller, pianist; "Love, My Heart Is Calling You," "When You Walked Out Someone Else Walked Right In," Billy Newsome and Joe Griffeth, soloists; piano medley, Jimmy Clark; "Indiana Moon," Billy Newsome and Joe Griffeth, soloists; "Classico Piano Ragioso," Tom Waller, pianist.

WFAA (Central, 476), 12:30-1:00 P. M., Address, Will H. Evans; 8:30-9:30, Musical program, conducted by W. H. Evans, presenting Wesley Male Quartet, pianist, saxophonist and vocalists; 11:00-12:00, Gibson Mandolin and Guitar Club.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00 P. M., Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's own half hour, stories by Cousin Sue; 8:00, Boy Scouts Radio Corps, special program; 8:30, Song recital; 10:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGR (Eastern, Daylight Saving, 319) 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30, George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, topics of scientific interest; 11:45, weather.

WGY (Eastern, 380), 1:00 P. M., Music and reading, "Out of Doors," Margaret Tucker; 7:45, Musical, "Sunbeams," Mrs. Edwin Newkirk, contralto; Mrs. Alfred Heller, accompanist; "Forgotten," Mary Burns, pianist; "I Love a Little Cottage," Mae MacCarroll, soprano; "With You," "The Morning Wind," Mrs. Edwin Newkirk, contralto; "Afterwhiles," Mary Burns, pianist; "Sleep, Why Dost Thou Leave Me?" Mae MacCarroll, soprano; "The Bird Census," address; "Morning," "Sonny Boy," Mrs. Edwin Newkirk, contralto; "Herald of Spring," "Nocturne," Mary Burns, pianist; "Carmena," Mae MacCarroll, soprano.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor; 7:30-9:00, Mrs. Carl D. Jones, soprano; concert, Sylvian Trio; Fannie Elizabeth Stoll, violinist; Myrl Chrisman, flutist; Evelyn Kaiser, pianist; reading, "An Interesting Historical Episode."

WJAX (Eastern, 390), 7:30 P. M., Dance orchestra and musical specialties, arranged by the Cleveland News-Leader.

WJAZ (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Orchestra selections; "Song of Steel," "Danny Boy," R. G. Ball, baritone; Solos, Lucille Gutelius, soprano; "The Prison," "Sea Shade," Irma Lloyd, contralto; "Major Concerto," Sylvia Weinstein, pianist; "On the Road to Mandalay," "The Eagle," R. G. Ball; Orchestra selections; "Juba Dance," Sylvia Weinstein; "Trade Winds," "Port of Many Ships," "Hear Me Ye Winds and Waves," R. G. Ball.

WLW (Eastern, 309), 10:00 P. M., Selections, "Sun-Kist Rose," "Dream Daddy," "Somebody Else," Circle Orchestra; Solo, Howard Hafford, tenor; Billy Waterworth, accompanist; "Jeanne d'Arc," "April Morn," Gladys Helen Woerz, soprano; "Steering for Erin," Howard Hafford, tenor.

WMAQ (Central, Daylight Saving, 447), 9:00-9:15 P. M., Music, Hotel La Salle Roof Garden Orchestra; E. E. Sheetz; director; Carl Crave, tenor.

WOC (Central, 484), 3:30 P. M., Educational program, A. G. Heinrichs; 5:45, Chimes concert.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 8:30, Concert, Schmeman's Concert Band; Concert, Detroit News Orchestra.

Wednesday, August 29

CFCA (Eastern, 400), 8:00-9:00 P. M., Selections, "The Magic Flute," "Serenade for Strings," "Entrance of the Boyers," "Amina," Star Concert Orchestra; "From the Land of the Sky-Blue Waters," "Pale Moon," "I Heard a Thrush at Eve," Neva Deeton, soprano; "Chant of the Minstrel," "Rondo," Jacques Sterin, cellist.

KDKA (Eastern, 326), 5:15 P. M., Dinner concert, KDKA Little Symphony Orchestra; 6:45, The Children's Period; 7:20, Concert, KDKA Little Symphony Orchestra, under direction of Victor Saudek; W. O. Williams, tenor; Prof. E. E. Drake, accompanist.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert, presenting Dr. J. W. Wallace, baritone; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, De Luxe program.

KGW (Pacific, 492), 3:00-4:00 P. M., Children's program, music and story by Aunt Nell; 8:00-9:00, Concert by Columbia Theater All-Artist Orchestra; Harry Linden, director; 10:00-11:00, Dance music by George Olsen and his orchestra.

KSD (Central, 546), 8:00 P. M., Mrs. William Robinson, soprano, Sarah Kline, soprano; Dorothy Pickert, violinist.

KYW (Central, Daylight Saving, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program; La Gourgue Quartet; Lucille DeMert, soprano; C. Lagourgue, tenor; Ethel Murray, contralto; Louis DeMert, bass; Cope Harvey's orchestra, College Inn.

WBZ (Eastern, Daylight Saving, 337), 6:00 P. M., Dinner concert, WBZ Trio; 8:00, Musical Program; Alwyn B. W. Bach, baritone, assisted by the WBZ Trio.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical selections; Arcadia Cafe Concert Orchestra; 4:30-5:55, Short talks; 7:30, Bedtime stories, Dream Daddy; 8:00, Special musical features.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., "Do You," "Laughing Saxophone," Gladys Taylor, composer-pianist; "Barber of Seville," William Struber, baritone; "I Know a Dewey Garden," "In Poppy Fields," Gladys Taylor and Vaughn De Leath; Songs by William Struber, baritone; "Where the Sacramento River Flows," "Susan," "Cause It's You," Gladys Taylor, pianist; 7:00-7:50, "Balade in C Minor," "Polonaise in A Flat Major," "Valse in A Flat Major," Jasha Samoos, pianist; "The Two Grenadiers," "At the Mill," "The Volga Boat Song," H. Kotylansky, baritone; "Love Is a Song," "Arcadia," Elsie De Groode, violinist; Piano recital, by J. Samoos.

WFAA (Central, 476), 12:00-1:00 P. M., "Fancied Trips and Real Ones," William G. Lex.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song and piano recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecasts for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange and Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, 9:00-11:30, Concert, direction of J. P. Quinn; 11:45, Weather.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor; Organ Selections, Roy C Parks; 7:30-9:00, Concert by Mrs Jane Webster Murrell; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Musical selections by WHK Trio; Babson's Radio release; Automobile Road Report..

What Time Is It?

Pacific | **Mountain or Pacific Daylight Saving** | **Central or Mountain Daylight Saving** | **Eastern or Central Daylight Saving** | **Eastern Daylight Saving**

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:00-6:30, Dinner music, Dick Regan's WIP Concert Orchestra, final baseball scores; 7:00, Bedtime stories, Uncle Wip; 8:00, Short talk; 8:15 P. M., Musical selections; 9:00, Artist recital.

WJAZ (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Orchestra selections; "A Dream," "I Love You Truly," R. F. Elliott, tenor; "Nina," "Non so pis'cosa son," Clara Louise Becken, soprano; Orchestra selections; "The Bridesmaid Rose," "At The Winds Direction," R. F. Elliott, tenor; "Adagio," "Monnet," Gladys Welge, violinist; "Whither," "Hedge Roses," Clara Louise Becken, soprano; "Joy in Summer," "My Heart Is a Lute," Merleta Davis, soprano; Orchestra selections.

WMAQ (Central, Daylight Saving, 447), 9:00-9:15 P. M., Music, La Salle Roof Garden orchestra; H. P. Dahlquist, baritone.

WLW (Eastern, 309), 8:00 P. M., Selections, The Aichele Novelty Dance Orchestra; "Wanda," "She's Got That Too," "Somebody Else," Mary Elizabeth Green, Louise Rasch, accompanist; Radio Wedding From Music Hall, The Bride, Alice Hazenfield, Bridegroom, William F. Maine, Lillian Plogstedt, organist.

WOC (Central, 484), 3:30 P. M., Educational Program, Clyde G. Kern; 6:30, Sandman's Visit; 8:00, Pipe Organ Recital, Erwin Swindell, organist; 10:00, Musical, John McGreevy, baritone; Mrs. John McGreevy, contralto; Allouez Council, K. of C. quartette; Edna Sonneville, pianist and soprano; "Tourists' Road Report."

WOO (Eastern, Daylight Saving), 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sports results and police reports.

WWJ (Eastern, 517), 12:05 P. M., Concert, The Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 8:30, Concert, Schmeman's Concert Band; Concert, The Detroit News Orchestra.

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LINCOLN RADIO CORP.

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Thursday, August 30

CFCA (Eastern, 400), 8:00-9:00 P. M., Selections, "Mignon," "Minuet," "Amina," "Moment Musical," "Blue Danube," Star Concert Orchestra; "Selected," Florence Waizman, soprano; "Indian Lament," "Tambourin Chinois," Harry Adaskin, violinist.

KIKA (Eastern, 326), 5:15 P. M., Dinner Concert, Grand Symphony Orchestra; 6:45, The Children's Period; 7:20, Concert, KDKA Little Symphony Orchestra.

KGW (Pacific, 492), 10:00-11:00 P. M., Dance music by George Olsen and his orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John," 8:00-10:00, De Luxe Program.

KPO (Pacific, 423), 8:00-10:00 P. M., Organ recital, Gladys Salisbury, Sequoia Trio.

KYW (Central, Daylight Saving, 345), 1:35-2:00 P. M., Afternoon concert, Lyon and Healy Concert Dept.; 7:00-7:58, Musical Program, Lyon & Healy concert and artist dept., Cope Harvey's orchestra.

WBZ (Eastern, Daylight Saving, 337), 6:45 P. M., Organ Recital, Elsie Robbins-Gross, organist; 8:00, Musical concert; Marion E. Woodward, violinist, Ruth Dickinson, accompanist.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital from Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, popular dance music; 4:30-5:55, Short talks and musical program.

WDT (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Program through the courtesy of Mr. Widmer of the Lyceum Theatre (Bayonne, New Jersey); selections to be announced by Radio.

WFAA (Central, 476), 12:30-1:00 P. M., "Why Education Helps a Career," Dr. J. F. Kimball; 8:30-9:30, Hazel Sparks, mezzo-soprano, George E. Wilkins, Tenor-baritone.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano recital, Loretta Kerk; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00, Children's Own Half Hour, stories by Cousin Sue; 8:00, Song recital; 8:30, Dance music.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, Chicago Board of Trade, New York Stock Exchange; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, Boy Scout Radiograms, Employment Bulletin; Evening (time indefinite), Ball room music and festivities of the grand ball, convention of International Association of Printing House Craftsmen, Hotel Statler; 11:45, Weather.

WGY (Eastern, 380), 1:00 P. M., Music and address, "Making Over the Children," Modern Priscilla; 7:45, Musical, "Holding Hands," Beutling's Imperial Orchestra; "Tillie," Orchestra; "Drifting Back to Dreamland," Arthur Gunn, baritone; "Why Don't My Dreams Come True?" Orchestra; "Grand Daddy," "Take a Look at Molly," "Sun Kist Rose," "Sometime," "I'd Rather Fox Trot Than Waltz," "Oh! You Little Sun ur-er-Gun," Orchestra; "Climb on Top of Your Trouble," "Sunset Alley," Arthur Gunn, baritone.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor; Organ Selections, Roy C. Parks; 7:30-9:00, Concert by Henrietta Everett and Elwynne Griffith, of Scottsburg, Indiana.

Saturday, August 25

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Piano and violin recital; 6:00, Final baseball scores; 7:00, Bedtime stories, Uncle Wip; 8:00, Short talk,

(Continued on page 8)

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These popular hook-ups use UV-199, WD-11 or WD-12 Tubes. One hook-up gives selectivity and 1500 miles with absolutely no body capacity, while the other gives the remarkable distance of coast to coast. Both prints postpaid for 50 cents or any of the above tubes postpaid $5.45. Formerly operated by C. W. Kautz. We welcome his customers. No stamps accepted.

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Honeycomb coil, mounted 50 turns	$0.95
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Freshman variable grid leak	.60
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Single circuit jack, list 65c	.30
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It needs no batteries or rheostat, is always on the right spot, never wears or burns out, and is guaranteed for six months, although it will last for years.

Read these letters and try one yourself. You cannot lose anything but the postage sending it back.

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Gentlemen:—Let me say that your product is exceeded in merit only by your liberal policy of distribution. For your further information I want to add that I am using the detector in the Erla hook-up and have compared it with (mentions two well known makes) and other less well known types and have found yours superior in each instance. Herewith my check for $2.50.

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Gentlemen:—I have used your type "C" detector on my 3-tube Reflex and am satisfied that it is the best thing out. It is far superior to my (mentions a well known make) and galena detectors in every way.

Sincerely,
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Radiophone Broadcasting Stations

Corrected Every Week—Part III

(Note.—The third part of the schedule list appears and is completed below. The fourth part consists of the state, city-station index and will appear next week.)

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C. 263 meters. 200 mi. White & Boyer Co. Daily ex Sun, 11:30 am, reports; 1-2 pm, music. Tues, 7:45-10 pm, concert; 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 1500 mi. R. C. A. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri, 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.

WJZ, New York City. 455 meters. 1500 mi. R. C. A. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11 pm, special program. Sun, 10:30 am-1 pm, church service; 8:30-10:30 pm. Eastern Daylight Saving.

WKAA, Cedar Rapids, Ia. 360 meters. 200 mi. H. F. Paar. Daily ex Sun, 12:45 pm, reports; 5:30, reports, agriograms; 6-7, music. Thur, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 275 meters. 400 mi. The Lincoln Star. Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. 240 meters. Charles Looff.

WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 226 meters. 200 mi. United Battery Service Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Grandston, R. I. 360 meters. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 11 pm-12:30 am, entertainment. Intercolonial.

WKAR, East Lansing, Mich. 280 meters. Mich. Agri. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lines Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri, Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.

WKAW, Beloit, Wis. 242 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 231 meters. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern Daylight Saving.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 7:30 pm, sports; 9-11:30 pm, "Raven Frolic." Central.

WL2, Fairfield, O. 360 meters. U. S. Army.

WLAC, Raleigh, N. C. 360 meters. N. C. State College.

WLAG, Minneapolis, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Slogan, "The Call of the North." Club, "Tooth Brush." Daily ex Sun, 8:30, 9, 9:30 am, 10:10, 10:30, 12:30, 1:30, 3:30 pm, reports; 7 pm, children's hour; 7:30-8:30, lecture. Daily ex. Wed, Sun, 8:30-10 pm, concert. Sun, 10 am, church services; 4 pm, concert; 5, children's hour; 7:30 services. Central.

WLAH, Syracuse, N. Y. 234 meters. 900 mi. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. 360 meters. Tulsa, Okla.

WLAN, Houlton, Me. 283 meters. Putnam Hdwe. Co.

WLAP, Louisville, Ky. 360 meters. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 244 meters. 100 mi. A. E. Schilling. No regular program. Central.

WLAT, Burlington, Ia. 360 meters. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec. Co.)

WLAY, Fairbanks, Alaska. 360 meters. Northern Commercial Co.

WLAZ, Warren, O. 100 mi. 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sat, 2 pm, special. Sun, 9:30-11 am, church services. Central Daylight Saving.

WMAC, Cazenovia, N. Y. 261 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp. Slogan, "From the Land of the Pilgrim Fathers."

WMAH, Lincoln, Neb. 254 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun. 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 286 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Central Daylight Saving.

WMAT, Duluth, Minn. 266 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:20 am, 4:20 pm, weather; 6:15-7:30 pm, markets. Tues, Fri. 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. 250 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7:30-8:30 pm, music. Central.

WMAY, St. Louis, Mo. 230 meters. 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC, Memphis, "Down In Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8, music. Wed night silent. Tues, Fri, 11 pm, Midnight Frolic. Central.

WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 261 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 4-5 pm, dance music. Mon, Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 300 mi. Okla. Radio Engineering Co. (Univ. of Okla.) Daily ex Sun, 10-10:30 pm, news. Central.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Wed, Sat, 7:30-9:30 pm. Sun, 2:30 pm, 4:30, church services. Eastern Daylight Saving.

WNAV, Knoxville, Tenn. 360 meters. 1,000 mi. People's Tel & Telg Co. Tues, Thurs, Sat, 9-11:30 pm, concert. Sun, 10:30-12 am; 7:30-8:30 pm. Central.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yankton, S. D. 244 meters. Dakota Radio Apparatus Co. Daily, 10 am, reports. Wed, Sat, 9-10 pm, music. Central.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Daily ex Sun, 10-10:15 am, market reports. Wed, 8:15 pm, concert. Eastern.

WOAA, Ardmore, Okla. 360 meters. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 280 meters. 50 mi. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun. 12 m, weather, markets; 7 pm, weather, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 7, news, markets. Tues, Sat, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 5-6 pm, concert. Central.

WOAJ, Parsons, Kans. 258 meters. 50 mi. C. E. Erwin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 240 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Wed, 8:30-10 pm, music. Fri, 9:15-10:45 pm, music. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 526 meters. 1,000 mi. Woodmen of the World. Slogan, "Gateway to the East and West." Mon, Tues, Thurs, Fri, Sat, 9 pm, concert. Sun, 9:30 am, 9 pm, church services. Central.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 10:55 am, time; 11, weather; 12 m, chimes; 2 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9:30 pm, concert, Sat only. Sun, 9 am, chimes; 6 pm, concert; 7, church services; 8, concert. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:30 am, 12:45 pm, 9:30, music, weather. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:30, weather; 12-1 pm, concert; 4:45 pm, organ recital; 10:55, time; 11:02, weather. Mon, Fri, 7:45-11 pm, music, concert. Eastern, Daylight Saving.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Mon, Tues, Wed, Thurs, 9:45 am, 10:55, 11:30, 12:30 pm, 2, 7:30, time signals, reports, etc. Sat, 8 pm, concert. Sun, 7 pm, concert.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks, Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern Daylight Saving.

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WPAB, State College, Pa. 360 meters. Pa. State College.

WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.

WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, music. Mon, 6:30-7 pm. Tues, Thurs, 8-9 pm, concert. Wed, Thurs, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.

WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.

WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.

WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. 360 meters. Awerbach & Guet

WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.

WPAR, Beloit, Kans. 50 mi. 360 meters. B. A. Ward. Fri, 8 pm, entertainment. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.

WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. 360 meters. Concordia College.

WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.

WPG, New Lebanon, O. 360 meters. 1,500 mi. Nushawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Daily, 10:30 pm. Eastern.

WQAB, Springfield, Mo. 236 meters. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 300 mi. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Daily, 7-7:30 pm. Sun, 2:30-4:30 pm. Eastern.

WQAF, Sandusky, O. 240 meters. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

WQAL, Mattoon, Ill. 258 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.

WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 8 pm, church services. Eastern Daylight Saving.

WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.

WQAQ, Abilene, Tex. 360 meters. 300 mi. Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

WQAS, Lowell, Mass. 266 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

WQAV, Greenville, S. C. 258 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. Catholic University of America.

WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.

WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.

WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.

WRAD, Marion, Kans. 248 meters. Taylor Radio Shop. Daily, 12-12:45 pm, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. Radio Club. Inc.

WRAH, Providence, R. I. 360 meters. Stanley N. Read.

WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.

WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.

WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.

WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.

WRAV, Yellow Spring, O. 360 meters. Antioch College.

WRAW, Reading, Pa. 238 meters. Horace D. Good.

WRAX, Gloucester City, N. J. 268 meters. Flexon's Garage.

WRAY, Scranton, Pa. 280 meters. 100 mi. Radio Sales Corp. Daily ex Sun, 11 am, music; 12 m, reports; 3:30-5:30 pm, reports, music; 7, bedtime stories, music. Wed, 8:15-9:45 pm, music. Sat, 8:15-11:30 pm, music. Sun, 4 pm, chapel. Eastern.

WRAZ, Newark, N. J. 233 meters. Radio Shop of Newark.

WRC, Washington, D. C. 469 meters. Radio Corp'n of America.

WRK, Hamilton, O. 360 meters. 1,000 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Fri, 8:30 pm, music, lecture. Sun, 2:30 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.

WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30, Univ. news, talks, music. Central.

WRP, Camden, N. J. 360 meters. 250 mi. Federal Inst. of Radio Teleg. Temporarily discontinued.

WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio & Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.

WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.

WSAD, Providence, R. I. 261 meters. J. A. Foster Co.

WSAG, St. Petersburg, Fla. 244 meters. Loran V. Davis.

WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.

WSAI, Cincinnati, O. 309 meters. United States Playing Card Co. Tues, Thurs, 8-10 pm. Sat. 10-12 pm. Eastern.

WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.

WSAK, Middleport, O. 258 meters. The Daily News.

WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. Allentown Radio Club.

WSAP, New York, N. Y. 263 meters. Seventh Day Adventist Church. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAQ, Dartmouth, Mass. 280 meters. Round Hills Radio Corp.

WSAR, Fall River, Mass. 254 meters. Doughty & Welch Elect. Co.

WSAT, Plainview, Tex. 268 meters. Plainview Elect. Co.

WSAU, Chesham, N. H. 229 meters. Camp Marienfield.

WSAW, Canandaigua, N. Y. 275 meters. Curtice & McElwee.

WSAX, Chicago, Ill. 268 meters. Chicago Radio Laboratory.

WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music, weather; 2:30, reports; 4-6, baseball; 8-9, concert; 10:45-12, concert. Sun, 10:54-12:15 pm, 5-6 pm, 7:30-9:15, church services. Central.

WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 2-2:30 pm, 3-3:30, 4-4:30, 5-5:30, music, news. Mon, Wed, 8-9 pm. Sat, 11-11:30 am, 5-6 pm, 8-9. Sun, 10:30-12 m, 7:30-9 pm. Eastern.

WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Sun, 11 am, 7:30 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. Fall River Daily Herald.

WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.

WTAD, Carthage, Ill. 229 meters. Robt. E. Compton.

WTAF, New Orleans, La. 242 meters. Louis J. Gallo.

WTAG, Providence, R. I. 258 meters. Kern Music Co.

WTAK, Steubenville, O. 266 meters. The Swan-Bower Co.

WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.

WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.

WTAW, College Station, Tex. 254 meters. 200 mi. Agricultural and Mechanical College of Tex. No regular schedule. Central.

WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.

WWAD, Philadelphia, Pa. 360 meters. Wright & Wright, Inc.

WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.

WWB, Canton, O. 268 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.

WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, music; 3:30-3:35, weather; 3:35-4:15, markets; 5-6, sports. April 22, and every other week, 8:30-10 pm, concert. Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.

WWL, New Orleans, La. 280 meters. Loyola Univ.

WYG, San Antonio, Tex. 1,500 mi. U. S. Army. Kelly Field. No regular schedule.

6KW, Tuincucu, Cuba. 315 meters. 1,500 mi. Frank H. Jones. Slogan, "If you hear the koo of the cuckoo you are in tune with Tuincucu." Mon, Tues, Thurs, Sun, 9 pm, music. Central.

(Note.—This completes the station schedule list. The fourth part of the directory consists of the state, city-station index, and will appear next week.)

SEND NEW SONG HITS

(Continued from page 2)

lishment, the cost of the entertainment was obviously included in the price for meals and that patrons therefore paid for the vaudeville.

Broadcasters to Fight Case

But, in the opinion of many broadcasters, the contention of Judge Lynch that the "broadcasting of the defendant (Station WOR) was public for profit within the meaning of the copyright act and its interpretation by the United States supreme court," is not supportable. "Many broadcasters," concluded Mr. Klugh, "will experience difficulty in trying to reconcile the court's decision in relation to Station WOR, which, according to its defense, is not operating for pecuniary profit."

So that the public may be protected in this and like contentions the National Association of Broadcasters proposes to further its efforts more toward the revision of the copyright act than to contest it in its present ambiguous state, toward making known the increase in value given musical and similar compositions by broadcasting and the injustice on the part of composers and publishers of demanding payment for broadcasting, toward making known that the number of such compositions controlled by their organization is very small as compared with the total number under copyright and that therefore the society is not in a justifiable nor tenable position to make concerted demands for pay, and that the bureau of release of the National Association of Broadcasters supplies weekly to its members good, new, popular, copyright musical compositions without the payment of fee or tax.

Cutting Off Brass Screws

It becomes necessary at times to cut off a small brass screw with a pair of snips. This batters the threads so that the nut will not run on easily. If the nut is screwed on first and the screw cut off below the nut, then the nut taken off, the thread will be found to be in much better shape, as the nut in coming off removes the burr left by the cut.—Thomas E. Wyatt, Cocoanut Grove, Fla.

ADVANCE PROGRAMS

(Continued from page 7)

"Where to Go and How to Get There," by Eugene E. Hogle; secretary of the Automobile Club of Philadelphia; 8:20, Dance music, Ace Brigode's Ten Virginians from Walton Roof Garden; 9:00, Song recital; 10:00, Dance music.

WJAX (Eastern, 390), 8:00 P. M., An all-solo program of the Singers' Club; "Love Sends a Gift of Roses," saxophone solo, Rudolph Adler. "There's a Lark in My Heart," vocal solo, Theresa Brautigam. Allegretto from "Sonata in A for Violin and Piano," violin, Sara Watson; piano, Emily Watson. "Under the Roof where the Laughter Reigns," baritone solo, Harry Dunham. Selections from "The Holberg Suite," piano, Mrs. Lester L. Askue. Vocal solos by Thomas George and Herbert Arnold Smith. Vocal duet by Thomas George and Herbert Arnold Smith. "Beside a Babbling Brook," saxophone solo, Rudolph Adler. "Love's on the High Road," vocal solo, Theresa Brautigam. "Cavatina," violin solo, Sara Watson. "The World Is Waiting for the Sunrise," Harry Dunham, baritone. "Reflections in the Water," piano solo, Mrs. Lester L. Askue. "Land of the Heart" (sung in Welsh), Thomas George, bass. "No One Had Told You," Herbert Arnold Smith, tenor.

WJAZ (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Oriole orchestra; "Minuet de l'Arlesienne," Grace Welsh, pianist; "If I Were King," "The Sunshower," Richard B. DeYoung, baritone; "Songs My Mother Taught Me," Harriet Hertz Seyl, soprano; "Romance" (Rachmaninoff), "Pin Wheels," Grace Welsh, pianist, piano parts, Aletta Tennold; "The Truant Lover," "Four Leaf Clover," Harriet Hertz Seyl, soprano; Orchestra selections.

WLW (Eastern, 309), 10:00 P. M., Piano solo, Anna Canova; "The Requiem," Leo Canova, baritone; L. & N. Quartet, Maud Davis, soprano, Norma Hetsch, alto, A. C. Kessen, tenor, Fred Otte, bass. "Hunting Song"; "Trees," "O Golden Sun," "Open Thy Blue Eyes," "Were My Songs with Wings Provided." Norma Richter, Eugene Eckerle, accompanist; "A Medley from the South," L. & N. Quartet; Xylophone solo, Medley of Southern Airs, Anna Canova; "The Mocking Bird," Leo Canova, Whistling; "Salvatore," a race-horse story, Olive Vail; Duet, Anna Canova and Leo Canova, Mrs. J. F. Canova, accompanist; "Good-Night Quartet from Martha." The L. & N. Quartet.

WMAQ (Central, Daylight Saving, 447), 9:00-9:15 P. M., Music, La Salle Roof Garden, Orchestra; Marjorie Middlekaus Sherman, contralto, Erna Blythe Athey, accompanist.

WOC (Central, 484), 3:30 P. M., Educational Program, Karl G. Stephan; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Mrs. S. J. Burich, pianist; Address, "Vision or Illusion," B. J. Palmer

(Continued on page 9)

ADVANCE PROGRAMS

(Continued from page 8)

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sports results and police reports.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 8:30, Concert, Detroit News Orchestra: Concert, Schmeman's Concert Band, 11:00, Concert, Detroit News Orchestra.

Friday, August 31

CFCA (Eastern, 400), 8:00-9:00 P. M., Selections, "Marche Militaire," "Intermezzo Pittoresque," "Suite Melodique," "Air de Ballet," "Sweethearts," Star Concert Orchestra; "Selected," Kate Jackson, contralto; "Chanson Triste," "To a Wild Rose," Jacques Sterin, cellist.

KIKA (Eastern, 326), 5:15 P. M., Dinner Concert, Grand Symphony Orchestra; 6:45, The Children's Period; 7:20, Concert, Madeline Barnes, soprano; J. A. Muerer, accompanist; A. W. Juehner, baritone.

KGW (Pacific, 492), 8:00-8:15 P. M., A. G. Tindolph, baritone; Hazel Handy, accompanist; 8:15-9:00, Dance music, George Olsen and his orchestra; 10:00-11:00, Dance music, George Olsen and his orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:00, Children's Hour, "Uncle John"; 7:00-7:30, Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist. 8:00-10:00, De Luxe Program.

KSD (Central, 546), 8:00 P. M., Program by Oakville Maennerchor.

WBZ (Eastern, Daylight Saving, 337), 6:00 P. M., Concert, WBZ Trio; 8:00, Musical Concert, Minnie G. Nickels, centralto; Mrs. Hugo S. Thompson, accompanist, assisted by WBZ Trio.

WDAR (Eastern, Daylight Saving, 395), 12:00-12.54 P. M., Organ recital from Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, musical selections, Arcadia Cafe Concert Orchestra; 4:30-5:55, "Affairs of the Heart," Betsy Logan; 7:30-8:00, Bedtime stories by Dream Daddy; 8:00-12:00, Dance music, Arcadia Cafe Dance Orchestra, songs by Harry Glyn.

WDT (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., "Cannibola," Billy Frish, singer; Will Donaldson, accompanist; "Onions Bring Memories of You," Frank Goodman, singer; George Schottler, pianist; "Who Did You Fool After All," Vaughn De Leath, singer; Herbert Hood, pianist; "Chick-a-Dee," Louis Breau, pianist; "Walk Jenny Walk," Bob Schaffer, singer; Herbert Hood, pianist; "Papa Better Watch Your Step," Frank Goodman, singer; Herbert Hood, pianist; "Who Will It Be," Lew Pollack, singer-composer; "They Fall in Love with Everyone but Me," Frank Goodman, soloist; George Schottler, pianist; "Don't Let Me Find You Here When I Get Back," Vaughn De Leath; 11:00-11:50, Concert by Sherwood Orchestra; Original Songs by the Original Radio Girl; Songs by Vaughn De Leath.

WFAA (Central, 476), 12:30-1:00 P. M., Address, "Paul, the Apostle," Dr. Robert Stewart Hyer; 8:30-9:30, Musical Recital, Alice Knox Ferguson, pianist, H. G. Wells, soprano, J. H. Fuqua, basso-baritone.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange, Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news, road reports; 9:00-11:30, Honeytown Minstrels of Riverside, E. Robert Jones, director; 11:45, weather.

WGY (Eastern, 380), 1:00 P. M., Music and address, "Ancient Homes of Old Corlaer," Katherine V. Steers; 7:45, Musical and Three one-act plays, "2nd Sonata in G Minor, Op. 22," Annina McCrory Evans, pianist; "A Marriage Proposal," Comedy; The Cast, W. J. Ward, Arline Montgomery, Jerome Lovenheim; Scene, Reception Room in a Country Home in Russia; "Pastorale," "Capriccio," Annina McCrory Evans, pianist; "The Holdup," Tragedy; Cast, Rose Cohen, Edward H. Smith, Charles Baumis, Paul Harkey; Scene, The Douglas Apartment; Time, Midnight; "Polonaise," Annina McCrory Evans, pianist; "The Tenor," Comedy; Cast, Joseph Carl, Rose Cohen, Jerome Lovenheim, Edna Kershaw, Chas Baumis, John Loftus, Earl Harvey, Frances Ford; Time, the present; place, "A City in Austria; "Man Lebt Nur Einmal," Annina McCrory Evans, pianist; 10:30, Musical, Imperial Brass Quartet; "The King's Highway," The Imperial Brass Quartet, Charles Fahey, cornet, Fred Fahey, cornet, Albert Tompkins, baritone, John Galloway, baritone; "Brown October Ale," Arthur Gayne, baritone; "Old Kentucky Home," Albert Tompkins, Euphonium solo; "Sweet and Low," quartet; "Dearest Believe," Arthur Gayne, baritone; "Out On the Deep," John Galloway, Euphonimum solo; "Billy," address, Henry S. Watson; "Over the Wavee," "Homeward Bound," Quartet; "Vision Fair," Arthur Gayne, baritone.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theater Orchestra; Ollie Jones, conductor; Organ Selections, Roy C. Parks, 7:30-9:00, Concert by Silver King Sextette; Ottis Steffy, director; William W. Francisco, pianist; William W Francisco, saw soloist; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., WIP Instrumental trio, under direction of Dick Regam; 6:00, "Radio Baseball Dope," by Monte Cross, old-time ball player; 7:00, Bedtime stories, Uncle Wip.

WJAZ (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Selections, Oriole orchestra; "Tears of Love," "Sleep and the Rose," Howard Nielson, baritone; "Melody in F," "Two Larks," Hilda Farr, pianist; orchestra selections; "Caprice Vienos," "Valse Blue," Lulu Giescke, violinist; "Under the Old Birch Tree," "Could I," Howard Nielson; Orchestra selections; "March Mignon," "Shepherds," Hilda Farr; "As You Pass," "Flirtation," Howard Nielson; Orchestra selections; "Serenade" (Chaminade) Hilda Farr; "There's a Beautiful Land on High," "A Dream," Howard Nielson; Orchestra selections.

WLW (Eastern, 309), 8:00 P. M., Special features to be announced.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Weekly Musical Lecture, Mrs. Marx E. Oberndorfer; 9:00-9:15, La Salle roof garden orchestra; Marion Ranstead, pianist; H. Arnold Michel, tenor.

WOC (Central, 484), 3:30 P. M., Educational Program, C. E. Wilent; 5:45, Chimes concert; 6:30 Sandman's Visit.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Sports results and police reports; 7:45, Dinner music, Hotel Adelphia Roof Garden; 8:45, Dance music, Hotel Adelphia Roof Garden; 11:10, Continuation of dance music, Hotel Adelphia Roof Garden.

No Saturday, Sunday or Monday Programs. (Latter is Labor Day.)

WWJ (Eastern, 517), 12:05 P. M., Concert, The Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 8:30, Concert, The Detroit News orchestra; Concert, Schmeman's Band.

Saturday, September 1

CFCA (Eastern, 400), 8:00-9:00 P. M., Selections, "In a Tavern," "Pulcinello," "Entrance of the Boyers," "Pleading," "Shadowland," Star Concert Orchestra; "Selected," Ernest Morgan, baritone; "Hejre Kati," "Serenade," Mannie Roth.

KDKA (Eastern, 326), 5:15 P. M., Dinner Concert, Westinghouse Band, under the direction of T. J. Vastine; 6:45, The Children's Period; 7:20, Concert, Westinghouse Band, Margaret Aibe, mezzo-soprano and pianist; Julia Aibe, soprano.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, story by Aunt Nell; 10:00-11:00, Dance music by George Olsen and his orchestra.

KHJ, Pacific, 395), 12:30-1:15 P. M., Concert Program; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, De Luxe Program, arranged by the San Diego Chamber of Commerce.

KSD (Central, 546), 8:00 P. M., Orchestra concert, organ recital; vocal and instrumental specialties, Missouri Theatre.

KYW (Central, Daylight Saving, 345), 7:00-7:58, Musical program, National School of Music; Aubrey B. Hawkins, Tenor, Emmit G. Berger, baritone, W. C. Mason, baritone; Mme. Camile Cohen-Jones, soprano; Cornelia Lampton, pianist; Lawrence Lomax, tenor; The Fulton Four, Cashmere, Hopkins, Castleman, Crutcher; The Kappa Alpha Psi Four, Dr. Marshall, C. Roberts, Roger Wilson and Prof. Thomas; The Ladies' Singing Four, Miss Sheen, Lottie Evans, Mrs. Fucha, Mrs. Hattie Oaldwell.

WBZ (Eastern, Daylight Saving, 337), 7:00 P. M., Concert, Hotel Kimball Trio; Jan Geerts, director and violinist; Angela Goddard Lonergan, cellist; Howard W. Nichols, pianist; 8:00, Musical concert, Bertha Bowen, banjo-mandolin; Mrs. Begley, guitar and accompanist; Katherin Pomeroy, cornet.

WDT (Eastern, Daylight Saving, 405), 12:00, Story for the Children, Edith J. Craine; 12:15 P. M., Dick Finch, pianist; Piano solos, "Gypsie Love Song," "Kerr Dance," "Et C'Est Elle Que J'Aime le Mieux," Richard Gilbert.

WFAA (Central, 476), 12:30-1:00 P. M., "September Star Story," Prof. J. D. Boon; 8:30-9:30, "Going to School," speaker Rotary Club; Mario H. Bolack, pianist, Mrs. Clyde F. Magee, reader; 11:00-12:00, Netto Male Quartet.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario aviation and marine interests; 12:00-12:30 P. M., George Albert Bouchard, organist; 12:35-3:30, Produce and live stock market reports, New York Stock Exchange, Chicago Board of Trade; 6:30-7:00, George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news; 11:45, weather.

WGY (Eastern, 380), 8:30 P. M., Musical program, Meyerhoff's Orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Organ Selections, Roy C. Parks; 7:30-9:00, Concert, Instrumental quartette, Joel Haag, cellist; Dorothy Haag, violinist; Marjorie Haag, saxophonist; Mrs. Earl K. Haag, pianist; reading, "An Interesting Historical Episode."

WJAZ (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Selections, Oriole orchestra; "Caprice from Alceste," "Romance," Ruth Alexander Tracy, pianist; Contralto solos, Ruth Alexander Tracy; Orchestra selections; "Sonata in A Major," Nathalie Parker, violinist; Contralto solos, Elaine De Sellum; Orchestra selections; "Concerto in G Minor," Hazel Simms, pianist; "Hear Me Ye Winds and Waves," Elaine De Sellum; Orchestra selections; "Sarabande," "Minuet," "Fairy Sailing," Nathalie Parker; Orchestra selections.

WMAQ (Central, Daylight Saving, 447), 8:00-9:00 P. M., Labor Day program arranged by Rev. Martin Luther Thomas; Music, La Salle Roof Garden Orchestra; Cultural League orchestra.

WOC (Central, 484), 3:30 P. M., Educational Program, C. C. Hall; 5:45, Chimes Concert; 6:30, Sandman's Visit; 9:30, Dance Music, P. S. C. Orchestra.

WWJ (Eastern, 517), 12:05 P. M., Concert, Detroit News Orchestra; 3:00, Concert, Schmeman's Band; 7:30, Concert, News Orchestra; Concert, Schmeman's Band.

Sunday, September 2

KHJ (Pacific, 395), 10:30-11:00 A. M., Organ recital from First Methodist Episcopal Church, Prof. Arthur Blakeley, organist; 7:00-7:30 P. M., Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist.

KYW (Central, Daylight Saving, 345), 5:00-8:00 P. M., Classical and semi-classical selections, Sisson Trio, A. L. Shynman, pianist; Theo. Ratzer, cello; Geo. Bass, violinist.

WFAA (Central, 476), 2:30-3:00 P. M., Bible Class and Gospel songs, Dr. William M. Anderson, Jr.; 9:30-10:00, Choristers, Mrs. J. W. Ohl, director; 9:30, "Going to School," Speaker Rotary Club; 10:00-11:00, Music, Foot Warmers orchestra.

WFI (Eastern, Daylight Saving, 395), 8:30 P. M., Services, Arch Street Presbyterian Church.

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special Weather forecast for Lakes Ontario and Erie marine and aviation interests; 3:00 P. M., Vesper service, the Rev. L. R. Foulke, Methodist Episcopal Church; 11:45, weather.

WGY (Eastern, 380), 9:30 A. M., Church Service, "Contemplation," Magdalene Stephens, organist; "Holy, Holy, Holy," hymn; Responsive Service; Introit for 14th Sunday after Trinity; Gloria Patri, Kyrie, Gloria in Excelsis; The Epistle & Response Apostles' Creed; "I Will Lay Me Down in Peace, Lois Boakes Hardesty, soprano; "Forgive Us Our Trespasses as We Forgive Those Who Trespass Against Us," sermon; "Onward and Upward," Offertory quartet; Prayer; "How Firm a Foundation," Hymn, Benediction. "Postlude in A," Magdalene Stephens, organist.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00, Church services under the auspices of the Fourth Avenue Presbyterian Church, Rev. Dr. Charles W. Welch, pastor; William E. Conen, organist and choir director; Mrs. Newton G. Crafore, soprano; Mrs. Virginia Shafer Herrio, contralto; H. Archer Culmer, tenor; Peter Schlicht, baritone; 4:00-5:00 P. M., Concert under the auspices of Louisville Lodge, F. and A. M. No. 400, male quartette, Joseph Eisenbeis, first tenor; George J. Sutterlin, second tenor; P. M. Brooks, first bass; George T. Holmes, second bass.

WWJ (Eastern, 360), 8:00 P. M., Operatic selections and vocal solos by the WHK Orchestra and associated artists.

WJAZ (Central, Daylight Saving, 447.7), 6:00-9:00 P. M., Selections, Oriole Orchestra; "Joy," "Indian Spring Bird," "The Nightingale," Jewel Martin Lovejoy, soprano; "Polichinelle," "Overture to William Tell," Helen Raub, pianist; "Ave Maria" (Schubert), "Oh Love That Will Not Let Me Go," J. Lester Hobercorn, tenor; "Concerto for violin," Roul Kantrou, violinist; Orchestra selections, "Until," "On the Road to Mandalay," J. Lester Hobercorn, tenor; "Londonberry Air," Roul Kantrou; Orchestra selections, "At Dawning," "I Hear You Calling Me," Dorothy Davies Dillow; "La Gitana," "Thais Meditation," Roul Kantrou; Orchestra selections.

Monday, September 3

WGR (Eastern, Daylight Saving, 319), 11:45 A. M., Special weather forecast for Lakes Erie and Ontario marine and aviation Interests; 12:00-12:30 and 6:30-7:00 P. M., George Albert Bouchard, organist; 7:00-8:45, Digest of the day's news; 11:45, weather.

WGY (Eastern, 380), 7:45 P. M., Concert, "American Volunteers," WGY Orchestra; "When Song Is Sweet," Clara Habel, contralto; Ivan Strough, accompanist; "Rhinefels," WGY Orchestra; Labor Day address; "His Lullaby," Clara Habel, contralto; Duet, "Solitude," Edward Rice, violinist, Ernest Burleigh, cellist; "Just Been Wonderin'," "The Rosary," Clara Habel, contralto; "Down the Bayou," "Marshal Haig," WGY orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Organ Selection, Roy C. Parks.

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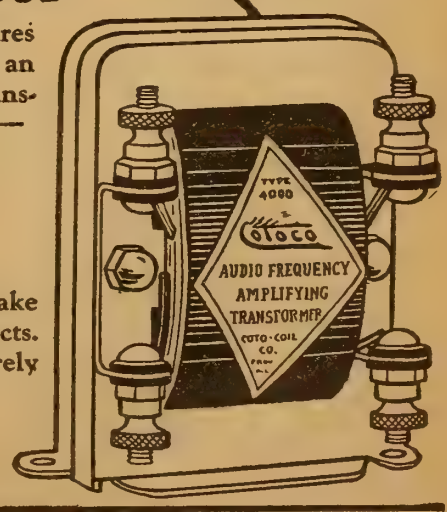


COTO-COIL CO. PROVIDENCE

Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

Member of the Audit Bureau of Circulations
58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional Single copies 10 cents.

Vol. VI Chicago, Saturday, September 1, 1923 No. 8

U. S. Leads in Radio Science

We Have the Largest Number of Broadcasting Stations

AMERICAN ingenuity, initiative and capacity for exploring uncharted domains with supreme confidence have placed this country far beyond all others in another scientific field—Radio. The number of stations in actual use in the United States is greater than that in all the rest of the world.

The reason we have gone ahead so fast is because we are willing to experiment, to try things out, and then correct our mistakes. One hindrance to development in foreign countries are the rigid laws as to Radio. In England, Radio broadcasting is practically a monopoly. The six stations there are organized in one corporation, and fees are charged for service, just as for telephone service here. It is purely a commercial enterprise. In Germany it is the same. It may come to a commercial basis here later but right now we are quite satisfied with the present system.

Bribes Should Not Be Accepted

Keep Unworthy Practices Out of Broadcasting

IT IS quite unfortunate that some broadcasting stations in the United States have adopted a policy of receiving fees for permitting the broadcasting of talks, lectures and speeches, sometimes music. It is very good for the industry as a whole and the great multitude of Radiophans that the practice is not general.

Broadcasting is not greatly different in effect from the pages of newspapers, periodicals and magazines. Those publications which are guided by fearless editors who print only that which they believe to be correct, right and fair, are the publications which have the respect and loyalty of their readers. This has proved to be the case in the past. The greatest American magazines and newspapers in existence today are those which have not prostituted the pages of their publications for the benefit of any kind of interest.

It seems a pity that with such laudable instances of untrammeled freedom of the press there should creep into the broadcasting of Radio the meanness and littleness of accepting money for the privilege of transmitting to the public information of any kind.

The broadcasting director is very much like the editor; it is left to his discretion as to what sort of material will interest, instruct and amuse his audience. It is not possible to see how he can exercise his freedom of judgment for a fee.

If honesty cannot stop the spread of such a practice it would seem that the law should be invoked. The broadcasting station has a large expense but the acceptance of bribes is certainly not the honorable way to meet the expense.

Quality of Programs Improved

Increased Number of Stations Gives Listener Choice

WHILE the increase in the number of broadcasting stations in operation is an important factor in the Radio situation this year, a more valuable feature from the viewpoint of the listener is a very notable improvement in the quality of programs and other features of operation. There are now about thirty Class B broadcasting stations operating on individually assigned frequencies between 1000 and 550 kilocycles (300 and 545 meters). These stations furnish programs of high quality and employ transmitting sets of 500 to 1000 watts power to obtain the privilege of frequency assignment in this band.

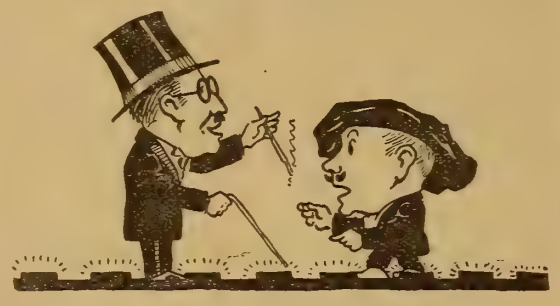
The large number of Class A broadcasting stations are also distributed over a range of frequencies of 1350 to 1050 kilocycles (222 to 286 meters). A number of these stations as well as some of the Class C stations operating on 833 kilocycles (360 meters) have well designed transmitting sets and carefully selected programs. The assignment of broadcasting stations to frequencies differing at least 10 kilocycles, in accordance with the recommendations of the second national Radio conference, has resulted in a decrease in interference and an improvement in the quality of broadcast service which is obtainable by the ordinary listener.

RADIO INDI-GEST

Fun on the Air

RADIO SETS ARE MUCH LIKE SPOILED CHILDREN.
THE WIFE AND I HAD FRIENDS VISITING THE OTHER EVENING AND IN THE COURSE OF EVENTS I THOUGHT WE WOULD ENTERTAIN A BIT
WITH THE SET, BUT NO NOTHING DOING NOT A PEEP.
AFTER WHICH THE GUESTS LEFT AND I STILL TINKERING WITH THE SET GOT NEW YORK AND SAN FRANCISCO WHICH THEREFORE PROVES THAT RADIO SETS ARE MUCH LIKE SPOILED CHILDREN.
GOO GOO.

The Tuning Troubles of Messrs. Gallagher and Shean



Oh Mister Gallagher, Oh Mister Gallagher,
I was listening on the Radio last night,
But an amateur quite near seemed to like to interfere,
So I'm going to kick and have him closed up tight.

Oh Mister Shean, Oh Mister Shean,
In the Radio game I see you're pretty green;
As they say in gay Paree, what an animal you'd be,
What, an air-hog, Mister Gallagher? No, a jackass, Mister Shean!

Oh Mister Gallagher, Oh Mister Gallagher,
Interference is no more I hear them boast,
'Cause a guy named Schell has said that the old sinc spark is dead
When the tube came in the spark gave up the ghost.

Oh Mister Shean, Oh Mister Shean,
I can't get the situation through my bean,
I must ask Sir Conan Doyle for when I burn the midnight oil,
You hear spirits, Mister Gallagher?
No—spark sets, Mister Shean!

Oh Mister Gallagher, Oh Mister Gallagher,
Now I don't see why you put the blame on me,
Everywhere I turn my knob I can hear the noisy slob,
So it's not my fault at all as you can see.

Oh Mister Shean, Oh Mister Shean,
You are up against a problem what I mean,
But there's something you can get that will cut him out you bet,
An injunction, Mister Gallagher?
No, a tuner, Mister Shean!

Pittsburgh Post

A-B-C Lessons for Indigest Beginners

Chapter XI—But You Really Shouldn't

BY GOSH

K IS for Kurses,
That you hurl with all your might
When all you get to hear is,
"Signing off—Good-night."

Some Would Call It a Miracle

Teacher: "Johnnie, explain the meaning of the expression, 'multitudinous accomplishments.'"

Johnnie: "Building your own set, getting it to work and then selling it for more than it cost you and havin' the fella tell his friends what a great bargain he got." SPIDER WEBB.

Do not disturb
Poor Clarence Bing,
Tuned in static
But got lightning.

Sure, We Hide from Him

Dear Indi: Have you noticed that the old-fashioned man who used to grab you by the coat lapels and tell you all the latest bright sayings of his offspring, is still grabbing you by the coat lapels but is telling you all the long distance stations he managed to tune in the night before? POLLY W.

All of which reminds us that some months ago we left Brambdin Bray, Wattle Knees, Izzy and Ikey and all Station BLAH'S broadcasting equipment stranded on the great little south sea isle, Walla Walla. Rumors are current that they will be heard from again. Watch this "colyum." —Indi.

The Same Set but a Different World

Condensed

By DIELECTRIC

Whatever happens of general interest in the nation's capital may now be broadcast directly to a large part of the Radio audience in this country, since there are two stations capable of reaching them. Station WCAP was first to enter the field; WRC more recently began operations. Both may be linked by wire with two powerful stations in New York city and their programs spread over an even wider radius: WCAP with WEAF; WRC with WJZ.

Public interest in broadcast reception in France is increasing, though not on a par with the tremendous impetus Radiophony has received in the United States. That is to be expected under the varying conditions in the two countries. It may well be that when General Gouraud returns to France, after listening in to concerts received aboard his private car en tour, he urge a more liberal governmental policy. For the sake of French fans, we hope so.

When Signor Marconi goes aboard his yacht for a cruise it is usually safe to predict that his return will bring news of some discovery in the realm of Radio telegraphy. Returning to London recently after a two months' cruise, the great pioneer Radioist assured the world that a way had been found to transmit messages at less expense and with greater rapidity than with the system now in use. By the adoption of his new system power stations for long-distance work will cost less to build. There remains much to learn, but we are progressing.

For an adult to address children in a way to keep their interest requires special thought, something not always noticeable in the broadcast of bedtime stories. Station WRC, in Washington, has arranged to have an experienced woman in charge of this feature, one who will talk to the kiddies each evening in such manner as to maintain a feeling of intimacy. I am of the opinion that no other feature in Radio broadcasting receives so consistent attention from a large body of listeners in as do the children's stories.

That broadcast reception has come to be regarded as part of the service a hotel guest demands is evidenced in the planning of modern hostelries for Radio equipment. When the new hotel in Detroit is complete it will provide means of listening in to concerts for all of its guests; choice of programs will be honored by the one in charge of the Radio room. Two aerials for reception and one for transmission will cover all the requirements for making this a really up-to-date affair. Should conventions be held in this hotel the entire proceedings could be broadcast to the country from its own studio.

Many a man has been forced to gain an education, beyond that obtained in public schools, by means of the correspondence courses offered by various colleges. To the one sincere in his effort this may wholly compensate for enforced absence from the class room. There are undoubtedly many who would take advantage of courses in Radio, if they knew where they could be obtained. Pennsylvania State College is offering courses by correspondence in Radio reception and transmission, one for the ordinary student and one for advanced work.

First the musical composers raised their voices in protest against allowing broadcasting stations to use their music for entertaining Radio audiences; now the Baseball Writers' association raises a howl about broadcasting baseball results. Next we will be urged to forego hearing the "blow by blow" accounts of boxing contests and soon or late the market reports—farmers profit by getting these. Are we listeners in to be limited to police reports?

First Steps for Beginners in Radio

Chapter XIV, Part II—Telephones and Loud Speakers

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XV—Filament Batteries.

Chapter XVI—Plate Batteries.

Chapter XVII—Using Alternating Current on Tubes.

Chapter XVIII—Testing Radio Instruments.

Chapter XIX—Locating Trouble in the Set.

Chapter XX—Useful Information and Formulas.

THE telephone headset is intended primarily for long-distance work or where the signals are rather weak. On short-range work, where the signals are loud, it is desirable to use a form of reproducing device that will permit the music being heard over a large area. To this end use is made of loud speakers. The telephone is limited in design by reason of its having to be light and compact, whereas in the loud speaker weight or size is not a limitation and great latitude in design is possible.

The simplest form of loud speaker is made by mounting a telephone receiver in the throat of a horn, thus throwing the loud signals for quite a distance. The best results are obtained from a receiver having a large diaphragm deflection. In the usual type of headset there is very little deflection possible because the diaphragm is located close to the magnets. The use of a mica diaphragm permits large deflection without the danger of bending; for that reason the Baldwin type phone is usually employed in what we may term telephone speakers.

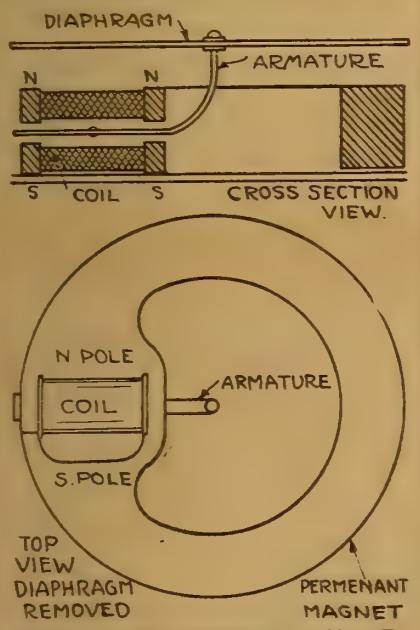


Figure 56—Construction details of Baldwin Type receiver

Operation of Telephone Unit Speakers

The operation of the Baldwin receiver differs greatly from the standard type; for the benefit of those not fully acquainted with the action it will be covered briefly. Around the inside of the shell is mounted a circular permanent magnet made of steel and strongly magnetized. The ends of the magnet are twisted and flattened to form four pole pieces, as shown in Figure 56, which shows the cross section of the coil winding. The arrangement is rather difficult to explain, but an examination of the illustration will show that the fine winding has positioned at each end two poles of opposite polarity. The poles at the top are of like polarity and those at the bottom are alike. Pivoted at the center of the coil is a tiny soft iron armature that normally is not attracted by either set of poles because the lines of force pass through the ends of the armature. The armature is linked to the mica diaphragm with tiny washers soldered in place on the end.

The operation is as follows: consider the polarity of the poles as shown. Should an electric current flow in the coil the armature will be magnetized; say the right end is made north and the left end south. The right end will then be repelled by the upper north pole and attracted by the lower south, while at the opposite end the upper pole will attract and the lower repel. This action results in the diaphragm being drawn down. A reversal of the current in the winding will give the opposite effect with the diaphragm being raised. The fourfold action makes the receiver very sensitive; the light mica diaphragm permits pure reproduction at all frequencies.

Attaching Receiver to Horn

The attachment of the receiver to a horn or to the phonograph sound box presents no difficulties, for attachments are manufactured for this purpose. A point worthy of note at this time is that when two Baldwin phones are attached to a horn a very weak sound will sometimes be emitted. This is due to the fact that the diaphragm of one phone is drawn in when the other is forced out. The two phones then neutralize each other and no sound is emitted. The remedy is to reverse the leads to one receiver when they will be found to work together satisfactorily.

It is not necessary to connect the leads from Baldwin receivers in any particular way with respect to polarity, for the magnetic field of the coil being at right angles to the permanent field does not tend to neutralize the permanent magnet.

It will be found that the armature will strike the pole pieces when very strong signals are received, which gives rise to a chattering sound that destroys the music or words. There is no way to overcome this except by changing the diaphragm, replacing the mica diaphragm with one made of metal. It need not be of iron; in fact one of thin phosphor bronze is ideal for the purpose. By soldering the armature extension to the center of the diaphragm we have a structure that will work excellently as a loud speaker and prevent much of the chattering on loud signals.

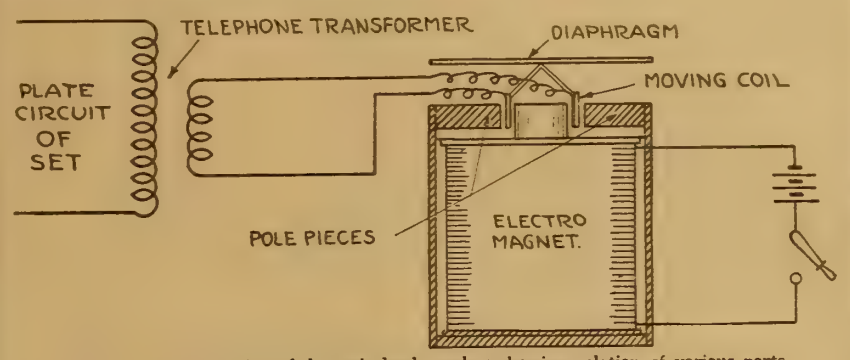


Figure 57—Cross section of dynamic loud speaker showing relation of various parts

Kind of Horn to Use

A word or two about the horn used. Contrary to general belief, a horn that will not vibrate will result in the loudest sounds. It may be a surprise to some to know that the greater part of the horn in a victrola is made from castiron, and it is hardly necessary to repeat that the modern phonograph represents the best in acoustics. Thin fiber and wood horns absorb much of the vibration from the air column in the horn, cut down the strength of the sound and often add overtones and stray tones with a metallic ring. A horn cast from concrete would be ideal; perhaps some with built-in horns can make use of this idea in building a loud speaker.

There are several loud speakers on the market that employ a principle identical to that in the Baldwin receiver, but the parts are much larger. These speakers function very well and are reasonable in price. Their chief advantage lies in the fact that they require no storage battery and therefore are less costly to operate than the dynamic type of speaker.

The Dynamic Type Speaker

The dynamic type speaker is a radical departure from the other two principles described and is perhaps the best type of loud speaker. It makes use of the principle employed in motor practice and is capable of handling the loudest signals without danger to the mechanism. If we place a conductor in a strong magnetic field and then pass a current through the conductor, the magnetic lines of force around the wire tend to cause the wire to travel at right angles to the magnetic lines. The direction of movement will depend on the direction of the magnetic lines and the direction of current flow. Reversing either will result in the reversal of movement of the wire.

In the dynamic talker, such as the Magnavox, use is made of this principle to operate the device. The actual construction of such an instrument was described in detail some months ago in these columns, so we will confine ourselves to the

(Continued on page 14)

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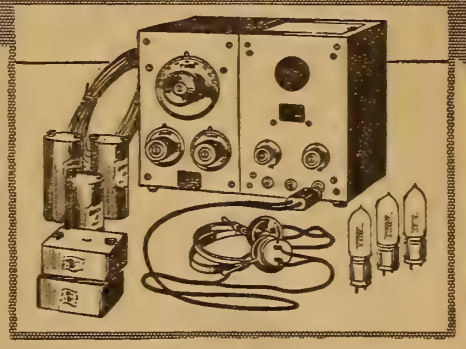

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Every Radiophan is eager to operate his set at the least possible expense. Here is one way to use a crystal on local stations and leave the expensive tube operation for distance work, eliminating the battery discharge on a tube when it is not necessary to use on local stations.

By connecting the crystal detector to the circuit, as shown, I can hear the local stations on the crystal. To listen with the crystal it is necessary only to turn off the A and B batteries, switch on the crystal and tune in the station with the condenser and variocoupler.—Jay Nunes, Des Moines, Iowa.

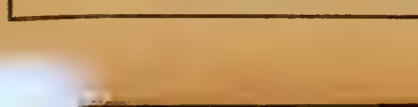
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

Wire End Insulation Covering

When using long leads to switches, batteries, etc., consisting of lengths of annunciator or like wire the usual difficulty encountered is that the insulation shreds at the ends and makes a bad looking job. A novel way of overcoming this

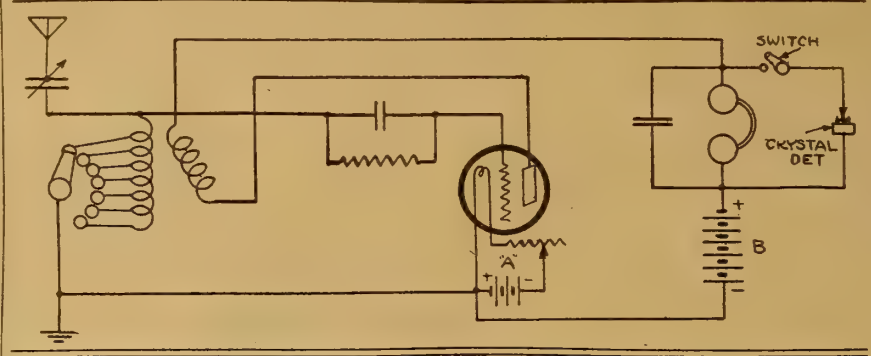


is as follows: cut the wires to the desired length; then cut some of the insulation away, leaving about ½ inch of the wire exposed. Twist the insulation at this end; then cut a piece of spaghetti about ½ inch long and cover the end of the insulation, leaving the end of the wire still exposed.—T. Meyers, New York City.

Iron Nails and Tacks

Never use nails or tacks when making up panels for a set. Holes in bakelite or hard rubber or fiber must be made with a drill.

EITHER DETECTOR MAY BE USED



Solder All Connections

Loose connections have been the cause of many of the troubles experienced in receiving sets. When wires are connected to nuts, binding posts, etc., or with each other, care should be taken to see that these joints are tight and if possible soldered. No joints should be left unsoldered except those which have to be changed from time to time, such as the batteries and the headphones. It is advisable sometimes to solder the B batteries, as these usually last about six months. A good joint is, first of all, one that is strong enough to hold up under the strains of handling. When two wires are connected they should be soldered at the center. The solder part makes the connection perfect, and the rest of the splice takes up the strain.

Magnetism Increases Reception

Magnetism plays an important part in Radio reception; the sensitivity of an audion tube sometimes may be increased by placing a large magneto magnet in a certain position so that the poles of the magnet are on each side of the tube. This probably is due to the magnetic effect upon the moving electrons that flow across from the filament to the plate.

Connecting Filament Rheostats

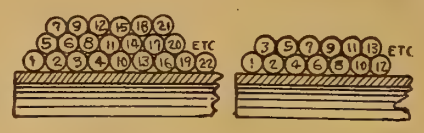
In Radio frequency amplifying stages it is advisable to connect the rheostats, which control the filament current, in the negative lead from the filament battery. This permits the potential on the grids to be more negative than the negative side of the filament due to the voltage drop through the tube rheostat. This method of connection usually provides the proper amount of negative potential on the grid without the use of C batteries.

Utilizing Flashlight Battery

For one-tube receiving set designed for a minimum size and weight, it is possible to use a flashlight battery to light the filament. Such a battery may supply service of one hour per day for a month.

Bank Winding Made Easy

Give the surface to be wound a coat of shellac and bake it on to prevent shrinkage. The surface is then covered with adhesive tape with the coated side out. The best width of tape is 1½ inches. Wrap one turn of the tape around the part at the end where the winding of the wire

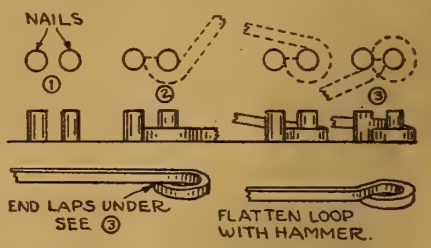


is to start. If necessary to cover space for the wire, wrap another piece on with the edges joining. Wind the wire on the tape.

The gum on the tape will hold the under layers so that they will not slip. This will make winding easy. Triple winding is done as shown in the left of the sketch and double winding at the right.—J. B. Yingling, Newton, Kansas.

Tool For Bending Loop Ends on Bus Bar Wires

When it becomes necessary to make several loops on the ends of bus bar wires while wiring a set, time will be saved in making the bends if a tool is constructed as shown in the illustration. To make the tool procure two ten penny nails and remove their heads. Drive the body of the nails into a board, placing them just far enough apart so that the ends of the wire may be slipped between them. Place the end of the wire against the side of one of



the nails; it then becomes easy to bend the wire around the other nail, making a uniform loop.—Horace Mason, Republic, Washington.

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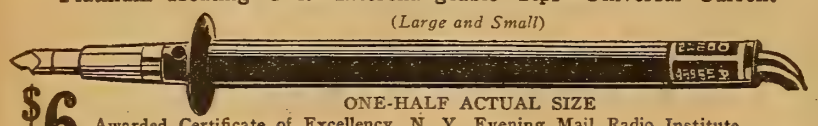

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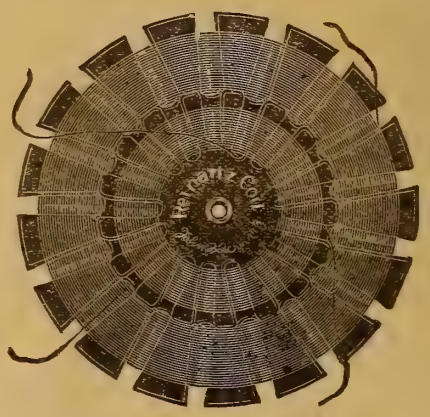

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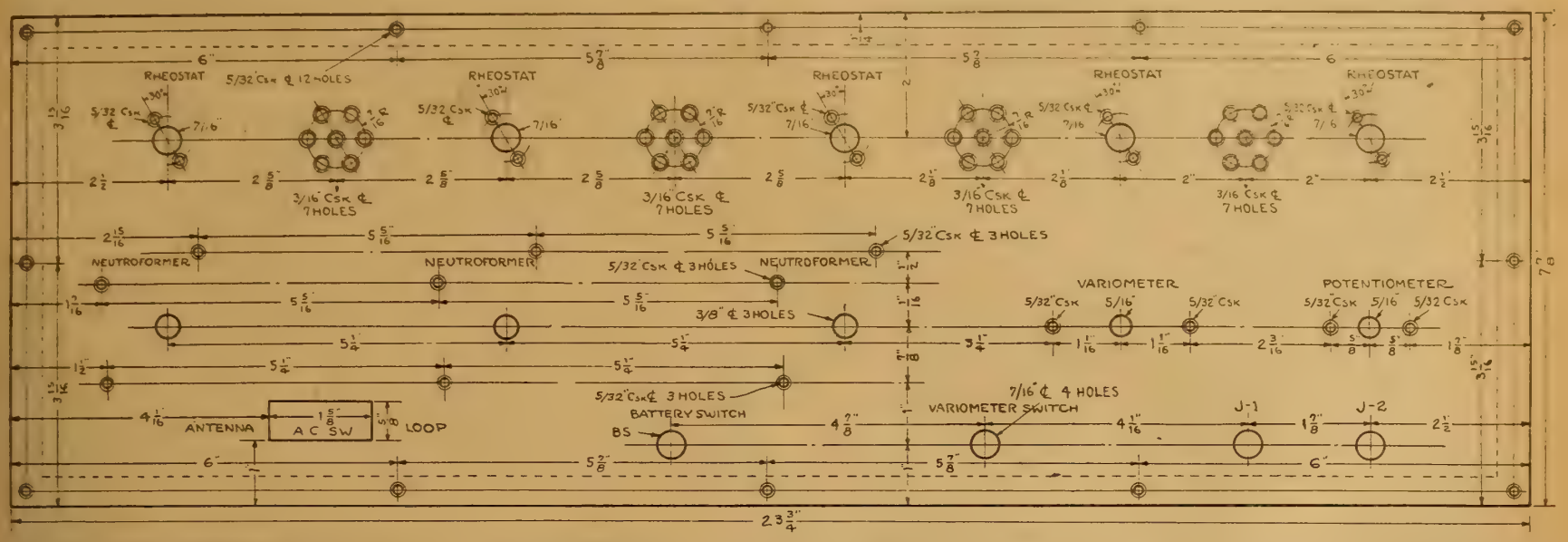
Five Tube Neutrodyne Receiving Circuit

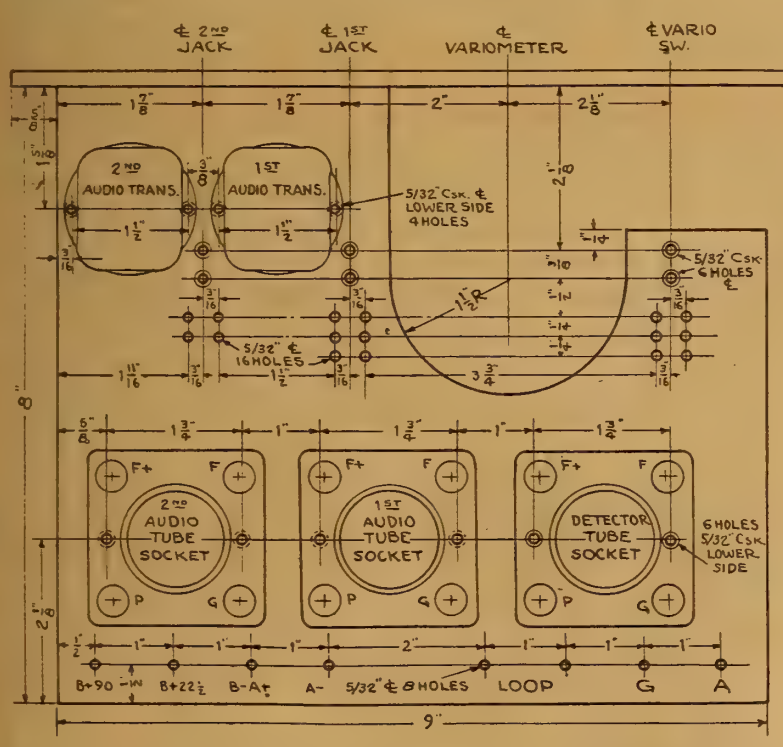
Part II—Panel Layouts

By H. J. Marx



IN any circuit employing the use of Radio frequency, the question of mounting the apparatus becomes of paramount importance. Inductive interference between leads has always been a factor to contend with, but in a circuit of the type under consideration capacity and inductive reaction between apparatus, especially in the Radio frequency stages, requires a concentration of thought in order to obtain the best possible layout.

It will be noticed that it has become customary to mount the neutroformers at a slight angle; this is done to avoid any stray magnetic field or lines to effect the coupling of the air core transformers.



The spacing between the three neutroformers has been reduced to a minimum and should not be decreased any further. The Radio frequency amplifying tubes are placed sufficiently far apart so that no intertube capacity effects need be anticipated. The detector and audio frequency amplifying tubes are not very susceptible to interference and have therefore been concentrated on the small sub-panel on the back of the right side of the set.

As to the Sub-Panel

This sub-panel is supported by the two jacks and the variometer jack switch. The six $\frac{5}{32}$-inch countersunk holes are for the screws that pass through the sub-panel into the jack and clamp the jack springs in position, taking the place of the screws that are normally used for that purpose.

The sixteen $\frac{5}{32}$-inch holes in back of these holes are to permit the leads from the jack terminals to pass through to the upper side of the sub-panel.

The cut-out in one corner of the sub-panel is to permit clearance for the rotor of the variometer. The two small hedgehog type of audio frequency transformers were found to fit conveniently into the rather limited space available. The larger type of transformers could not be used, due to the limitations of space.

The Binding Posts

All the binding posts for connections are mounted on the rear edge of this sub-panel. The antenna and ground posts, with the separate two for the loop aerial, are on the one side, while all battery connections are on the other side.

The negative B battery is connected to the positive A battery. A 22½-volt tap is used for the detector stage. About 90-volt plate battery is sufficient for the amplifying stages. For other tubes these values may be altered to suit.

The Main Panel

The five rheostats are mounted along the top of the panel. Between the rheostats are four sets of seven peepholes for observing the filament lighting. By countersinking all holes evenly the appearance of the completed panel is considerably improved.

The five controls are in alignment through a line a little below the center of the panel. Once adjusted, the rheostats require little further attention; so the main tuning controls are always at the finger tips.

The anticapacity switch is mounted below this, betwen the first and second dials. The connections are made so when the lever is thrown to the left the antenna and ground are connected; when to the right, the loop aerial is used.

The jacks and jack type switches are a little lower. The battery switch is centered between the second and third dials.

The variometer switch is between the third and fourth dials, thus putting it very close to the variometer (fourth) dial, with which it works in conjunction. The two audio frequency control jacks are located in the lower right-hand corner.

Twelve countersunk holes are indicated around the edge of the panel for mounting the panel in the set.

The writer has found square ruled paper, eight divisions to the inch, very convenient for making these layouts. Little or no measuring need be done.

After the layout has been drawn to scale, the paper is held in position on the panel, which has been cut to size, and the holes are punched with a center punch through the paper.

All holes are drilled with a $\frac{5}{32}$-inch drill and are then enlarged with a taper reamer to proper size. This avoids the necessity of a large number of drill sizes. The ordinary hand drill will not hold a $\frac{7}{16}$-inch drill (used for jacks); the reamer solves this and other similar difficulties. The square hole for the anticapacity switch must be cut out with a scroll saw and filed to exact size afterward. The two outer holes for the switch plate are best drilled after the body has been fitted into the square hole.

Small counterbores can be purchased for countersinking all holes for flat-head screws. Fans will find the polished hard-rubber panels considerably easier to work than the composition ones.

Naturally, different makes of apparatus will necessitate slight changes in mounting holes. For this reason the apparatus should be checked with the layout and any necessary alterations incorporated.

(TO BE CONTINUED)

Value of Grid Leak

For all around work the best value for the grid leak is one to two megohms. The actual size of the leak for best results varies slightly, and the range is usually from one-half to five megohms. The most usual value, however, is two megohms.

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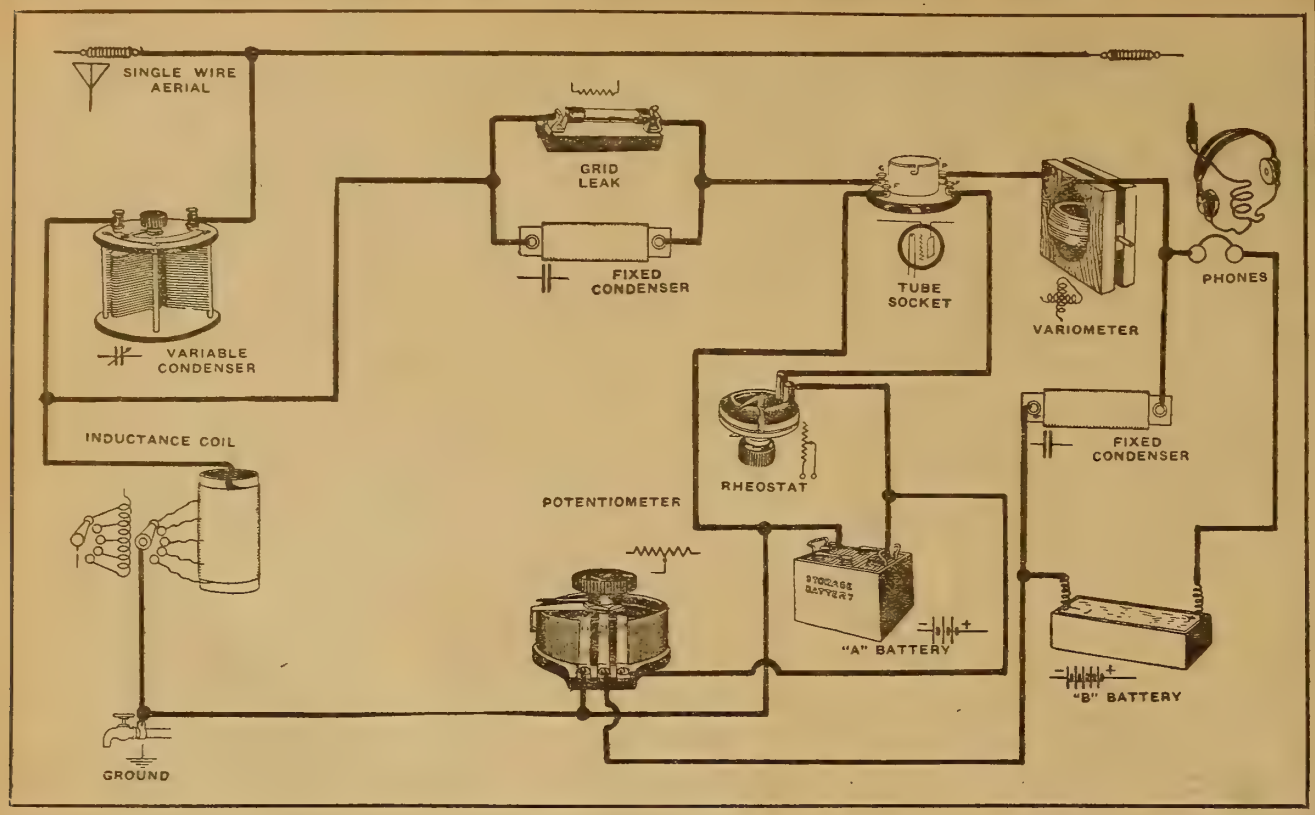

MANY of the Radio apparatus manufacturers are putting out tapped inductance units. Some are in the form of single layer coils wound on tubing; some are spider web windings; others have a lattice wound honey comb coil. These coils take the place of the old single slide tuners.

The taps need not be more than four or five, since the finer tuning can be taken care of by means of a .001 mfd variable condenser in series in the antenna circuit, as shown in the simplex diagram. For close tuning it will be found advantageous to have some vernier control on this condenser, since it will help clear up the reception through very accurate adjustment.

If a 400 ohm potentiometer is connected across the A battery as shown, very close adjustment of plate potential is possible; this is important with the variety of tubes at present available. The plate or B battery should consist of one 22½ volt unit.

The fixed condenser connected across the receivers should be .002 mfd capacity; the grid condenser .00025 mfd, and the grid leak should have a resistance of about 1½ megohms. The plate circuit is controlled by means of the variometer. This variometer can be inductively coupled to the inductance coil if desired; that is, the center line of the inductance unit should pass through the variometer. The distance between them depends entirely on the apparatus used and is best determined by experimentation.

Audio frequency amplification can be added in the usual manner if more volume is desired.

FIRST STEPS IN RADIO

(Continued from page 11)

theory of the operation at this time. As shown in Figure 57, a large electromagnet energized from a storage battery is used to create a dense magnetic field between circular pole pieces. A six-volt storage battery is used; it may be the same battery used with the tube filaments. A large permanent magnet may be employed instead of the electro magnet with some loss in signal intensity.

Within the magnetic field is suspended a coil of very fine wire, which is rigidly attached to a diaphragm cut from thin mica. The movable coil is connected to the secondary of a telephone transformer, the resistance of the movable coil and secondary winding being the same. The primary winding of the transformer primary is connected into the plate circuit of the last tube; it has the same impedance as a standard telephone receiver, being the same as the plate-filament impedance of the tube.

When the audio currents flow in the primary of the transformer they induce currents in the secondary which flow through the wire on the movable coil. When the current flows through the coil in one direction the coil has a tendency to move across or at right angle to the lines of force from the large magnet and thus move the diaphragm. A reversal of the current through the movable coil tends to pull the diaphragm in the opposite direction. The transformer has a twofold effect. By using the step-down in voltage it is possible to use fewer turns of wire on the movable coil to balance the low resistance of the secondary winding; thus a short air gap is possible. Were we to attempt to put enough wire on the movable coil to equal the impedance of the tube circuit, the coil would be too heavy and damp the diaphragm, and the longer air gap would make a larger electromagnet necessary. The other effect of the transformer is that it converts the pulsating direct current in the plate circuit into an alternating current that has both a push and pull effect on the diaphragm instead of simple variations in pull, as in the usual receiver.

There are several freak types of loud speaker in the experimental stage; the Radio inventor will find in this field a wide scope for his ingenuity.

(TO BE CONTINUED)

To compare a regenerative and a non-regenerative set short-circuit the tickler or plate variometer and note the decrease in signal strength and the quieter operation.

Reviews of Books

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Ideas for the Radio Experimenter's Laboratory. By M. B. Sleeper. The novice will find a wealth of information which will asist him in the designing, constructing and testing his set. Data on laboratory instruments are given. Price, 75 cents.

Experimental Wireless Stations. By P. E. Edelman. Simple directions are given in this book for making Radio equipment for the transmission of messages over long distances. Price, $3.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make a cabinet. It includes a 27-by 36-inch layout blue print. Price, 75 cents.

The Radio Amateur's Handbook. By A. Frederick Collins. A new revised edition of this book is just out. It is complete, authentic and informative work on Radio. Fully illustrated. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

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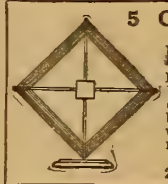

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Questions and Answers

Glass Panel

(4268) CH, Kansas City, Kas.

Will you please print a panel layout for the following: I have a one-tube, one-honeycomb coil and one condenser outfit. My tube is a C-300 Cunningham; the condenser is 43-plate vernier, and I am using, at present, a 50-turn honeycomb coil. I have heard Minneapolis, Chicago, Davenport, Omaha, and Tulsa, Okla. But none of them is 800 miles away. You said the outfit was good for 800 miles. This is what I want—a panel layout using one honeycomb coil, one variable condenser, one grid condenser, one A battery, one B battery, and I want to apply one step of amplification. My variable condenser is a 43-plate, and my grid condenser is a .0005, wired according to the hook-up Q. and A. Number 03518. You can print the panel layout or you can send me one, as it suits you. I am a constant reader of the RADIO DIGEST, and am saving its issues for future reference. Will you please tell me the best way to drill glass? My panel will be made of plate glass, ⅜ inch thick, by 7 by 12 inches in panel, 7 inches high, by 12 inches long, by ⅜ inch thick.

What size transformer should I use and what tubes? At present I am having considerable trouble with my set. When I start to tune in it sounds just like a windstorm coming; it seems impossible to get rid of it. I have a loop aerial; outside wires are 3 feet from rib to rib, making it 12 feet around, and there are 14 rows of wire on the frame reducing to the center. In using it should I connect both ends of the loop to the aerial post?

A.—The panel layout is entirely a matter of personal discrimination and convenience, the important feature being only to keep the instruments spaced at about two inches and all leads as short as possible.

Glass can be drilled either with a piece of copper tubing of the diameter desired and pumice powder, or with a tri-cornered file with the end ground flat, the latter being the more rapid method; great care must be taken not to crack the glass.

A diagram illustrating the method of amplification with your present set is shown on page 14 of March 3 issue of RADIO DIGEST.

A ten to one ratio audio frequency transformer of rugged construction will prove satisfactory.

A C301-A tube will function best as an amplifier.

The hiss encountered in the operation of the circuit is doubtless due to having the filament turned too high or to too high plate potential on the detector tube.

In stating the receiving range of any circuit it is always based on the most favorable circumstances. The reception you have accomplished with the circuit under discussion and in using a loop aerial would be considered very good.

Honeycomb Coils

(4113) FRS, Zion, Ill.

Using a single fixed honeycomb coil in the ultra audion set, what are the wave lengths for the coils of different number of turns?

How many ohms should a rheostat be to regulate the filament of a 1½-volt tube?

What capacity grid condenser should be used with a 1½-volt tube?

A.—With reference to wave length values of honey comb coils we advise them approximately as—

150 to 250 meters.....25 turns
200 to 350 meters.....35 turns
300 to 450 meters.....50 turns
350 to 550 meters.....75 turns

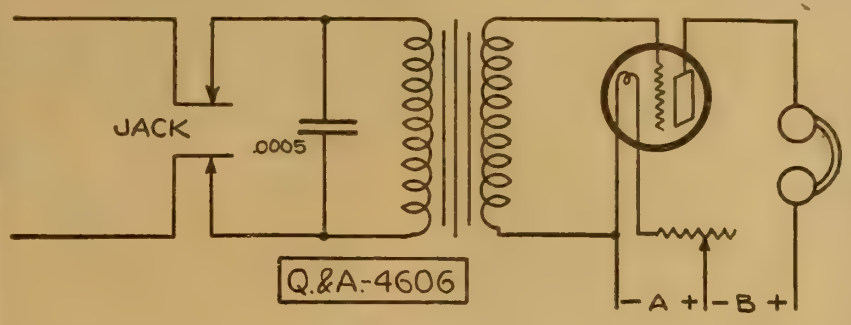
The usual six ohm rheostat is used with a 1½-volt tube. A .00025 mfd grid condenser is indicated.

Audio Frequency Stage

(4606) MP, Washington, D. C.

Please publish hookup diagram of separate one-stage audio frequency amplifier that is adaptable to any circuit and will give maximum volume with WD-11 tubes.

A.—Complying with your request we are herewith presenting a diagram employing a one-stage amplifier, audio frequency, which is adaptable to any standard circuit.



Body Capacity

(4219) CB, Hygiene, Col.

Is there any method that will stop the body capacity effect and the tube hiss? I use the standard three circuit regenerative set. What 'phones do you think are the best on the market? Is Brandis Navy as good as Baldwin type C?

A.—Body capacity effect can be eliminated by shielding the back of the panel with tinfoil and grounding the shield.

Incorrect tuning will cause the tube to hiss. However, this action is most frequently due to the tube being cold. After it has been turned on two or three minutes this should cease. If it does not, cut down the B potential until the hiss stops.

The Brandies 'phones are very good and will stand up under rougher usage than the Baldwin which, however, are more sensitive.

Super Heterodyne

(4169) FZC, Tampico, Mexico.

Referring to hook-up R. D. 73 appearing on Page 14 of your issue dated February 24, the Armstrong super-heterodyne circuit, will you kindly inform me as to—

What kind of coils are those shown shunted across condensers C4 and C5; are they honeycombs? If so, what size?

Will the UV-199 tubes give just as good results as the standard type 6-volt tubes? If I use the UV-199 tubes will it be necessary to use independent rheostats for each tube?

Which is the detector on this hook-up?

A.—The coils may be honeycomb, the size depending on the wave length desired. A table giving the value of respective coils accompanies the descriptive article.

The UV-199 tubes may be used in this circuit, although not as effectively as the UV-201AS. In either instance one rheostat will serve to control the filament.

The first tube is the detector.

Loop Aerial

(4242) CHS, Davenport, Ia.

I have made a folding loop for use with my reflex, which is not completed. I am undecided in regard to the kind of wire to use on the loop. The loop is of the box type, 3 feet square, with cross arms to hold the wire. The arms are 6 inches long, to hold 10 wires ½ inch apart. What is your opinion of copper ribbon? Is it better than stranded wire? What width and thickness is best? Will it have more or less skin resistance than stranded wire? I want something flexible so it will hold up neatly.

A.—We recommend copper ribbon wire, as in a small measure it is more efficient than the stranded wire, although hardly sufficient to be of material difference. The ribbon wire has less skin resistance than stranded wire, but there is so little used in the construction of a loop aerial as to make the ohmic resistance a negligible factor.

Nacireman Circuit

(4500) GWD, Bowling Green, Fla.

On the Nacireman circuit, RD Number 87, could honeycomb coils be used in place of the variocoupler? What would the values be? I would like to use a 43-plate vernier variable condenser in place of one of the 23-plate condensers. Could this be satisfactorily done? Should I put it in place of C or C2?

In using honeycomb coils instead of the variocoupler, is a 3-coil mounting suitable, or should the 75-coil be isolated?

A.—Two 50-turn honeycomb coils may be substituted for the specified variocoupler.

A 43-plate variable condenser may be used in place of C2, 23-plate if desired.

If the honeycomb coils are used in place of a variocoupler, a 2-coil mount is indicated, as the 750-turn honeycomb coil must not be in inductive relation to other coils.

Antenna Efficiency

(4634) JVB, Cincinnati, O.

As I cannot get a longer stretch than 45 feet I am now using a two-wire antenna, 45 feet long. What I would like to know is the approximate receiving efficiency of other kinds of antennae compared with the one I have? Please tell me how much better or worse the following antennae are than the one I am now using—single wire antenna 45 feet long; four-wire antennae 45 feet long, cage form?

A.—The described construction of antennae will give equal results in reception. If it is impossible to lengthen the antenna an advantage will be gained by raising it to as great a height as practicable.

Standard Variocoupler

(4573) AE, Bushton, Kans.

Please let me know how to wind a standard variocoupler to get the different wave lengths, static and rotor size of wire?

A.—A standard type variocoupler is accomplished in 56 turns of number 22 wire, tapped at every seventh turn, for the primary, and 40 turns of number 26 wire for the secondary.

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Radio Illustrated

Five-year-old Paul Totten, Jr., of Rochester, N. Y., in keeping with the times has Radio-equipped his "automobile" and enjoys the music very much when "touring" along. The set is a Reinartz (Radio Digest specifications), size 10 by 6 by 6 inches and combs the country of stations

Frank Houck, three years, because of his pluck has been nicknamed "The Sunshine of Hahnemann" at the latter hospital in Philadelphia where he listens in while being cured of spinal curvature

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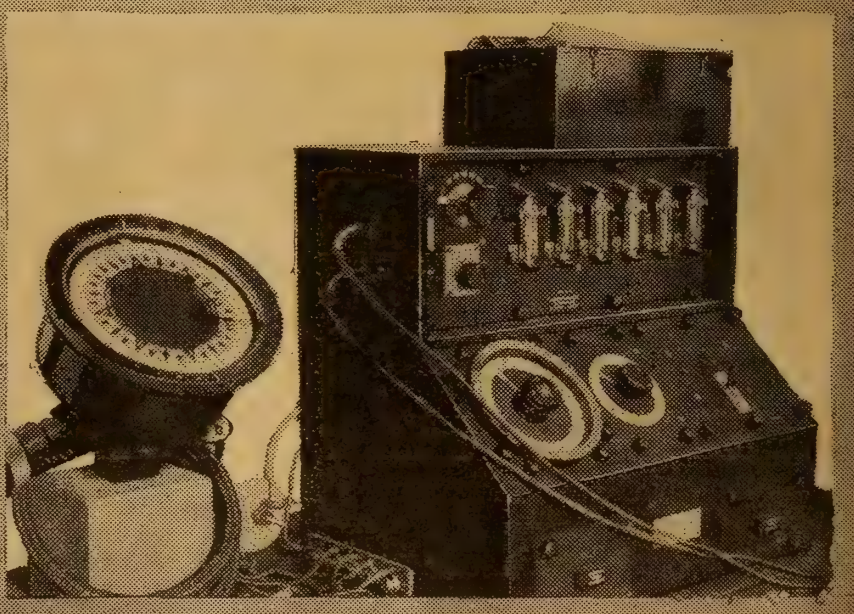

The seventh wonder of the maritime world, the "D. F." (direction finder) or Radio compass as it appears on the world's fastest liner, the S.S. Mauretania. The device consists of a Sperry gyro repeater and a special six-tube Radio receiving set. The D. F. is directly connected with the ship's compass

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New Three Coil Simplex; Neutrodyne Assembly

Radio Digest

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Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, SEPTEMBER 8, 1923 | No. 9

HANDWRITING BY RADIO

Mrs. Calvin Coolidge, right, first lady of the land, is a Radiophan. She is shown with the set in her apartment at the New Willard Hotel where she and President Coolidge lived in Washington prior to their removal to the White House. Above is Mary Lee, known as the "Radio Queen" of Chicago on account of her singing from KYW and WJAZ ©U.&U.

BOWDOIN MUM; FIRST DX TALK TO GET SET

WJAZ, Worried Over Ship's Silence, Offers Receiver

CHICAGO.—Anxiety caused by lack of recent word from the Polar expedition, headed by Dr. Donald MacMillan, has led Station WJAZ, Chicago Radio Laboratory, to offer to the first amateur in the United States or Canada communicating with the Bowdoin, on which the MacMillan party is making its way through the Arctic, a complete regenerative tuner and amplifier, an exact duplicate of the set aboard the Bowdoin.

DIRECTION FINDERS HELP LAKE BOATS

VESSELS REDIRECTED TO PATHS BY AIR GUIDE

Pointer on Movable Loop Over Compass on Chicago's Pier Fixes Crafts' Position

CHICAGO.—So that ships lost on the Great Lakes may learn their bearings, the United States government has established a new system in conjunction with the naval station at Great Lakes and its control on the municipal pier, Chicago. The method is similar to that applied to shipping on the east and west coasts and to the Gulf marine.

Heretofore, when vessels on the lakes were in doubt as to their positions, it was necessary, especially on stormy or dark night, for their masters or navigation officers to work long and hard to redetermine their courses. Ths process of course was attended by an element of danger.

Sends QTE? Receives MO

The new system enables the master of a ship, through the Radio operator, to relocate his path in a few minutes. On order from the captain the Radio operator sends the call (international code) QTE—"What is my bearing?" The naval station at Great Lakes, through its control on the Chicago municipal pier, then awaits the repeated MO which enables the naval operator to compute the latitude and longitude of the craft.

By means of a movable loop a pointer attached to it is swung by the naval operator over a compass. The volume of sound produced by the MO, that is, its intensity, serves as a basis for figuring the position of the transmitting station aboard the ship. The direction finder at the naval station gauges the maximum volume of the MO, then tunes out until the MO is silent. Midway between the maximum and the zero points on the compass is the position of the ship.

New Airphone Society in Rio

RIO DE JANEIRO.—A Radio organization, known as the Radio Sociedade do Rio De Janeiro, has has been formed here; it already has more than 100 members.

FRENCHMAN TRANSMITS AIR SCRIPT

Sends Long Actual Written Message in Only Six Minutes

Dollar Is Total Expense

Revolving Cylinder, Lights and Mirrors Feature Device Which Also Copies Photos

PARIS.—Absolute facsimiles of Radio telegraph messages in the original handwriting of the sender are now being sent every day over the French Government stations by the Belin system, which is an adaptation of the inventor's method of transmitting photographs by wire.

The sender of the telegram writes it on ordinary paper which is placed on a re-

(Continued on page 2)

PARTS BUYERS HEED CALL OF WEATHER

NEED FOR DEVICES RISES AS TEMPERATURE DROPS

Ill Wind That Blew Cold Causes Greater Demand All Over Land for Apparatus

SPECIAL REWARD OFFER

Coupon Number 15

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

The recent ill wind that blew chill and damp over almost all the United States blew good in that it aided considerably the reception of Radio signals. The same meteorological phenomenon caused readers of the Radio Digest to increase their interest in the offer to supply parts at low prices.

Where low temperatures prevailed, where clear starry nights marked the season, the demand for parts rose highest. As the year grows and the summer wanes inquiries as to the parts offer will gain in number.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Ray-O-Vac Dry Battery, 1½ volts; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Gird Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B-Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; Basco Switch Lever Assembly; 3" Radion Dial, black; 2¼" Radion Dial, black; 3"x1" Radion knob with shafts, ⅜" or ¼", black; 3" Radion Dial, ribbed surface.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Pudlin Variable Grid Leak with .00025 mfd. Condenser; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm; 3¼" Radion Dial, black; 4" Radion Dial, black; 4" Radion Dial, black, ribbed surface.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat, 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Ray-O-Vac Dry Battery, 2 cells 1½ volts; Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack, Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Basco Tuning Coil; Basco Vernier Rheostat; Radion Panel ⅛"x7"x9", black or mahoganite; Radion Panel ⅛"x7"x12", black.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Ray-O-Vac No. 4151 B Battery, 22½ volts; Ray-O-Vac Dry Battery, 3 cells 4½ volts; Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Radion Panel ⅛"x 7"x12", mahoganite; Radion Panel ⅛"x7"x18", black; Radion Panel ⅛"x9"x14", black; Radion Panel ⅛"x10"x 12", black.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Ray-O-Vac Dry Battery, 4 cells 1½ volts; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial; Radion Panel ⅛"x7"x18" mahoganite; Radion Panel ⅛"x7"x21", black.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80), any one of the following articles will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Ray-O-Vac No. 2151 B Battery, 22½ volts; Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser; Radion Panel ⅛"x7"x21", mahoganite; Radion Panel ⅛"x7"x24", black; Radion Panel ¼"x10"x12", black; Radion Panel ⅛"x9"x14", mahoganite; Radion Panel ⅛"x10"x12", mahoganite.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate; Radion Panel ⅛"x7"x24", mahoganite; Radion Panel ¼"x10"x12", mahoganite; Radion Panel ⅛"x12"x21", black; Radion Panel ⅛"x14"x18", black.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Ray-O-Vac No. 2301 "B" Battery 45 volts; Ray-O-Vac Dry Battery, 6 cells 1½ volts Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Turney Spider Web Coil Mount, Type B; Thordarson A. F. Transformer, 6 to 1 Ratio; Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Heat Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser, 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser, with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Basco Radio Frequency Transformer; Radion Panel ⅛"x12"x21", mahoganite; Radion Panel ⅛"x 14"x18", mahoganite.

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Looking Ahead

A New One Worth Trying—The Miloplex Circuit—Soon to be described in the Digest. This new hook-up rivals the famous Flewelling Flivver with its results. We introduced you to the flivver last fall, and the world is still talking about it. The world will shout about the Miloplex. Simple, costs little, and gets the country!

Conclusion of the Five Tube Neutrodyne Set Series—Next issue Mr. Marx will give the instructions for neutralizing the capacity coupling between the tube by the adjustment of the small neutrodons. He will also tell how to operate the set. Don't miss the conclusion whatever you do.

Plate or B Batteries—All About Them—The sixteenth chapter of Mr. Benson's series for Radio beginners will appear next week and be devoted to a discussion of plate batteries, their maintenance and failing points. Worth knowing.

Simplex Diagram Means Simple Picture Illustrations of Simple Sets—Efficient but easy for the new fans to set up and operate. A new, inexpensive, single tube hook-up will be given next issue.

Better than a Super is R. D.-97 to Appear Next Week—This layout may be described roughly as being a single tube reflex circuit using three honeycomb coils, but not as tuning units.

Soon Coming—Photo Diagram of the Melco Supreme Receiver—Using the popular Acmedyne circuit. A different type of set from the usual.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City ..... State .....

RADIO HANDWRITING

(Continued from page 1)

volving cylinder and by the play of lights and mirrors, as in the case of transmission of photographs the exact script is sent over the wire. It is much cheaper than the ordinary Radiogram. A flat rate of twenty francs is charged, the number of words being limited only by the size of the writing.

Sends 1,453 Words for Dollar

For instance, in one case a stenographer sent from Lyons to Paris a message of 1,453 words, in shorthand notes, which was written on the cylinder of about the same size as an ordinary telegraph blank. The cost was only one dollar. In this way about one column of a newspaper could be sent for about $1.25. The system is very fast. The operation of sending the stenographic message from Lyons took only six minutes.

If the telegram had been written in ordinary script and sent by a fast telegrapher it would have required twenty-five minutes at the rate of sixty words a minute, and the cost, at the current rate, would have been about $16. This method of automatic transmission of telegrams is now open to the public, the necessary apparatus having been installed in the French government telegraph offices of the larger cities. There is no reason why a person could not send his own photograph with an inscription this way.

WDAR Balks at "Operators' Night" but Permits Dance

PHILADELPHIA.—Station WDAR, Lit Brothers, recently had an "operators' night," the first of its kind in this city, probably in the country. Although the program was to have been put on the air, not one listener in heard the fun, because the transmitter quit "cold" about two hours before the start and stayed that way all night.

Operators and announcers in all the stations here and newspaper Radio editors were invited to participate. It was planned that all of them would speak via Radio. Station WOO, after broadcasting the time signals and weather reports, announced the break-down of WDAR. But everybody enjoyed himself. Mrs. B. F. Marshall was hostess, assisted by A. S. Crooks. After speeches by several of the announcers there was a "Radio dance."

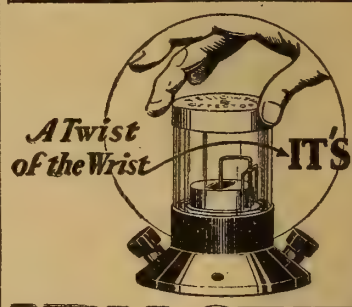
Positive Radio Helps

For Storage Battery Tubes Use *Eveready Storage "A" Batteries.*

For Dry Cell Tubes Use *Eveready Dry Cell Radio "A" Batteries.*

For all Vacuum Tubes Use *Eveready "B" Batteries.*

EVEREADY Radio Batteries
—they last longer



YELLOWTIP
MICROMETER ADJUSTING
CRYSTAL DETECTOR

Any adjustment made in a moment—fixed instantly! Hold indefinitely, until you wish to change, then—"A Twist of the Wrist—It's Set." Ideal for reflex and other circuits. $2

Write for folder, and name of your nearest dealer

Wholesale Radio Equipment Co.
Exclusive Factory Representatives
35 William Street, Newark, N. J.
Dealers and Jobbers—Write for Attractive Proposition

WGY OFFERS $500 FOR RADIO DRAMA

NEW ART UTILIZES VOICE TO BUILD SCENERY

General Electric, Fostering Novel Theatrics, Encourages Use of Sound Imitating Devices

SCHENECTADY, N. Y.—Station WGY, General Electric Company here, is offering a prize of $500 for the best Radio drama submitted in competition during the three months' period beginning September 1.

The prize-winning play will be presented by the WGY players during the winter when transmission conditions are best and when perhaps 1,000,000 persons will be listening in. An audience of this size will be equivalent to the attendance at 500 performances of a stage production in a theater seating 2,000 persons. Other plays offered in competition will be produced via the air, if found suitable, and the authors remunerated.

Public Demands Radio Drama

One year's production of Radio drama by the WGY players has convinced Martin P. Rice, director of broadcasting, that there is a public demand for this type of entertainment and that the peculiar requirements of the Radio drama as compared with that of the stage and the screen will result in a new form of dramatic art. The screen has evolved a distinct type of drama which depends solely on the eye for its appreciation; tomorrow the Radio drama may be so written that the ear and the imagination unaided by the eye may be satisfied. It is to stimulate the development of the Radio drama that the General Electric company has inaugurated the contest.

The author of the Radio drama must place himself in the position of writing for a blind man. The words or lines of the actors must convey a picture of the scene in which the action takes place.

When Speech Is Scenery

This apparent limitation or handicap becomes an aid to the action, as the writer need not restrict his play to three, four or five scenes. For example, he can depict an automobile race and carry his audience through its exciting phases by means of the lines. He may take his listener from room to room or floor to floor in a dwelling, if farce or melodrama call for such action. The chase, long a popular feature in the early motion pictures, may be brought into the Radio play by means of speech. The spoken word builds the scenery. Dramatic situations may be built by the voice and by sound-making devices. The writer is encouraged to make use of the latter so as to simulate rain, thunder, surf, roar of a moving train, a pistol shot, an airplane, a telegraph key or an automobile motor.

IT COST HIM $110 TO LISTEN TO KPO MUSIC

San Francisco Radiophan Robbed by Fair Hotel Guest

SAN FRANCISCO.—It cost J. W. Phillips $110 to have a strange but pretty woman share a KPO Radio concert with him in his room in the Ventura hotel here recently, he told the police. Phillips, explaining that he was a Radiophan, installed a receiving set in his room. Shortly after he had tuned in and was intently listening to a musical program broadcast by Hale Brothers, he said he heard a gentle knock at his door.

"Come in!" he called.

The door opened, a pretty girl begged pardon, but asked if she could listen in with him. Leaving the door ajar, Phillips told the police, the young woman pressed her head closely to his and shared with him the receiver.

"While listening in she was 'dipping in' to my pockets," said Phillips, "for after she had thanked me and hastened away, I missed $110 I had in my vest pocket."

WOC OFFERS PRIZE TO BACK ITS CORN TALE

DAVENPORT, IA.—So that the thousands of listeners in may see proof of the usual announcement of Station WOC of this city that it is "where the West begins in the state where the tall corn grows" $50 in prizes will be awarded to boys and girls in Iowa who report and exhibit the tallest stalks of corn.

SUNDAY'S "DRY" TALK WILL BE SENT BY WGR

BUFFALO, N. Y.—WGR announces the tentative engagement of Billy Sunday during the week of October 15. The Rev. Mr. Sunday is scheduled to speak to the national convention of the W. C. T. U. All of the addresses will be given before microphones of the Federal Telephone and Telegraph Company station.

THEY'LL NICKNAME HIM WGM

"Lasso" Moseley, director-announcer, Station WGM, The Atlanta Constitution, "christening" the two-months-old baby boy of Mr. and Mrs. George F. Pollock, of Atlanta, Georgia. William Grady Moseley, whose initials represent the call letters of "Old Reliable" of the South, was the name given the youngster. Mrs. Pollock is shown "standing by" during the ceremony

New Station KGB, Built by Operator, Is Opened

Newspaper Plant in Tacoma Operates Temporarily on 50 Watts

TACOMA.—Station KGB, the new plant of the Tacoma Daily Ledger, one of the most powerful in the northwest, was opened here recently by means of a fine musical program. The station, which was built by Alvin Stenso, chief operator, who also constructed The Ledger's two preceding plants, is designed for facilitating reception by crystal and less powerful tube sets in a wide area. KGB will operate temporarily on 50 watts; it is a 100-watt station.

WOR AGAIN PRESENTS PLAY FROM BROADWAY

Writer of "Thrillodrama" Introduces Characters

NEWARK, N. J.—Another Radio matinee of a current Broadway success was staged at Station WOR, L. Bamberger and company, here recently. It was Myron C. Fagen's "thrillodrama," "Thumbs Down"' A prologue, especially written, was read by the author, who also described each scene and each character and personally introduced each player to the listeners in. The rise and fall of the curtain was indicated by a gong; there was orchestral music between acts.

CHAIN OF THEATER STATIONS PLANNED

PLANT IN BOSTON SECOND IN LOEW'S PROJECT

Line of Playhouses Broadcasting Own Feature Acts Part of New Yorker's Scheme

By F. N. Hollingsworth

BOSTON, MASS.—This city is to be the second in a chain of broadcasting stations to be established by Marcus Loew in connection with his chain of vaudeville and motion picture houses across the country. Mr. Loew has already transferred Station WHN from Ridgewood to the Loew State theater building in New York City.

It is planned to extend this service; part of the plan calls for the erection of a similar station in Boston, at the new theater under construction in the former Siegel building, which will be the third Loew theater in Boston.

Will Broadcast Headliners

It is his intention to broadcast headline acts. Theaters not in the same building with the broadcasting station will be connected by telephone and microphone service with the broadcasting studio. Mr. Loew's finest orchestras will also feature the broadcasting as will celebrities of the stage and screen who will discuss topics of interest to Radiophans.

Station WHN has been heard in all of the eastern states and as far as Dallas, Tex., and Butte, Mont. Mr. Loew plans to increase its range to 2,000 miles.

Will Help Theater Patronage

Leading theatrical men say that the plan of Marcus Loew points the way for other theatrical men and that it will have a marked effect in raising the plane of Radio programs throughout the country.

Viewed in the light of the results attained by grand opera broadcasting last winter, when many thousands hitherto unfamiliar with grand opera became enthusiasts and many hundreds became patrons, the project of Mr. Loew will undoubtedly result in largely increasing the interest in and direct patronage of theaters.

Room will be reserved in the studio of the Boston theater so that famous orchestras may send their repertoires readily by Radio. Proper acoustics and every detail necessary to successful broadcasting will be provided. The studio will be connected by telephone lines with Station WHN in New York so that any important event in Boston or New York can be broadcast simultaneously from both stations.

Word from Arctic Ship and Back in 10 Minutes

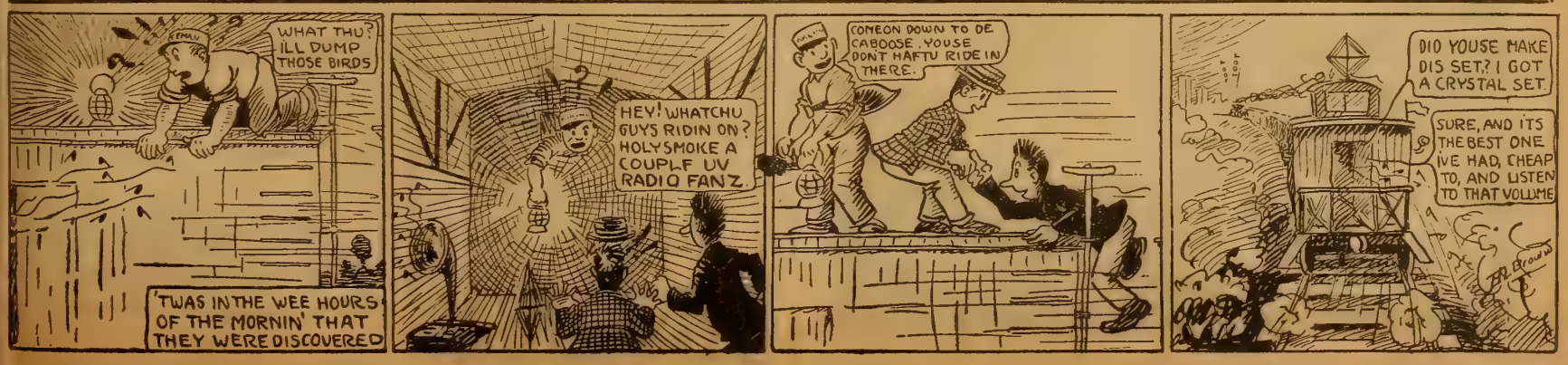
Message from Bowdoin's Operator Is Relayed to Mother

WATERBURY, CONN.—Ten minutes was the record time consumed for the sending of a Radio message from Donald B. MacMillan's Arctic-bound schooner, Bowdoin, to Bristol, Conn., via a local amateur station, and the relaying of a reply to the ship somewhere northeast of Labrador on the way to Greenland.

The prophecy that the Radio installation on the Bowdoin could be utilized by members of the crew to communicate with friends and relatives at home, thereby relieving the tedium of Arctic loneliness, has proved true, the feat demonstrating the efficiency of the American amateur traffic system.

The message was a personal greeting from Donald H. Mix, Radio operator with the exploration party, to his mother in Bristol. Communication was established with WNP, the Bowdoin's Radio, shortly after midnight by Allen C. Lawson here, who immediately called Mrs. Mix by telephone. The reply was soon on its way north; Lawson heard Mix thankfully acknowledge its receipt.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Radio Hoboes DeLuxe



ETHERIC 'BELLHOP' NEW HOTEL DEVICE

HOSTELRY IN PHILADELPHIA PLANS STATION

"Meesta Hmphmp" Called by Airphone —Page One of Several Innovations in Apartment

PHILADELPHIA.—Three new large apartment buildings in this city are making elaborate Radio installations. In the Pennsylvania apartment hotel, which is nearly completed engineers are installing receiving apparatus on the roof, which device will supply Radio programs in the main dining room, banquet hall and grill.

The Garden apartments and the Lincoln Drive apartments, the latter of which will be built soon, also plan complete Radio installations. Each apartment in the two structures will be equipped with headphones and loud speakers. Receiving equipment will be placed too in the lobbies and dining halls.

Will Page by Apparatus

The Lincoln Drive apartment equipment will permit reception from three stations simultaneously; the circuits are designed so that any of three broadcast features can be given to the entire building or to individual tenants as they may choose. It is also planned to establish a small broadcasting station in a room by which orchestral music or the voice of a speaker may be transmitted to all other rooms. Durham and Company, Radio engineers who are installing the apparatus, say it will be the most elaborate ever attempted.

In the Pennsylvania apartments the engineers have connected a novel paging system with the Radio equipment so that the telephone operator may by plugging in a microphone talk to any one or all of the output stations and make what announcements may be necessary. This system will be used also for paging guests.

New Jersey Radio Makers to Show in Few Weeks

Manufacturers Propose to Work with Electrical Firms

NEWARK.—More than thirty Radio manufacturers in New Jersey, who recently formed an organization for the betterment of the industry, known as the Radio Manufacturers' Association of New Jersey, have announced that plans are almost complete for a Radio show, to be held probably the latter part of October or the early part of November, in the 6th Infantry armory, Newark.

They have decided, owing to the fact that Radio is so closely connected with the electrical industry, that electrical firms will be invited to participate in the exposition.

Radio Exports Show Gain

WASHINGTON, D. C.—Export shipments of radio apparatus varied widely from month to month during 1922, according to R. A. Lundquist, chief of the electrical equipment division of the department of commerce, who reported recently that a much wider distribution was shown this year by the manner in which the quantity of exports maintained a steady high level. During the first six months of this year the shipments were valued at $1,209,389.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Dyed in the Wool Radio Men

(Submitted by R. L. B., Denver, Col.)

Question. In my experience with the Flewelling I had great difficulty in obtaining a grid leak that would give the proper control of the circuit. Finally I was able to pick out two that worked. From then on in each set I received tremendous regeneration. Your comparison of dumping a ton of very hard coal is very good. It is all that. But while I can get all the local stations on any antenna or ground or nothing, yet I can do no distant work. Why? We certainly know how to tune our sets but this point seems to be beyond us. Can you help us?

Answer. You chaps are real dyed in the wool, experienced Radio men and above all others should make the Flewelling work, but I'll bet you a baker's cooky that you are overlooking one point. Here goes —a million persons asked for all the information that we could give them about the circuit. Emphasize the word *all.* That means that we had to tell them about using a tickler for feedback and also about a variometer in the plate circuit. You know as well as I that a tickler means constant regeneration over a greater band of wave length; it is therefore easier to tune with than a plate variometer. Using a plate variometer means that we must operate both tuning elements and variometer together because of the fact that one setting will change the other. We already have a few actions going on in the Flewelling without adding a further complication such as tuning the plate circuit. Let me tell you that if you are using a variometer in the plate circuit of a Flewelling you are at the present development of the set undertaking a man's sized job when you start to tune in a distant station. Do not use a plate variometer but stick to the good old fashioned tickler coil; you will not have much difficulty in tuning in the distant stuff.

ARMY'S EAR SHOWS ADVANCE, REPORT

Tests on Aviation Field, East, Shows Spark Bests Phone on Airplane

NEW YORK.—One of the most interesting applications of Radio is found in the modern airplane, according to military experts here. The aviation service is known as the "eye" of the army, but that eye is blind unless it can signal back its observations.

During the last war compact Radio outfits were constructed for plane-to-ground communication, but as there was little time to do experimental work with them, they did not perform as well as desired. Since the war, however, rapid strides have been made on the aviation field of the 102d observation squadron of the New York national guard at New Dorp, Staten island.

Here are eight airplanes, two of which have been equipped with complete receiving and transmitting apparatus by Lieut. James K. Noble, who is in charge of Radio work.

It has been found that the spark equipment is much more reliable than the phone. There is less to become out of order, and the parts withstand more easily the terrific vibration.

Steamer Line Orchestras Give Concerts Over CKAC

MONTREAL.—If Canadian and American Radiophans have heard high-class orchestral programs every Thursday evening this summer they are indebted to the White Star Dominion line, which, in cooperation with Station CKAC, the La Presse of this city made arrangements to broadcast the music of ships' orchestras while in port. These programs will continue until November 8.

AIR TELLS STROKES OF GOLF CHAMPION

Various "Plays" of Bobby Jones on Long Island Links Are Broadcast to Atlanta

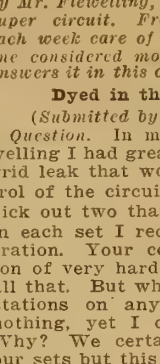
ATLANTA.—An odd sidelight on the victory of Bobby Jones as American open golf champion was the Radio reception of the news by scores of his friends and admirers playing on the young amateur's home course in Atlanta.

Dotting the course were rereshment stands, all Radio equipped. While the sensational match was under way, a leased telegraph wire connecting the Inwood Links on Long island, N. Y., and the Atlanta Journal building, enabled Station WSB to keep a stroke-by-stroke narrative of the battle.

As the news of Jones' victory reached the East Lake stations, it spread over the entire course. A great crowd at the clubhouse surrounded a loud-speaker.

Zion Opens Another Studio

ZION, ILL.—Zion's second Radio studio was opened recently for broadcasting band and orchestra selections from WCBD. The studio is in the southeast corner of Shiloh tabernacle.



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(Both Copyrighted)
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This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.
My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.
Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 170 to 500 meters.
AUXILIARY TUNER
This new instrument connected to your present receiving set with one wire enables you to easily bring in both the long and short wave stations which you cannot get with your present equipment. It also enables you to eliminate that local interference so you may listen to distant stations.
Copyrighted diagram and complete instructions for building and operating this instrument, 50c, or with all parts, including Condenser, Coils, Switches, and Panel, $8.50. Complete instrument, $15. All goods prepaid.
These instruments are easy to build, easy to operate. Everything clearly shown.
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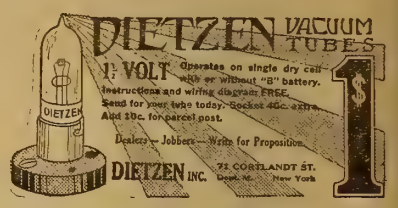

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Bell V. T. & W. D. 11	.89 .10
V. T. Bakelite	.50 .10
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2-inch	.25 .06
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The New Grebe Broadcast Receiver

JOHN JAY ADAMS, of Mount Vernon, N. Y., was at Charleston, Ontario, during July. With his Grebe Broadcast Receiver he enjoyed programs from fifty-three broadcasting stations, including those at Atlanta and College Park, Ga., Memphis, Tenn., Fort Worth, Texas, Omaha, Neb., Chicago, Philadelphia and New York. He reports "absolutely no interference."
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GREBE RADIO

THE MAJOR AND ADONIS OF WNAC

Station WNAC, Shepard Stores, Boston, has long been recognized for the quality of transmission. Its equipment is partly responsible, but to Major John F. Fanning (right), announcer and program director, and Irving B. Robinson (left) operator and assistant announcer, should go a great deal of credit. The Major, or "JJF" as he is known to listeners, has some very definite ideas about broadcasting. Here he is explaining some of these to one of the Shepard Stores' dummies, who, to judge from her smile, thinks the Major is microphoning "through his hat." Mr. Robinson, or "Adonis," is a capable assistant and keeps the amperes flowing into the WNAC antenna. His nickname is due to his handsomeness and marriageability © K. & H.

Most Popular Voice on Air in East Is Major J. J. Fanning's, of WNAC

By F. N. Hollingsworth

BOSTON, MASS.—Probably the best known and most popular voice in the East is that of Major John J. Fanning, director of broadcasting at WNAC, The Shepard Stores station here, and heard by thousands of admirers of Radio concerts as "JJF."

As director of broadcasting since the establishing of Station WNAC last year, it became Director Fanning's duty to announce the Radio programs daily. From the very first day, when a telephone call was received by Mr. Shepard from a woman in Chelsea asking the name of the announcer with the wonderful voice, men, women and children continue to call him up, write him letters and send picture postcards, requesting his photograph and telling him complimentary things about his voice.

Voice Liked by All

Should he ever lose that remarkable voice—deep, rich and resonant—it would be a hard blow to WNAC, as well as to thousands of Radiophans. It is necessary for him to employ a private secretary to read and answer his mail and to tell the writers who he is. It is not alone the quality of his voice, but that quiet, unassuming attitude in his announcements that has made him so popular with the great unseen audiences of the East. And personally to meet, he is just as unassuming and quiet as his voice over the Radio would indicate. He impresses one, however, as having a great reserve of forcefulness and as one who would be quick and decisive in action should occasion require.

Arranges WNAC Programs

As director of broadcasting it devolves upon Major Fanning to make up the programs for WNAC from day to day and far in advance. It is to him in a large measure that thanks should be extended by Radiophans for some of the wonderful programs they have heard from Station WNAC, including several nights of grand opera, and for some of the remarkable "stunts" that have been sprung from time to time.

The latest feature added to WNAC's programs is announcements of the results of some of the big boxing events that have taken place lately, including the Dempsey-Gibbons battle and others. A news ticker, connecting directly with the ringside of every important "scrap," has been installed in the announcer's studio, and as the returns come in, together with other ticker news, it is announced to Radiophans who otherwise would have to call up some distant telephone station or wait for the morning papers.

Wide Army Experience

Major Fanning is a native of Boston and a graduate of Boston schools. He served in the Signal Corps of the Massachusetts National Guard from 1907 until the outbreak of the world war, this period including a term on the Mexican border as sergeant of the Radio company. In May, 1917, he was commissioned a first lieutenant in the Signal Corps, a month later promoted to captain, and then transferred to the Signal Corps of the regular army. In January, 1918, he was again promoted to major in the regular army.

Major Fanning commanded the 301st Field Signal Battalion during its entire existence, first for a year in America and for another year overseas as part of the first and second American armies and the army of occupation. He is at present commanding officer of the 301st Signal Battalion, 21st Army Corps, U. S. Army, with the rank of major in the Signal Reserve Corps.

For ten years he has been active in Radio. He is married, so those of the feminine fans who admire his voice will have to be content with that.

Second Announcer Eligible Catch

Irving B. Robinson is assistant broadcasting operator and announcer for WNAC. He is just twenty-four years old, girls, a likable chap, with a good announcing voice and a fine war record. He was born in Attleboro, Mass., and his father, Dr. H. S. Robinson, is one of the best known Radio amateurs in the country. When Irving was old enough to pound a key he was at the set, sending and receiving, in communication with his boy friends and his father's older amateur friends.

Young Robinson was one of a party which installed a Radio communication service in the gold camps near the South Porcupine, Africa, district. He has traveled all over the world, even at one time joining a party of gold prospectors on a trip to Labrador. He has also acted as a superior claim agent, settling some important cases.

Besides his liking for Radio, which seems to be now his life work, he has quite a hobby for amateur theatricals and has taken prominent parts in many shows, displaying no mean ability.

And girls! He is unmarried! They call him "Adonis" Robinson.

Radio communication is rapidly being adopted by Western power companies as a means of maintaining communication with their distant power plants when wire lines are inoperative.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00				11:30- 1:30	11:00- 1:00	
CKAC, Montreal, Que.	430		6:00- 9:00		6:00- 9:00		6:00- 9:00	3:00- 4:30
KDKA, E Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver Colo.	360	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Orc.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00		10:00-12:00		10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00		8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	345		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00		4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360		9:00- 1:00		9:00- 1:00		9:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	
WDT, New York, N. Y.	405			5:00- 5:50		9:00-10:00		
WEAF, New York, N. Y.	492		5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00		8:30- 9:30	8:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30		5:30- 6:30
WGI, Medford, Mass.	360		6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00		6:00- 8:00		6:00- 8:00		
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-11:00		5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30		7:30- 8:30		7:30- 8:30		
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	6:00-10:00	
WJAX, Cleveland O.	390		6:30- 8:30					
WJAZ, Chicago, Ill.	448		9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	5:00- 8:00
WJY, New York, N. Y.	405				5:30- 9:30	5:30- 9:30		1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360		9:25-10:55				9:25-10:55	
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30		5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00			
WMAQ, Chicago, Ill.	448		6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00		8:00- 9:30	8:00-12:00	8:00- 9:30	
WOAI, San Antonio, Texas.	385		9:30-10:30		7:30- 8:30			9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30		10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00				5:45- 9:00		
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5:15- 6:30	6:00- 9:00	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSAI, Cincinnati, O.	309		7:00- 9:00		7:00- 9:00		9:00-11:00	
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	7:30- 9:15
WST, Birmingham, Ala.	360	8:00- 8:45		8:00- 8:45		8:00- 8:45		7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30		4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

"Airphone Helps Us to Be Good" Hobo Pens to WGY

SCHENECTADY, N. Y.—Radio has invaded the twilight camps of the hobo. As these adventurers of the road and open spaces gather around their fires they may hear bedtime stories, stock reports, weather forecasts, music and drama.

A recent correspondent of WGY, station of the General Electric company here, who signed himself "A Wanderer for Twenty Years," said that he always carried some sort of receiving set with him.

"I have been to hell and back in my young life," he wrote, "and have associated with business men, millionaires, ordinary folks and crooks." In his concluding paragraph the wanderer said: "Last Sunday's sermon entered through my set into a bootleg joint, and I'm sure it did some good."

Denmark is discussing the erection of a Radio station in Greenland.

DISCORD HOLDS UP EUROPEAN STATIONS

EUROPE'S AIR TELEPHONY BOUNDARY BLOCKED

Observers in Washington Say Broadcasting Used for Propaganda Obstructs Its Development

WASHINGTON.—What prevents European countries from progressing as far and fast in Radio broadcasting service as the United States?

The answer, as given here by observers recently, lies in the discord prevailing over the eastern hemisphere.

There is no doubt that officially Radio is utilized to its highest efficiency, so far as present engineering can take it, in Europe. The British government has been erecting the greatest worldwide chain of powerful Radio stations.

Even Russia Advances

Three stations in France are among the most powerful in the world. Italy, Germany, the Scandinavian countries—even Russia—have also developed their Radio facilities to the 'nth degree, but only for official government purposes. The layman, who in the United States is enjoying broadcast services from all parts of the land, is strictly limited abroad as to such entertainment. If he can afford to pay a high tax, a high price for his set and a high annual fee for the broadcast services, he may at times be permitted to operate a receiving set.

The reason for these extra duties and high prices lies to the greatest extent in the existent troublesome situation in Europe.

Fear Causes Limitations

There is international fear among the countries. Jealousy and hatred clog the minds of the diplomats and other government officials. And these are conveyed to the people.

Imagine a broadcasting station with power to transmit speech beyond the boundaries of its own country. Then imagine Radio as popular socially in these European countries as it is here—no government tax, comparatively low price of material and free broadcasting service.

Propaganda would fly through the air in all directions. One country would send its propaganda into all the surrounding territories in languages. And there would be no way of preventing the reception of such propaganda.

That is why ownership even of receiving sets is under strict government control. Until that fear is foregone, Radio reception and broadcasting will remain under strict control—even in England.

Missouri was the first farming State to erect Radio broadcasting stations for market reports.

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(Patent Pending)

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Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

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FOG SIGNAL BY AIR SEEN AS SHIPS' AID

U. S. EXPERT FORECASTS GREATER USE AT SEA

American Methods of Protecting Marine by Airphone Studied by Several European Lands

By Carl H. Butman

WASHINGTON.—Radio within the next few years will play an increasingly important part in the work of protecting those who go down to the sea in ships, according to George R. Putnam, commissioner of lighthouses.

As a result of his experience with Radio in the lighthouse service, Commissioner Putnam is an enthusiastic supporter of that means of communication. He expressed his opinions strongly at the recent International Congress of Navigation in London, when he asserted his belief that Radio fog signals were destined to become one of the prime factors in life-saving work. Since his return to Washington he has plunged into plans for extending the use of Radio in the lighthouse service.

U. S. Leads World

Although not the first country to install Radio fog signals, France having done so several years before this country took the matter up, the United States today leads the world in the number and efficiency of such signals and its methods are studied abroad. The American Radio fog signals are sent out on a 1,000-meter wave length. Those of France were sent on a very low wave length and lacked efficiency; the French government is remodeling all sets so as to use the internationally adopted wave length of 1,000 meters.

Radio fog signals, as their name implies, are sent in foggy weather to warn mariners that they are near dangerous coasts. They have an all-weather range of about thirty miles, but this range can be extended if greater distance is deemed desirable. The sets are automatic, needing only to be started, and are cared for by light keepers and others; knowledge of Radio is not required.

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now being used in radio sets manufactured by leaders in the industry.

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The Reader's View

Flewelling Super Bouquet

Some time ago I wrote you about making the Flewelling Super. I constructed the set from the Radio Digest book (using three .006 mfd. condensers). When I had made the super the body capacity effect was very bad.

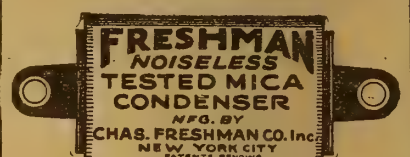
Well, I decided on the first prize set and it certainly eliminated the body capacity. With an outside aerial 60 feet long and 40-foot lead-in I receive all New York stations like wild fire, and very loud. I picked up WOC, Davenport, WDAP, Chicago, and WGY, Schenectady, the first night.

Now I have a 25-foot piece of parallel cord along the picture moulding, and all New York stations come in fine. I also pick up WGY and WDAP on it. I am using a 50 and 75-turn duo-lateral coil, and a WD-11 tube with 45 volts on the plate.

I want to thank you for your letter which indeed shows there is one Radio publication that really does help one when advice is needed. I look for Radio Digest every Tuesday and would not be without it.—Thos. H. Hughes, New York, N. Y.

Radio microphones, loud speakers and vacuum-tube amplifiers are now used in directing vast crowds and mob scenes in moving-picture spectacles.

The Condenser Sensation of Modern Radio



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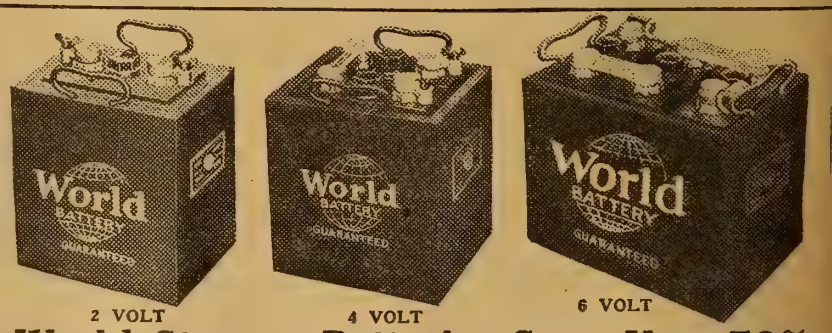

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The Week's Advance Broadcast Programs

Tuesday, September 4

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selection from "Tannhauser," Star Concert Orchestra; Songs by Sydney Walsh, tenor; "Shadowland," Star Concert Orchestra; "Hindoo Chant," Mamie Roth, violinist; "Valse Bluette," "The Indian Love Lyrics," Star Concert Orchestra; "Chanson Arabe," Harry Adaskin, violinist; "Grand March," Star Concert Orchestra.

KDKA (Eastern, 326), 11:30 A. M., Music, victrola, S. Hamilton Co.; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's Period; 7:20, Concert, Trio of the KDKA Little Symphony Orchestra.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program, talk by Jeanette P. Cramer, editor of The Oregonian; 10:10-11:00, Dance music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee musicale, Major and Orchestra; 6:45-7:30, Children's Hour, Wesley Peterson, flutist, age 9 years; Story by "Uncle John;" 8:00-10:00, De Luxe Program.

KSD (Central, 546), 8:00 P. M., Concert, Chevrolet Motors Band of St. Louis, Dr. J. M. Black, director.

KYW (Central, 345), 1:35-2:00 P. M., Concert, Lyon & Healy Concert Dept.; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Mark S. Love, bass; Howard Neumiller, accompanist; Evelyn Freedman, violinist; Mrs. D. D. Sells, accompanist; Isham Jones and his orchestra; 8:05, Book reviews, Llewellyn Jones.

WBZ (Eastern, Daylight Saving, 337), 7:30 P. M., Bedtime story for children; 8:00, Concert, Anna Wollman, soprano; Mrs. Dorothy Birchard Mulroney, accompanist; Italo Bisesti, violinist; 9:00, Bedtime story for grownups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical program, Arcadia Cafe Concert Orchestra; 4:30-5:55, "Affairs of the Heart," Betsy Logan; Song recital; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT (Eastern, Daylight Saving, 405), 12:00-12:45 P. M., "I've Got The Yes We Have No Bananas Blues," "Last Night on the Back Porch," "Somebody Else Took You Out of My Arms," "Oh Min," "Mammys Silver Linning," "The Gold Diggers," "Annabelle," "Stingo, Stango," "Underneath the Sip Sip Sippi Moon," Fred Whitehouse and Jack Stanley, soloists; Comedy Recitations, Fred Whitehouse; "Where The Sacramento River Flows," "Susan," "Hawaiian Nightingale," Jack Stanley, pianist.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner dance music, Meyer Davis Bellevue Stratford Orchestra; 3:00, Musical program; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Boy Scouts Radio Corps, supervision of Boy Scouts of America; 8:30, Piano recital; 10:30, Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the Day's News, topics of scientific interest.

WGY (Eastern, 380), 1:00 P. M., Music and reading, Mrs. Katherine V. Steers; 7:45, "Peg O' My Heart," drama; Cast, Ruth Bentley, Edward H. Smith, Rose Cohn, W. H. Ward, Jerome Lovenheim, Chas. Baumis, Frances Ford, Earle Harvey, Arline Montgomery; Orchestral selection, "Irish Rhapsody."

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Organ selections, Roy C. Parks; 7:30-9:00, Concert by Ray Pfaff and his orchestra; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Piano recital; 6:00, Dinner music, Dick Regan and his WIP Little Symphony orchestra; 7:00-7:30, Bedtime stories, Uncle Wip; 8:30, Organ recital, Karl Bonawitz.

WJAX (Eastern, 390), 7:30 P. M., Concert, Cleveland News-Leader, Emerson Gill Orchestra, program of popular dance music; Dorothy Maskell, Miss Edith Cannon, Miss Rose S. Seton, vocal solos and trios.

WJAZ (Central Daylight Saving, 447) 10:00 P. M.-2:00 A. M. Musical program selections Oriole Orchestra, Dan Russo, director, Ted Firoito, coach; Jane Holter, soprano; F. LeRoy, pianist; Russell Longmeyer, baritone.

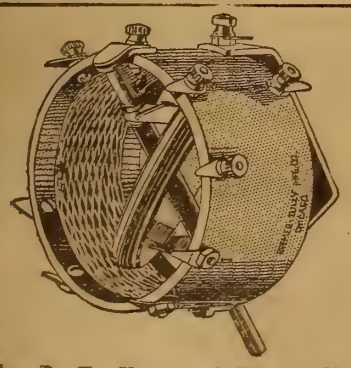
WLW (Eastern, 309), 10:00 P. M., Selections by the Circle Orchestra; "One Fine Day," "For You Alone," "Life," "Carry Me Back to Ole Virginny," "Spirit Flower," "Love Sends a Little Gift of Roses," "Love's Old Sweet Song," Idella Banker, soprano; One-Act Play, "The Lollard," Olive Vail, An Old Maid; Dorothy E. Hecker, The Young Married Woman; "She Got That Too," "Steerin' for Erin," "Missing," "Old Fashioned Days," Circle Orchestra.

WMAQ (Central, Daylight Savings, 447), 9:00 P. M., La Salle roof garden orchestra, E. E. Sheetz, Jr., Conductor; 9:15, Program arranged by Corydon Smith.

WOC (Central, 484), 12:00 noon, Chimes concert; 3:30 P. M., Educational program, A. G. Hinrichs lecturer; 5:45, Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon Music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30.

WWJ (Eastern, 517), 9:45 A. M., "Ironing Day," program, Fred Shaw, pianist and soloist; Margery Richmond, pianist; 12:00 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; the Town Crier; G. P. Pittson, tenor; F. W. Durkee, tenor; Bertha Cavanagh, soprano.



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Wednesday, September 5

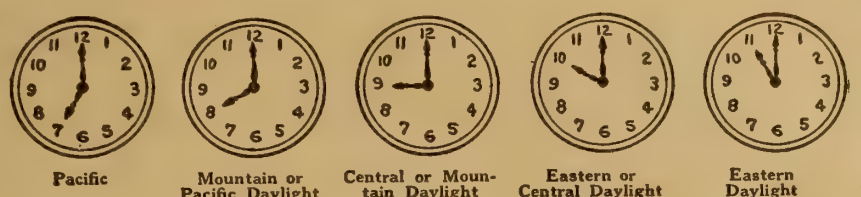
CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., "Merrie England," Star Concert Orchestra; Eileen Law, contralto; "Sonata," Jacques Sterin, cellist; "Orientale," "Spanish Dances," Star Concert Orchestra; "Rondo," Jacques Sterin, cellist; "June Love," Star Concert Orchestra.

WIP (Eastern, Daylight Saving, 509), 3:00-4:00 P. M., Song and piano recital; 6:00-6:45 Dinner music; 7:00-7:30, Bedtime stories and roll call, Uncle Wip.

WJAZ (Central, Daylight Saving, 447), 10:00 P. M.-2:00 A. M., Musical Program, Selections, Oriole Orchestra, Dan Russo, director; Ted Firoito, coach; May Goldberg, soprano; Harriet Weeber, pianist; Emlyn Jones, tenor; Edward Hagner, violinist.

WLW (Eastern, 309), 8:00 P. M., Cincinnati Fall Festival Program broadcast direct from Music Hall, address, Governor Edwin P. Morrow, Kentucky;

What Time Is It?



Pacific | Mountain or Pacific Daylight Saving | Central or Mountain Daylight Saving | Eastern or Central Daylight Saving | Eastern Daylight Saving

THE above clock dials are shown to clear up the misunderstanding which the various time bands and the Daylight Saving plan are creating. Although each dial registers time one hour ahead or behind of its neighbor, the exact period indicated on each dial is the same as that on every other. This chart will aid in the use of the advance programs and the schedules in the Radiophone Broadcasting Station Directory, both of which give the hours stated in the particular kind of time in use at each station. Only features are listed in the advance programs below. Much additional data and such parts of station schedules as are regular features week in and week out, will be found in the station directory which appears serially continuously on page eight.

KDKA (Eastern, 326), 11:30 A. M., Music, victrola, S. Hamilton Co.; 5:15 P. M., Dinner concert, KDKA Little Symphony Orchestra; Victor Saudek, director; 6:35, Literary program, Marjory Stewart; 6:45, Children's period; 7:20, Concert, KDKA Little Symphony Orchestra.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, story for tiny tots by Aunt Nell; 8:00-9:00, Helen Van Houten, pianist; 10:00-11:00, Dance music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Musical features; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John;" 8:00-10:00, De Luxe Program, Mrs. A. F. Borden, director.

KSD (Central, 546), 8:00 P. M., Concert, Edwardsville Concert Band, Joseph A. Raffaelle bandmaster.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, Harry Geise, pianist; Sallie Menkes, pianist; Isham Jones and his orchestra.

WBZ (Eastern, Daylight Saving, 337), 6:00 P. M., Dinner concert, WBZ Trio; 7:30, Bedtime story for children; 8:00, Concert, Walter Marsh, baritone; Mrs. Eleanor Turner LaZazzera, accompanist; WBZ Trio; 9:00, Bedtime story for grownups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Musical program; 4:30-6:30, Fashion Talk and piano recital; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00, Song recital and dance music.

WDT (Eastern, Daylight Saving, 405), 7:00-8:00 P. M., "La Colomba," "Mattinata," "Two Roses," Barcarola Nocturna," "Love Is a Song," "Chanson De Le Lune," "Si Mes Vers Avaient," "Villanelle," Louise Dorr, saprano; "Ah Moon of My Delight," "It Was a Lover and His Lass," "Who Is Sylvia," "Sultima Cenzone," "The Garland," "Elegie," "So We'll Go No More a Roving," "Now Sleeps the Crimson Petal," "Thank God for a Garden," William Dawson, tenor.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00, Children's Own Half Hour, Stories by Cousin Sue.

WGR(Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the Day's News; 9:00, Concert, American Artists' Club, direction of A. A. Van De Mark.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Selections on the Rialto Theatre Organ; 7:30-9:00, Concert, auspices Mrs. Jane Webster Murrell; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., WHK Trio, musical program of popular selections; Babson's Radio Release.

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Thursday, September 6

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., "Kammenoi Ostrow," Star Concert Orchestra; "Come to the Fair," Kate Jackson, contralto; "Vivienne," Star Concert Orchestra; "Elli, Elli," Harry Adaskin, violinist; "My Dreams," Star Concert Orchestra; "Down to the Burn," Kate Jackson, contralto; "Gold and Silver," Star Concert Orchestra; "Canzonetta," Harry Adaskin, violinist; "The Slave Song," Kate Jackson, contralto; "Dreaming," Star Concert Orchestra.

KDKA (Eastern, 326), 11:30 A. M., Music, victrola, S. Hamilton Co.; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's Period; 7:20, Concert, Carlson Brothers Instrumental Quintet; Laura Statska, soprano.

KGW (Pacific, 492), 3:30-4:00 P. M., Child training program; 10:00-11:00, Dance music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert Program; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John;" 8:00-10:00, De Luxe Program, Charles Wakefield Cadman, and Harry James Beardsley; "Main Street," Rev. Thomas Lutman, lecturer.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58 P. M., Musical program, Ellyn Swanson Engel, contralto; Sylvia Jackson Holtsberg, accompanist; John Stamford, tenor; Sallie Menkes, accompanist; G. A. Bruno, French horn; Joseph Izzo, flutist; Herbie Mintz, pianist.

WBZ (Eastern, Daylight Saving, 337), 7:30 P. M., Bedtime story for children; 8:00, Concert, Margaret Regal, soprano; Willard Clark, baritone; Francis Regal, cellist; Mrs. Francis Regal, accompanist; 9:00, Bedtime story for grownups, Orison S. Marden.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; 4:30-5:55, Song recital; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Selections by Saul Rogers and his Famous Hofbrau Orchestra; Saul Rogers, pianist; Meyer Sklaroff, violinist; Charles Lucci, banjoist; Victor Bertez, saxophonist; Nat Levine, drummer; Songs by Frank Bessenger, tenor.

WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Short talks; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 8:00, Song recital and musical program.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the Day's News, Boy Scout Radiograms, Employment Bulletin, "The American Boy."

WGY (Eastern, 380), 1:00 P. M., Music and address, Dr. Claud M. Hall; 7:45, Selection, Cowbell Four, Male Quartet; Duet, Mrs. C. A. Lamb and Mrs. Elsie Adelle, guitar accompaniment; "Friendly Circle," orchestra.

WHAS (Central, 400), 4:00-5:00 P. M., Concert by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Roy C. Parks, organist; 7:00-9:00, Selections by the Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Concert, King Waller Studio; Selections on the Rialto Theatre Organ; Reading, "An Interesting Historical Episode.

WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Short talks and song recitals; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Song recital and concert; 9:00-9:30, Dance music.

(Continued on page 9)

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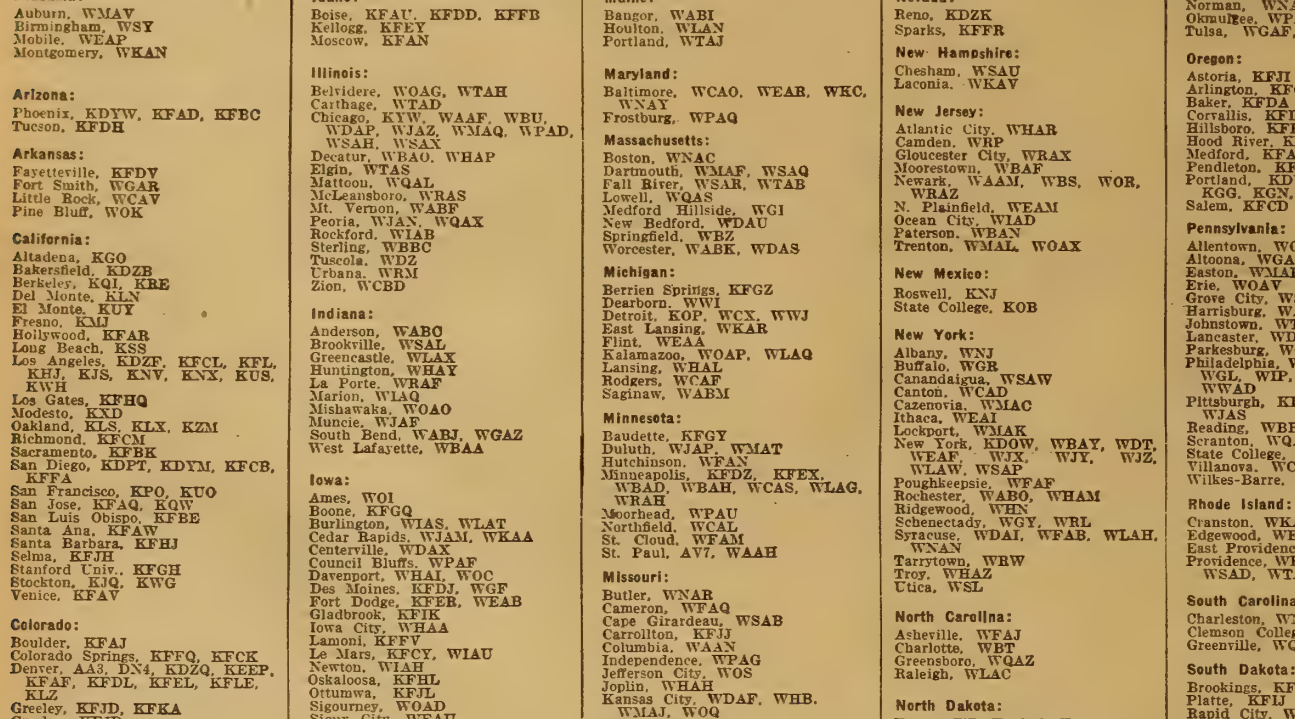

DR. EARL McGREW, of 825 Webster avenue, Chicago, Ill., reports that his triple honeycomb coil set works much more loudly than the standard. He developed the set himself. These stations he has heard in the last seven weeks: KYW, WBV, WPAD, WDAP, WAAF, WMAQ, WWAY, WOC, WGY, WBAP, WDAF, WHB, KSD, WAAK, WIAO, WHAS, WHAL, WTAS, WRW, WHAS, WJAN, WHA, KDKA, WLW, WAAH, WSAH, WDAJ, WWJ, WOAW, WOS, WHAZ, WLAG, WSB, WBZ, WCX, WMC, KFDL, WGR, WEAF, WSAI, WJAZ and WCBD. He suggests that it may be advisable to reverse the tickler coil leads to find the direction giving maximum reception. Mr. McGrew uses a dry cell tube with 45 volts on the plate.

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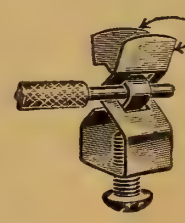

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ADVANCE PROGRAMS

(Continued from page 7)

WJAX (Eastern, 390), 8:00 P. M., Concert by the Hotel Cleveland Orchestra, Iva Francisci, director; Rudolph, violin soloist.
WJAZ (Central, Daylight Saving, 447), 10 P. M.-2:00 A. M., Musical Program, Selections, Oriole Orchestra, Dan Russo, director; Ted Fiorito, coach; Jack Crampton, baritone; R. T. Navigato, soprano; Helen Rauh, pianist; Wm. P. Zimmer, tenor.
WLW ((Eastern, 309), 4:00 P. M., Adelaide Aptel, pianist; Reading, "Love," Fred Smith; 10:00, Selections by the Eastern Hills Dance Orchestra; "Medley of Old Favorites," "I'm Drifting Back to Dreamland," I'm Steerin' for Erin," Cincinnati Harmony Four, Samuel Zadek, tenor; August Schwarm, 2nd tenor; Arthur S. Roth, baritone; Walter Schwarm, bass; "LeKue Sonata," "Moonflower," "Adieu," William Stoess, violinist; "Thought, the Corner Stone of Success," talk by Maxwell D. Schrieber.
WMAQ (Central, Daylight Savings, 447), 9:00 P. M., La Salle roof garden orchestra; 9:15, The Conel Trio.
WOC (Central, 484), 12:00 noon, Chimes concert; 3:30 P. M., Educational program, Karl G. Stephan, lecturer; 5:45, Chimes concert; 6:30, Sandman's visit.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music, Hotel Adelphia Roof Garden Concert Orchestra; 8:30, Concert and organ recital, Mary E. Vogt; 9:30, Dance music.
WWJ (Eastern, 517), 12:00 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; the Town Crier; Douglas Bailey, baritone; William W. Schumaker, tenor; Julis Wolpert, pianist.

Friday, September 7

GFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., "Lohengrin," Star Concert Orchestra; Nellye Gill, soprano; "Chant Sans Paroles," Star Concert Orchestra; "Ave Maria," Mannie Roth, violinist; "Longing," "I Love Thee," "Serenata," Star Concert Orchestra.
KDKA (Eastern, 326), 11:30 A. M., Musc, vctrola, S. Hamilton Co., **5:15 P. M.,** Dinner concert, Grand Symphony Orchestra; 6:30, Address to the farmers, Frank E. Mullen, Radio Editor of the National Stockman and Farmer; 6:45, Children's Period; 7:20, Concert, Ruth Bingaman, pianist; Mrs. J. C. Wilson, reader; Alan B. Davis, baritone.
KGW (Pacific, 492), 3:30-4:00 P. M., Woman's program; 8:00-8:15, Vocal solos; 8:15-9:00, Studio program, George Olsen and Orchestra; 10:00-11:00, Dance music, George Olsen and orchestra.
KHJ (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:00, Children's Hour, "Uncle John;" 7:00-7:30, Prof. Arthur Blakeley, organist; 8:00-10:00, De Luxe Program, "The Wayfarer Chorus."
KSD (Central, 546), 8:00 P. M., Musical program.
KYW (Central, 345), 5:50 P. M., Children's bedtime story; 9:00-10:30, Concert, Donald Osborne Campbell, bartone; Lysle G. Sutton, accompanist; Robert C. Kratschmer, violinist; E. G. Swift, violinist; Sallie Menkes, accompanist; Isham Jones and his orchestra.
WBZ (Eastern, Daylight Saving, 337), 6:00 P. M., Dinner concert, WBZ Trio; 7:30, Bedtime story for children; Current book review, J. W. Gilman; 8:00, Concert, Mrs. Harry S. Kitson, soprano; Mrs. Miriam Munyan Thomson, accompanist; WBZ Trio; 9:00, Bedtime story for grownups, Orison S. Marden.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra, A. Sarkozi, director; 2:00-3:00, Short talks and song recital; 4:30-5.55, "Affairs of the Heart," Betsy Logan; Song recital; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00-12:00, Radio drama, direction Walter Greenough; Song recital; Special features from Stanley Theater; Dance music; Songs by Harry Glyn.
WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Selections by Chester Frost and his Famous Bostonians; Songs by Jack Yellen, composer; 11:00-11:50, Selections by Vaughn De Leath's WDT Feature Orchestra; Songs by Frank Bessenger, tenor.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue.
WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the Day's News; 9:00, Howard Brothers and Noah Orchestra; address, F. B. Thompson, engineer, Vacuum Oil Co., "The Heavy Oil Fan."
WGY (Eastern, 380), 1:00 P. M., Music and reading, Dr. William Burgess Cornell; 7:45, "The Old Refrain," Ernest Griffiths, tenor; Irving Bullock, accompanist; Fred Grazaide, violinist; "Melody in E," John Finke, pianist; 10:00, Musical program.
WHAS (Central, 400), 4:00-5:00 P. M., Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Selections on the Rialto Theatre Organ; 7:30-9:00, Concert, Carl Zoeller's Melodists, Carl Zoeller, director and drummer; William Druber, Trumpeter; Logan Collins, saxophonist; Carter Bannon, pianist; Elmore Lampe, pianist; J. Selligman, trombonist; James Stewart, banjoist; Bill Gruber, trumpeter; Louis Giancola, saxophonist; Reading, "An Interesting Historical Episode."
WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Short talks and song recital; 6:00, Dinner music, Dick Regan and WIP Little Symphony Orchestra; 6:45, "Radio Baseball Dope," by Monte Cross old-time player; 7:00-7:30, Bedtime stories, Uncle Wip.
WJAZ (Central, Daylight Savings, 447), 10:00 P. M.-2:00 A. M., Musical program, selections, Oriole Orchestra; Dan Russo, director; Ted Fiorito, coach; Elizabeth Brasnick, contralto; Helen Louis Schaffer, soprano; Gladys Louise Welge, violinist; Sabina Soffer, pianist; Walter S. Campbell, tenor.
WMAQ (Central, Daylight Savings, 447), 9:00 P. M., La Salle Roof Garden orchestra; 9:15, Program arranged by Cosmopolitan School of Music and Dramatic Art.
WOC (Central, 484), 12:00 noon, Chimes concert; 3:30 P. M., Educational program, C. E. Wilent, lecturer; 5:45, Chimes concert; 6:30, Sandman's visit.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.
WWJ (Eastern, 517), 12:00 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; the Town Crier; Crosbie White, tenor; C. Bruce Myers, baritone; Eleanor Zieske, pianist.

Saturday, September 8

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selection from "A Persian Garden," Star Concert Orchestra; Ernest Morgan, baritone; "Sizillietta," Star Concert Orchestra; "Gavotte," Jacques Sterin, cellist; "Poupee Valsante," Star Concert Orchestra; "Tambourin Chinois," Harry Adaskin, violinist; "Air de Ballet," "Canzonetta," Star Concert Orchestra.
KDKA (Eastern, 326), 11:30 A. M., Music, victrola, S. Hamilton Co.; **5:15,** Dinner concert, Westinghouse Band; T. J. Vastine, director; 6:45, Children's Period; 7:20, Concert, Westinghouse Band, Alouise Marr, soprano; Peter Higgins, tenor; Aille Murray, soprano; Lelia Wilson Smith, accompanist.
KGW (Pacific, 492), 3:30-4:00 P. M., Children's program, story by Aunt Nell; 10:00-11:00, Dance music, George Olsen and orchestra.
KHJ (Pacific, 395), 12:30-1:15 P. M., Concert Numbers; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John;" 8:00-10:00, De Luxe Program, Paul Ford, baritone.
KSD (Central, 546), 8:00 P. M., Orchestral concert, organ recital, vocal and instrumental specialties broadcast direct from the Missouri Theatre.
KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program, W. W. Kimball Company; 8:05, "Under the Evening Lamp," service by Youth's Companion.
WBZ (Eastern, Daylight Saving, 337), 7:00 P. M., Dinner concert, Hotel Kimball Trio; 7:30, Bedtime story for children; 8:00, Concert, Mrs. Helen Campbell Triplett, soprano; Milton Aronson, violinist; Catherine Whitfield Ford, accompanist; 9:00, Bedtime story for grownups, Orison S. Marden.
WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; A. Sarkozi, director; 2:00-3:00, Artist recital; 4:30-5:55, Fashion talk and piano recital; 7:30-8:00, Bedtime stories, Dream Daddy.
WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Children's program "Tinkerman" and "The Winged Taxie" series, Edith Craine; "Yes We Have No Bananas," "Bebe," "Susan," "Where the Sacramento River Flows," "Swinging Down the Lane," "Stella," "Hawaiian Nightingale," "Lady of the Evening," Selections from "Wildflower," Jules Lavoy's Harmonists, Original songs by The Original Radio Girl.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital and piano solos; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Song recital, dance music, Meyer Davis Bellevue Stratford Dance Orchestra.
WGR (Eastern, Daylight Saving, 360), 12:00-12:30 and 6:30-7:00 P. M., George Albert Bouchard, organist.
WGY (Eastern, 380), 8:30 P. M., Music, Meyerhoff's Orchestra, Tehn Eyck Hotel, Albany, N. Y.
WHAS (Central, 400), 4:00-5:00 P. M., Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Selection on the Rialto Theatre Organ; 7:30-9:00, Concert, auspices of Mrs. Emery Nold; Reading, "An Interesting Historical Episode."
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Song and piano recital; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Musical program; 10:00, Dance music.
WJAZ (Central, Daylight Saving, 447), 10:00 P. M.-2:00 A. M., Musical Program Selections, Oriole Orchestra, Dan Russo, director; Ted Fiorito, coach; R. F. Elliott, tenor; Renna Graham Gallow, violinist; Harriet Weeber, pianist; Florence Nelson, soprano.
WMAQ (Central, Daylight Saving, 447), 8:00 P. M., Music from the Chicago Theatre; 9:00, La Salle Roof Garden Orchestra.
WOC (Central, 484), 12:00 noon, Chimes concert; 3:30 P. M., Educational program, C. C. Hall, lecturer; 5:45, Chimes concert; 6:30, Sandman's visit; 9:30, Dance music, P. S. C. Orchestra.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Band concert, J. W. C. I. Band; Organ recital, Mary E. Vogt.
WWJ (Eastern, 517), 12:00 P. M., Detroit News Orchestra.

Sunday, September 9

KHJ (Pacific, 395), 10:00 A. M., Sermon and service, 10:30-11:00, and **7:00-7:30 P. M.,** Prof. Arthur Blakeley, organist.
KYW (Central, 345), 10:00 A. M., Church service, St. Chrysostom's Episcopal Church; Rev. Norman J. Hutton, rector; **5:00-8:00 P. M.,** Classical and semi-classical selections, Sisson Hotel; Theodore Ratzer, cellist; George Bass, violinist; A. L. Shynman, pianist.
WBZ (Eastern, Daylight Saving, 337), 7:30 P. M., Sunday vespers, Springfield Municipal Chimes; Ernest Newton Bagg, chime ringer; 8:30, Church services, Adjutant J. H. Bloethe of the Salvation Army.
WFI (Eastern, Daylight Saving, 395), 7:30 P. M., Church services, Arch street Presbyterian Church, organ recital.
WGR (Eastern, Daylight Saving, 360), 3:00 P. M., Vesper service, the Rev. Jacob Eberling; 11:45.
WGY (Eastern, 380), 10:00 A. M., Church Services, St. George's Episcopal Church, Schenectady, N. Y., Rev. B. W. R. Tayler, Pastor; **6:30 P. M.,** Church Services, St. George's Episcopal Church, Schenectady, N. Y., Rev. B. W. R. Tayler, Pastor.
WHAS (Central, 400), 9:57 A. M., Organ Music; 10:00, Church services, auspices of the Broadway Baptist Church; Rev. Dr. Russell Johnson Pirkey, pastor; H. U. Goodwin, organist and director; Mrs. John Rasmussen, soprano; Angeline McCrocklin, contralto; William Layne Vick, tenor; William C. Burger, baritone; **4:00-5:00 P. M.,** Concert recital, Fanny May Baldridge, Mrs. James W. Tyler, Jr., accompanist.
WHK (Eastern, 360), 8:00 P. M., Program of popular operatic numbers by the W. H. K. Orchestra.
WJAZ (Central, Daylight Saving, 447), 6:00-9:00 P. M., Musical Program, Selections, Oriole Orchestra; Dan Russo, director; Ted Fiorito, coach; R. G. Ball, baritone; Helen Davie, soprano; Margaret Garrity, pianist; Herbert Weis, cellist; Joseph Discal, tenor.
WWJ (Eastern, 517), 11:00 A. M., Service of St. Paul's Episcopal Cathedral; **4:00 P. M.,** Detroit News Orchestra.

Monday, September 10

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Song recital; 4:30-5:55, Fashion talk, "Affairs of the Heart," Betsy Logan; Musical program; 7:30-8:00, Bedtime stories, Dream Daddy.
WFI (Eastern, Daylight Saving, 395), 1:00-2:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano and song recital; Short talks; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue.
WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the Day's News; 7:30, Music and Festivities of the annual banquet of the National Association of Cost Accountants.
WGY (Eastern, 380), 1:00 P. M., Music and address, Clarence Foote; 7:45, Program from Temple Beth Emeth, of Albany, N. Y. Evening Service for New Year "Rosh-Hashanah," Dr. Marius Ranson, Rabbi; Musical program, Temple Quartet; J. Austin Springer, organist and director of music.
WHAS (Central, 400), 4:00-5:00 P. M., Mary Anderson Theatre Orchestra; Ollie Jones, conductor; Roy C. Parks, organist.
WHAZ (Eastern, 380), 9:00-10:30 P. M., First anniversary night—Domino Novelty Orchestra; address by Dr. Palmer C. Ricketts, President of Rensselaer Polytechnic Institute.
WIP (Eastern, Daylight Saving, 509), 1:00-2:00 P. M., Organ recital, Karl Bonawitz, Germantown Theater; 3:00, Short talks and musical program; 6:00, Dinner music, Dick Regan and WIP Little Symphony orchestra; 7:00-7:30, Bedtime stories, Uncle Wip.
WOO (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music, Adelphia Hotel Roof Garden Concert Orchestra; 8:30, Concert, WOO Orchestra, Robert E. Golden, director; 9:00, Dance music, Hotel Adelphia Roof Garden Dance orchestra.

Long Aerials an Error

Long aerials are against sharp tuning. Many fans labor under the idea that a longer aerial will give them greater range and entertain all sorts of wrong ideas concerning aerials. If you want to get the most from your set and be able to tune it properly, do not use more than 100 feet of aerial.

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Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

Member of the Audit Bureau of Circulations
58
PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies, 10 cents.

Vol. VI Chicago, Saturday, September 8, 1923 No. 9

Broadcasts Spread Culture

An Increasing Demand for Better Entertainment

THERE are very few persons who realize just what broadcasting is actually doing for musical America. It is only by bringing the very best music into the home that makes the best most desirable. Thus, the broadcasting station is the only medium in existence which has the best possibilities for creating love for classical music. It is safe to say that every earnest program director of Radio broadcasting is endeavoring to place in the public menu the best musical food.

Musical Atmosphere Created

Broadcasting Concerts Has Brought Better Music

BETTER music is beginning to take the place of jazz. Jazz is an aftermath of the war; the present day jazz is more subdued, possesses more melody. The more violent of the wailing and groaning blues have gone. In their place still is jazz, but of a different nature, with less noise and more music.

Radio broadcasting has done much to create a musical atmosphere but the standard of the concerts broadcast to thousands of homes must be raised and better artists retained. Real artists demand high pay for their services; the Radio audience pays nothing, but the problem must be overcome.

Business Improvement

Elements Responsible for the Growth of Radio

BY this time most of the people have become more or less familiar with the various types of Radio receiving apparatus, especially from a practical standpoint. A large number have gone so far as to make an extensive study of the science, its history, development, and future possibilities, but a very small number, comparatively speaking, have looked on Radio as a business phenomenon. Very few seem to realize that the rapid growth of the Radio business has no parallel in the industrial history of the United States.

A number of elements are responsible for the rapid growth of Radio reception and broadcasting but extreme popular favor was given the science by newspapers. The national desire for more knowledge was further stimulated by the establishment of broadcasting stations.

Before the advent of Radiophone broadcasting on the lower wave lengths there were but few small stores throughout the country selling Radio apparatus exclusively. Within a few weeks after several broadcasting stations had been established, thousands of Radio stores sprang up in cities and towns all over the country.

The Radio business of the country grew from a few thousand dollars a day to more than $6,000,000 a day. At the outset there were only twenty-five small companies manufacturing Radio apparatus but this number was increased to 6,000 in less than five months.

Radio engineering talent was scarce and only about one percent of the number engaged in a Radio business were really conversant enough with the science to be of benefit to the public from an educational standpoint.

The people, most of them, did not heed the warnings issued by the more conscientious Radio authorities but plunged blindly into the field without fear of what the future might bring. Eighty per cent. of the people were prospective buyers. They had the money. Why not get a part of it? Enough money was uselessly spent on poor apparatus to establish a sinking fund capable of ultimately wiping out the nation's war debt.

The Radio dealer, jobber and manufacturer of today must be a trained business man, a merchandiser, a financier with initiative and forethought. The manufacturer must employ the necessary technical brains, and the knowledge of knowing how must be exemplified in the appearance and function of his product. The jobber and dealer must have sufficient knowledge of his business to keep the confidence of the people.

RADIO INDI-GEST

Take Your Girlie to the Earphones

"I'VE BOUGHT MY SWEETIE A RADIO," CONFIDED YOUNG SPARKINS TO ME YESTERDAY, AND I OF COURSE ASKED WHY, AND LISTENED IN FOR HIS BROADCAST. IT SHOWED HE HAD A NOBLE THINKER. "YOU SEE," SAID HE, "THE SET IS GREAT FOR CUTTING DOWN ON THEATER, DANCE, CABARET AND TAXI BILLS. TRY IT."

GOO GOO.

And He Made It All by Himself!

Dear Indi: The attached only goes to prove that Raymond Soper made a souper but did not read Radio Digest for his directions. The gem was removed from the Dallas (Texas) News. Here goes:

Question.—I have made myself a Radio receiving set with which I use an electric light globe for the vacuum tube. My slide coil is made of bare copper wire wound around a baking powder can. The tin can seems to make better connections between the wires than the pasteboard type of cylinder. I use a condenser between the phones. This condenser is made of about six layers of tin foil, laid one upon the other. I use only one battery, as there is no place to put another battery on the tube. A friend of mine told me that a light globe was better than a vacuum tube, so I did not buy a tube. I have not been able to hear a sound out of my set—not even static. What is my trouble?—Raymond Soper.

Answer.—Someone has misinformed you as you do not have any more of a Radio set now than when you started.

etc., etc., in which ye Radio Ed of the Dallas News enlightens, or should I say, illuminates Raymond about electric light globes and tin cans. J. F. W.

A-B-C Lessons for Indigest Beginners

Chapter XII—Ours Leads in Nothing Best

BY GOSH

L IS for Lead-in
Useful?—There's no doubt,
But mine lead in some lightning
And wouldn't lead it out.

The Major Presents His Thanks

At last I have a sure cure for static! Page Major Mauborgne. Follow my directions (copyrighted) and you will hear atmospheric no more. Solder the aerial lead to the ground lead, then weld one end of the lightning arrester to this. Connect the set to the other end of the arrester. Simple, isn't it? It sure is. HON. E. COMB.

P. D. Q. Enclosed find 1 (one) carload of rubles in payment for your acceptance of this kink, subject to its appearing in the February 31 issue of your notorious column.

H. E. C.

Hah, an Uncopyrighted Song. Good!

Dear Indi: I would be very glad if you would try this on your loud speaker some day. (All broadcasters hereby allowed to use it without fear of Chief Justice Taft.) Try to sing it to the tune of "Yes, We Have No Bananas, We Have No Bananas Today."

"Yes, we have no variocouplers, we have no variocouplers today.
We have rheostats and potentiometers, grid leaks and variometers, and all sorts of other things.
We have old fashioned generators, new style oscillators,
But yes, we have no variocouplers, we have no variocouplers today.

"Yes, we have no variocouplers, we have no variocouplers today.
We have switch points and switch stops, condensers and cabinet tops, and all sorts of other things.
We have old, burned out rectifiers, seventeen dollar amplifiers,
But yes, we have no variocouplers, we have no variocouplers today."

Thanks, very much. I remain yours until your postbox wears out waiting for my nickel-plated lead dollar.

W. I. RELESS.

This marks the grave
Of Clemmons Fasting
He continued to send
While WHAZ was broadcasting.

Nothing, Same as Usual

Dear Indi: What price am I bid for the following:

Here lies the remains of Douglas Sylvester
He forgot to connect his lightning arrester.

Under this turf lies mad Henry Spencer
He tried to digest his variable condenser.

MIKE ROFARADS.

Looking Ahead

Great Scandal Unearthed—All About Walla Walla Social Life—Gobs upon gobs of gossip have been scooped up by Indi-Gest's very special correspondent located near the keyholes at the home of Station BLAH, Indi-Gest broadcaster on the sunny south sea isle of Walla Walla. Why haven't we heard from Brambdin Bray, official janitor and announcer? Why have all appeals to Izzy and Ikey, chief trained chimpanzee antenna raisers, been futile? There has been monkey business! The truth has outed. Read this blood-curdling and horrifying tale in the next edition of Indi-Gest. At all newsdealers, 10c; at any other newsdealers, 10c anyway.

Out Gunning for Static

Condensed

By DIELECTRIC

Every amateur fan in the country who can possibly leave his DX set long enough for a trip to Chicago will gather at the second national convention of the American Radio Relay League. It is expected that more amateurs will meet face to face on this occasion than ever before. Of course, there are more "hams" now than two years ago; the membership of the league has grown very much since that time. It is indeed a healthy sign to find so large a proportion of the amateurs banded together. If you are not now a member, get in quick. It's to your interest—and ours.

In looking over the list of representatives at the Radio conference, in Washington some time ago, do you find one from the vast and important body of listeners in? Well, is it not about time we were organized so that our viewpoint could be presented with authority on occasion? A Baltimore chapter of the Radio Listeners' Protective Association has been organized; it is hoped that other cities will follow suit. This is a move to enlist the interest of every individual who finds pleasure in using a receiving set.

Eleven years of patient effort to perfect a means of keeping static from drowning out desired signals has resulted almost in success for Chief Electrician Scott of the navy. Although this device in its present stage is rather large for ordinary use, time will effect something adaptable to use by the average listener in. Another static remover is reported nearly ready for placing on the market.

"Dead" spots in Radio reception have been found in various parts of the world but no way has been found to overcome their effect on electromagnetic waves. Special tests are now being carried on by explorers of the geological survey along the banks of the Colorado river in an attempt to find how far Radio signals will penetrate the deep canyon in that section. It has its bearing on Radio for use in mines, where such communication would be of great value.

Just as I remarked in these columns a short time ago, it is entirely possible to turn a half-interested Radio fan into a bad knocker by simply forcing the attention of a loud speaker upon him. Colonel Green thought to provide amusement for his neighbors at Round Hills, Mass., but instead drowned the chatter of summer residents at Nonquit. The huge loud speakers which carried programs from the studio of WEAF in New York to these country folk will have to await the exit of vacationists before resuming. The retransmission of WEAF's concerts entails a lot of expense but few men are so public spirited as the owner of Station WMAF.

Anyone who followed the series of articles so clearly describing the present patent tangle, which appeared in Radio Digest recently, will be better able to fathom the meaning of Judge Hand's decision in reference to the Cutting and Washington Radio corporation in their suit against the Westinghouse Electric company. It is sincerely to be hoped that for the sake of continued progress in Radio manufacture the whole patent situation will be straightened in the near future. The automotive industry went through much the same thing.

On the night that WJZ bid all a sad farewell from their Newark, N. J., station it really seemed to mark the extinction of apparatus so long used to entertain vast Radio audiences. That was not to be, however, for the transmitter which at times kept from receiving sets in the vicinity of Newark all other stations on the 360 wave is again to function. It will carry the voice of the announcer at WBZ with an antenna input twice that possible up to the present.

First Steps for Beginners in Radio

Chapter XV—Filament Lighting Batteries

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XVI—Plate Batteries.

Chapter XVII—Using Alternating Current on Tubes.

Chapter XVIII—Testing Radio Instruments.

Chapter XIX—Locating Trouble in the Set.

Chapter XX—Useful Information and Formulas.

THE earlier forms of tubes used for Radio required a six-volt battery to operate the filament; each tube required one ampere of current, which made a storage battery a necessity. At the present time the tubes using heavy filament currents are practically unused, preference being given to the tubes that can be operated from dry cells, thus making the set more compact and portable.

Many fans still use a storage battery, especially when they have in operation a loud speaker requiring current for the field windings. Much has been written as to the care of the storage battery, but many persons continue unintentionally to abuse the battery. When the battery is charged at home it is more than likely the filling is neglected. The filling should be carefully attended to, especially during the summer months. When the solution gets below the top edge of the plates they are exposed to the air, which results in

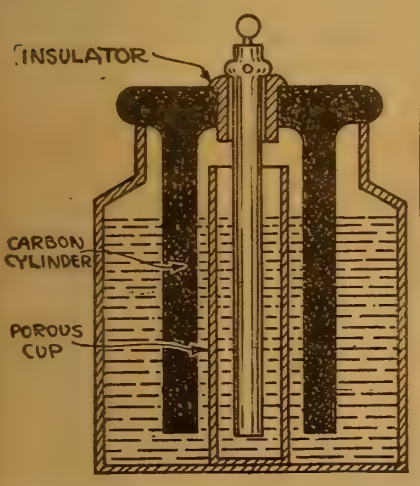

Figure 58—Cross sectional view of homemade Fuller battery for lighting tube filaments.

sulphation. The thin film of sulphate on the plates prevents the current from reaching the surface, which reduces the capacity of the battery. Keep the batteries well filled by adding distilled water when the solution gets low.

Corrosion Produces Noisy Operation

Another point is the corrosion of the terminals. The noisy operation of a set can often be traced to a corroded battery terminal giving an erratic current flow to the filament.

It is well to check the corrosion as soon as possible. When taking the battery off charge, wipe the top of it with a rag dipped in ammonia. The ammonia counteracts any acid sprayed on the top and keeps the terminals free from corrosion.

Many fans fail to realize the danger of bringing open flames near a battery while charging. It is well to remember that hydrogen gas is given off freely when the charge is complete; this gas mixed with air is highly explosive. An explosion may break the top of the battery or even throw acid on the face and into the eyes. For the same reason do not disconnect the charging wires from a battery with the charging current on, for in many cases the arc caused by removing the wires will ignite the gases with disastrous results.

Recharge Batteries at Regular Intervals

During the summer many persons do not use their sets as frequently as in the fall and winter, with the result that the battery is not recharged very often. This is poor practice; the battery should be recharged every month at least to keep it in good shape and to prolong its life. Do not add acid to the battery unless it is definitely known that the battery has leaked or the acid spilled. The proper method of adding the acid is to give the battery a full charge and then pour out the solution. A new solution can be mixed, having a specific gravity of 1,250, and poured in after it is cool. Add the acid to the water while mixing, stirring constantly and pouring in the acid slowly.

When connecting the battery to the set do not neglect to install proper fuses to protect the circuits. It is rather unpleasant to see a set start to smoke and on opening it find the wires partly fused away and the insulation destroyed.

A short circuit in the set may ruin it or start a fire in the room, besides damaging the battery by overheating and buckling the plates. To prevent this, install a fuse block near the battery, using the proper size fuses. Remember, a fuse is intended to blow; if a fuse of the right capacity continues to blow out there is something wrong.

Care of Dry Cells

Users of dry batteries for filament current are more lax in protecting their filament circuits, thinking that a dry cell can do no harm. Regardless of the damage that it may do the set, a shorted dry battery may spoil an evening's pleasure. These cells are termed dry cells, when as a matter of fact they contain some moisture and when shorted have a tendency to ooze a sticky liquid around the top. If enclosed in the set this chemical solution may damage the furniture or destroy the insulating qualities of parts of the instruments.

It is well to protect the cells with fuses of the proper size. Determine the amount of current the set uses and obtain automobile fuses of the right size so an excess current will blow them. The fuse can be mounted at some convenient point inside the set close to the filament battery terminals.

The cost of dry cells has led many to make use of various types of wet cells for lighting the filaments. The voltage of the Edison cell is rather low, about .7 on a closed circuit; it requires two of them for each dry cell used. They are remarkably constant in service, and when once set up need not be disturbed till the elements are exhausted.

The Edison cell consists of a zinc plate forming the negative terminal and a positive terminal made of an oxide of copper, the solution being a saturated solution of caustic soda in water. The plates are difficult to make; they should not be made at home. The solution is very destructive and should be handled with care, for if it is spilled on the hand bad burns or the destruction of articles of animal fibre will result. A thin layer of paraffin oil is poured on the surface to prevent the air

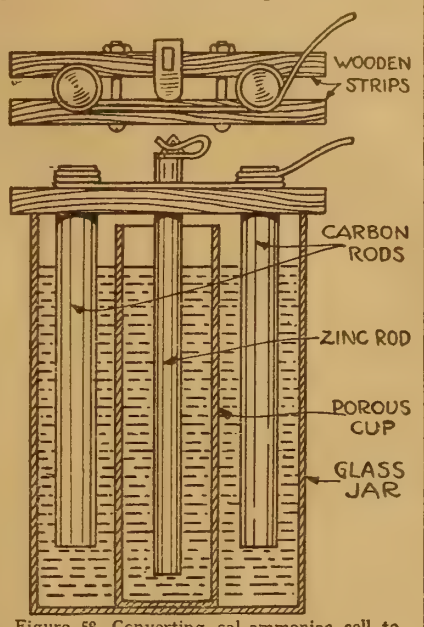

Figure 59—Converting sal-ammoniac cell to bichromate cell

destroying the active properties of the solution.

Types of Batteries to Be Used

There are several types of batteries that can be made at small cost and which will serve in the place of dry cells. The common sal-ammoniac cell cannot be used for the purpose since the current drops off rapidly while in use. The Fuller cell is perhaps best suited to the purpose; it is shown in the illustration Figure 58. The voltage of this cell is 2; one of them is sufficient for tubes having a filament voltage of 1.5. Two or three cells may be connected in series for higher voltages, but they should be used only with tubes using one quarter ampere or less.

The container is any glass vessel about 4 inches in diameter and 6 inches high. A porous cup of unglazed earthware or porcelain, which can be purchased for a few cents from any chemical supply house, is placed in the center of the jar. A plate of carbon is placed in the outer jar and a zinc rod in the porous cup. These may be suspended from a wooden cover or two carbon rods and a zinc rod supported, as shown in the illustration. The zinc rod is amalgamated with mercury by first rubbing with a cloth dipped in dilute sulphuric acid and then applying mercury, which will coat the zinc and give it a shiny surface.

Construction of Cell

To set up the cell, place two teaspoonsful of table salt in the porous cup and fill it three-quarters full with water. Into

(Continued on page 14)

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WD-11	$3.50	UV-199	$3.50
WD-12	3.50	C-299	3.50
UV-200	2.50	UV-201-A	3.75
UV-201	3.00	C-301-A	3.75
C-300	2.50	UV-202	4.00
C-301	3.00	C-302	4.00

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Insist on the name Federal on every part you buy. If your dealer does not stock them, a card will bring a complete catalog of the 130 Federal units and the name of the nearest Federal dealer.

Federal Telephone and Telegraph Company
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Boston New York Philadelphia Chicago San Francisco
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Circuit Using Loop Aerial or Ground

Tuning Is Sharp and Simple—Not Critical

In the illustration is shown a circuit which is the result of six months' experimenting. The set in operation, using aerial and ground or ground alone on either aerial post or ground, brings in local stations loudly enough to operate a loud speaker. With the phones placed on the table, music and voice can be heard 40 feet away. Tuning is very simple, not critical. Most of the tuning on practically the same wave length is done with the vernier. The tuning is sharp and clear, yet it is not difficult to cut out the whistle or carrier waves.

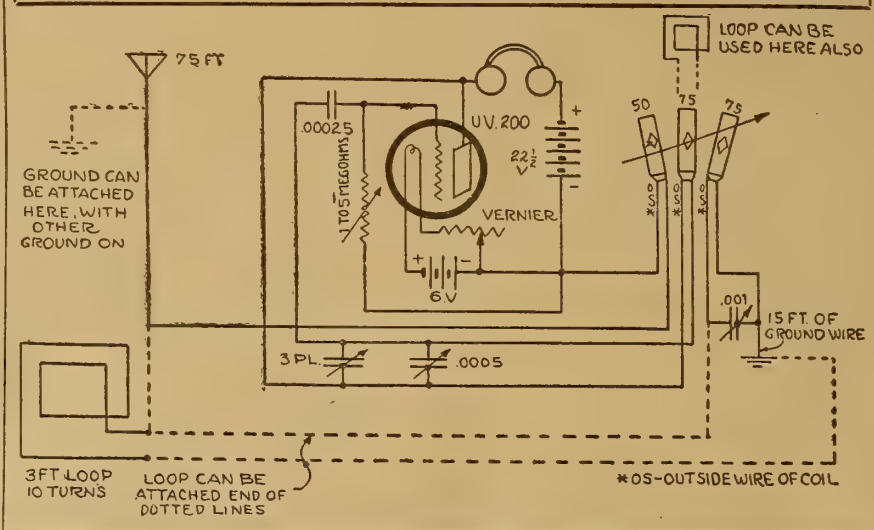
The rheostat adjustment of the filament is not critical. The knob can be turned until the click is heard in the phones. Just before the click is the point of reception. The tube will not oscillate. A UV-200 in this circuit will surprise you by its stability and amplifying powers. The rheostat at about half on is the point for best operation.

The energy collector can be of any type, viz., loop, aerial alone, or both aerial and ground, two grounds, loop and ground, lamp socket aerial with or without ground, or with loop aerial or ground. The last named is not so good.

The vernier of the condenser and rheostat raise the volume tremendously when used for fine adjustment.

In justice to the circuit I would suggest a trial. The controls are minimum. It is adaptable to any kind of energy collector. I have received up to 250 miles on two 30-foot wires lying on the floor with the center of the wires to the ground, both ends being connected to the set, one at the aerial and the other at the ground post.—John W. McGrath, Jersey City, N. J.

LOOP MAY BE USED AT TWO POINTS



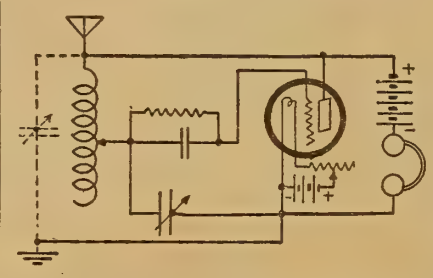
WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

Slide Tuning Coil with WD-11

Illustrated herewith is a hook-up for a WD-11 tube, variable condenser and a one slide tuning coil. With a set using this hook-up I have tuned in stations WSB, KSD, KYW, KDKA, WMAQ, WDAF, WHB, WOAI, WWAC, WBAP and numerous other stations. I am using a 75-foot one-wire aerial, 100 turn tuning coil and 43-plate variable condenser. If higher wave



lengths are wanted a 23-plate condenser may be connected across the aerial and ground as indicated.—Russell J. Schembs, Peoria, Ill.

Battery Connections

An A battery is connected in series with the filament, B battery in series with the plate, and C battery between the filament and secondary of the transformer leading to the grid.

How to Hold Dials Firmly

It often is difficult to make dials or knobs hold firmly in place on such instruments as variometers, rheostats and the like, because the shafts are too smooth. This may be overcome easily by filing one side of the shaft slightly, making a flat surface. Place the tightening screw over the flat space. Adjust it firmly; the dials will be held in place.

Use Wire for Aerial Support

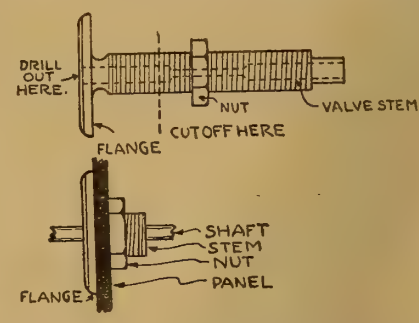
Use the same kind of wire for stringing up insulators that is used for the antenna itself. Rope will stretch and shrink with changes in weather and will cause the antenna to sag or tighten up.

Bed Springs as Aerial

Bed springs and window screens sometimes work on crystal sets that are located under the shadow of the transmitting aerial, but there is nothing doing on this type of inductance at any great distance from the center of broadcasting, unless you use a couple of steps of Radio frequency before the detector unit. Bed springs as aerials for a crystal set five miles from the broadcasting station are as useful as a headache.

Panel Bushings Made of Automobile Tire Valves

For those of you who "make your own" the following kink may be of interest. Procure one or more inner tubes from a garage, if you do not have an old automobile tire. Take the valve stem out of the tire and put it in the vise with the flanged end in front. Run in a 13/64 or 17/64-is 3/16 or 1/4-inch. Drill the hole in 1 inch inch drill, depending on whether the shaft or more and cut the flanged end off the



right length. The illustration is self-explanatory.—W. J. Sherid, Central Point, Oregon.

From time to time the aerial should be lowered, and the insulators should be cleaned off to avoid leakage.

Coast to Coast on One Tube and No Body Capacity

These popular hook-ups use UV-199, WD-11 or WD-12 Tubes. One hook-up gives selectivity and 1500 miles with absolutely no body capacity, while the other gives the remarkable distance of coast to coast. Both prints postpaid for 50 cents or any of the above tubes postpaid $5.45. Formerly operated by C. W. Kautz. We welcome his customers. No stamps accepted.

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1.00	Hook-ups	.25
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1/32"	THICK	1/2¢ PER SQ. INCH
1/16"	THICK	3/4¢ PER SQ. INCH
3/32"	THICK	1¢ PER SQ. INCH
1/8"	THICK	1 1/2¢ PER SQ. INCH
3/16"	THICK	2¢ PER SQ. INCH
1/4"	THICK	2 1/2¢ PER SQ. INCH
3/8"	THICK	4¢ PER SQ. INCH
1/2"	THICK	5 1/4¢ PER SQ. INCH

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Price **$10.00**

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List		Our Price
$12	Western Electric	$8.75
$16	Dr. Seibt 6000 Ohms, made in Germany	7.85
$16	N. & K. 6000 Ohms, made in Germany	6.50
$12	Nathaniel Baldwin	9.95
$8	Brandes Superior	5.45
$6	Nath. Baldwin Single	4.95
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VARIABLE CONDENSERS (*Moulded Ends*)

	List Price	Our Price
3 Plate	$2.00	$1.25
11 Plate	3.50	1.75
17 Plate	4.00	1.95
23 Plate	4.00	1.95
43 Plate	5.00	2.25
11 Plate Vernier	6.00	3.25
17 Plate Vernier	6.00	3.25
23 Plate Vernier	6.60	3.50
43 Plate Vernier	7.50	3.95

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One-tube Regenerative set	$19
Two-step Amplifier in mahogany cabinet	17
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	Hard Rubber	Bake-lite		Hard Rubber	Bake-lite
7x10	$0.95	$1.35	7x18	$1.65	$2.45
7x12	1.25	1.60	7x21	1.85	2.75
7x14	1.40	1.95	7x24	2.15	3.25

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Extra fine quality—Hinged top—Mahogany finish.

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Five Tube Neutrodyne Receiving Circuit

Part III—Assembly and Wiring

By H. J. Marx

TO THE writer the assembly and wiring of a receiving set always offers the most fascinating part of the work. The panel layout is simply the result of proportioning correctly the location of instruments on the panel and sub-panel but the assembly and wiring give free scope for a display of fine workmanship and neatness in appearance. From old, the true craftsman has always taken pains to make each job better than the latest. Quoting from Longfellow—"Each minute and unseen part, for the gods see everywhere."

Just because the set is enclosed in a cabinet and only the exterior of the panel and its control dials is seen, furnishes no reason for neglecting the interior. The true fan takes the greatest pride in displaying what's on the inside of the "mystery box"—the real machinery that collects from apparently empty air, the entertaining programs and offers them to the listeners.

Mounting the Apparatus

The neutroformers, consisting of the Radio frequency transformer windings, attached to the variable condensers, are mounted on the panel first. More plates are bent and the condenser short circuited in the assembly of the apparatus than in any other handling. For this reason, the following "kink" will be found of considerable advantage: turn the rotating plates until they are fully inside of the fixed plates, then wrap long strip of paper around the plates inside of the ends; hold in place by looping a few turns of string around it. In this manner the plates will not be turned out and knocked against in the assembly of other apparatus.

In order to mount the two neutrodous in the most logical place and to establish the most convenient proximity to the coils for shortest leads, holes were drilled through the tubing of the second and third neutroformers. The neutrodons were then fastened by means of machine screws passing through these holes. This is clearly indicated by the encircled 2 in the illustration of the rear view of the panel. The neutroformers are indicated by the numerals 1 and 3.

The panel mount sockets for the Radio frequency amplifying tubes 4 are next mounted in place.

The five rheostats (8) are then mounted, after which the potentiometer (10) and the variometer (7) can be added.

The anti-capacity switch, which can't be seen in the rear view, is then added, likewise the battery and the variometer switches and the two jacks. The proper location of the jacks and battery switches can be determined by means of the hook-up diagram in Part I of the series and the panel layout in Part II.

Sub Panel Apparatus

The socket for the detector tube 5 and the two amplifier tubes 6 are first mounted, then the two small audio-frequency transformers 12. These transformers are shown more clearly in the side view of the sub-panel.

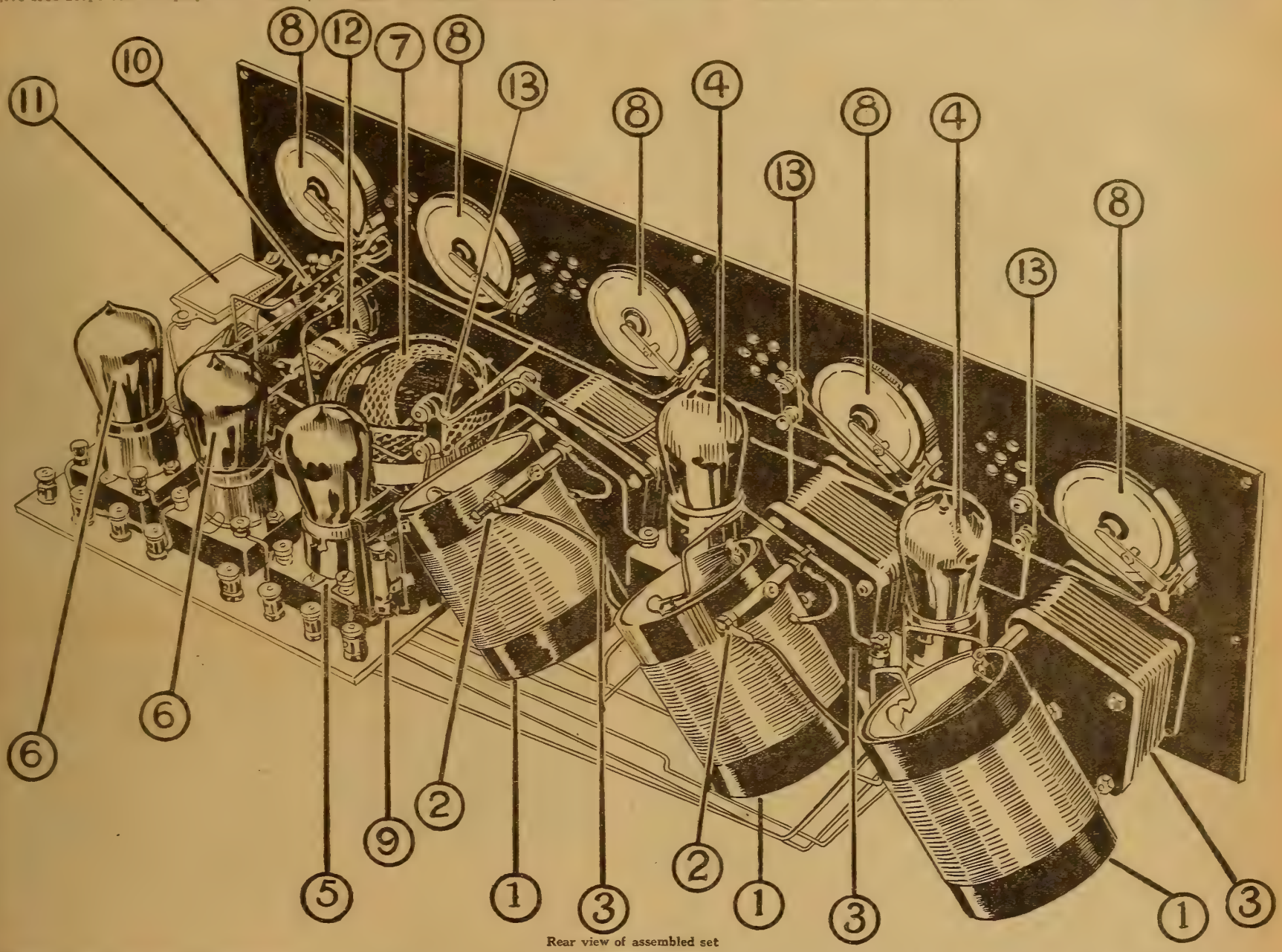
The eight binding posts are then added; if desired, indicating name plates can be inserted under each post.

In order to mount the grid leak and condenser, shown as number 9 in the rear view, a small brass angle is fastened under the thumb screw of the grid post of the detector tube socket. The condenser and leak are then fastened to the angle by means of a machine screw and nut which at the same time make contact with the one terminal of the condenser and leak. The angle closes the circuit to the grid binding post.

Mounting the Sub Panel

The sub-panel must next be mounted on the two jacks and the variometer jack switch. The two screws, clamping the jack springs in place, must first be removed but care must be taken not to loosen the micarta insulating spacers from the insulation tubing through which the screws pass. If possible procure six brass machine screws which will have the same threading as those removed, or a smaller size with nuts which will pass through the holes. If they are too long they can be cut off after being screwed tight. The panel is then put in place over the jacks and the screws passed through the proper holes and tightened up in the jacks or by means of nuts on lower side as shown in side elevation.

(Continued on page 14)



Rear view of assembled set

Crystal Tube Detector

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TUBES REPAIRED

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C-300 or UV-200	2.75
C-301 or UV201	3.00
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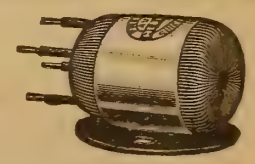

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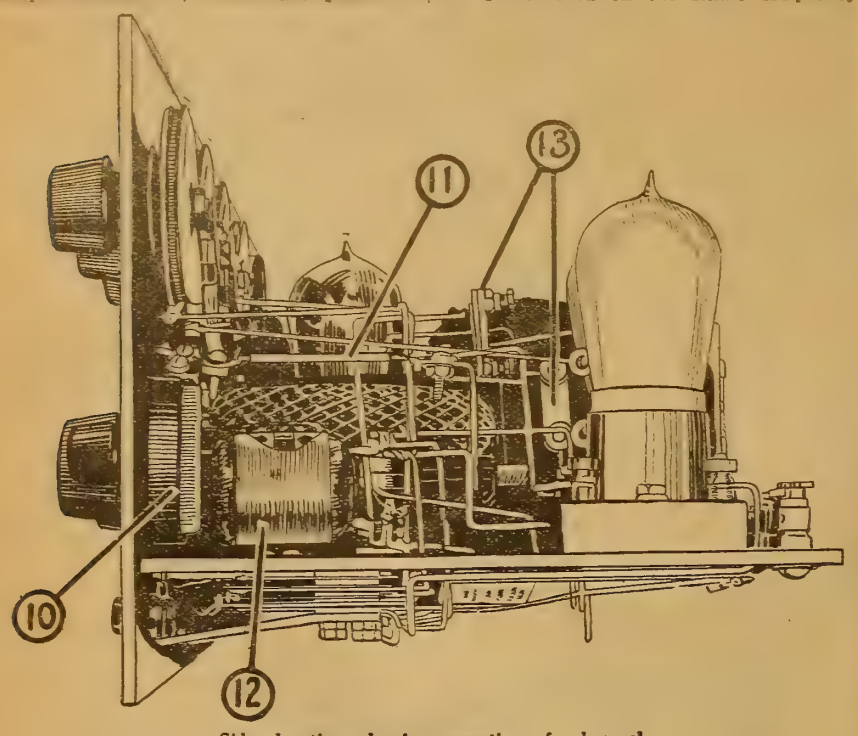
FIVE TUBE NEUTRODYNE

(Continued from page 13)

The assembly and mounting of the apparatus is now complete with the exception of the fixed condensers, for example number 11, which are placed in position during the wiring operations.



Side elevation, showing mounting of sub-panel

As to the Fuses

In the set that was constructed, before this article was prepared, five ½ ampere fuses were used as indicated by the numerals 13 in the illustration. They are not indicated in the hook-up diagram nor called for in the parts list but, if desired, are connected in series between the rheostat and the filament terminal of the lamp socket.

Soldering Solution

Most of the soldering pastes at present on the market are likely to contain corrosive chemicals which in time affect the electrical connections in the joints and introduce unnecessary resistance in the circuit. Before taking up the wiring, the following formula for a good Radio soldering flux is suggested:

Mix four parts by weight of resin with one part of wood alcohol. When dissolved the solution makes a flux which is non-corrosive and leaves a neat clean electrical joint.

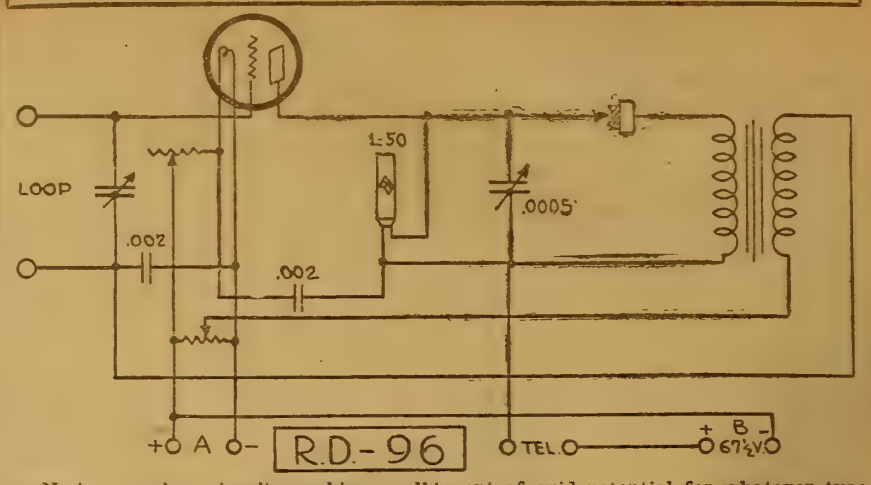
Wiring

In wiring, all filament and A battery leads should be inserted first. The grid and plate leads on the Radio frequency side are next in line. The shorter leads to the anti-capacity switch should then be added but the long leads to the binding posts should be put in last.

The next step is to complete all the short leads on the sub-panel side. Here again the long leads should be kept till last. When adding the condensers, don't solder the wires to them, but pass machine screws through the holes of the lugs; by looping the wire, the leads can be clamped firmly without incurring the danger of shorting the condenser in soldering.

In adding the long leads as the final operation, spaghetti can be passed over the leads wherever there is any possibility of contact between leads. The writer uses only stiff brass bus bar wire and adds no spaghetti except where there is a chance of short circuit. This improves the appearance of the work, especially if care is taken in the running of leads.

INEXPENSIVE SINGLE TUBE SET



AN inexpensive circuit working well with loop aerials always appeals to those fans who find Radio a decided drain on finances.

The parts required are not too numerous and the circuit is very efficient. Two variable condensers, .0005 mfd. capacity, are used for tuning.

A potentiometer permits best adjustment of grid potential for whatever type of amplifier tube is used.

The diagram, R. D.-96, calls for a 50-turn honeycomb coil, but for broadcasting stations of higher wave lengths this can be changed to a 75-turn coil. Two by-pass condensers of .002 mfd. capacity are indicated. The plate battery voltage should be about 67½ or three 22½-volt units.

Grid Leak Is Not Essential

The grid leak is not always essential in some circuits, and if a proper inductance is used even this part will act as a grid condenser. A secondary condenser will also sometimes do this, and the capacity of the secondary coil will also help. With some tubes the Radiophan may be able to "get away" without either part. The tube will be very unstable, however; at least a condenser should be used. A small variable condenser will be of considerable assistance.

YOU DON'T NEED Tubes to get out of town. Even in the summer I hear Omaha, Kansas City, Fort Worth and Davenport on my crystal set without amplification. Works over 1,000 miles in winter. Send self-addressed envelope for further information or $1.00 for complete copyrighted drawings and instructions. Everything clearly explained. Satisfaction GUARANTEED.
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The Improved Basket Weave, Covering All Broadcasting Wave Lengths
With each coil we send FREE two large blueprints, picture hookup and panel layout, list of materials, and fully illustrated instructions for construction and operation.
Buy before the fall rush sets in
We sell all parts required for this wonderfully efficient receiver—panel, coil, condensers, socket, vernier rheostat, variable grid leak, dials, switches, posts, contact points, wire, spaghetti, etc. (no tubes or phones) for only $9.85. Postage additional on all shipments.
Send no money PAY THE POSTMAN.
All Goods Shipped Parcel Post C. O. D.
RADIO SURPLUS STORES, Helena, Montana

FIRST STEPS IN RADIO

(Continued from page 11)

the jar pour a solution made by mixing 3 ounces of potassium bichromate, ½ pint of sulphuric acid and 1 quart of water. Mix the acid and water first and add the bichromate. The level of the solutions in the porous cup and jar should be the same. The zinc and carbon rods may now be inserted and the cell put into service. This cell can be put in some out of the way place and left until exhausted, when it is necessary only to renew the zinc and solution to give it a new lease of life. These cells can be purchased from electrical supply houses, ready to set up and use. This is perhaps the cheapest form of primary battery and will give good service where it is possible to use a battery containing liquids.

The common sal-ammoniac battery can be converted to the bichromate type by using a porous cup to separate the zinc and carbon, as shown in Figure 59. The porous cup fits inside the carbon cylinder, as shown, and the solution mentioned above may be employed. This is an inexpensive form of construction which should appeal to the experimenter.

(TO BE CONTINUED)

The purpose of a C battery is to provide the correct negative charge to the grid.

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for shielding back of panels, etc. Eliminates body capacity. Van's Liquid Copper takes the place of sheet copper or aluminum. Easily applied with a brush—no cutting, drilling, soldering or waste. One bottle covers 400 square inches; mailed to you for $1. Send a Dollar bill today.
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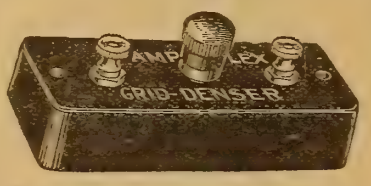

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Questions and Answers

Loss of Efficiency

(4200) RL, Toronto, Canada.

My set, which is a triple coil with a WD-11 tube, was very sensitive when I first set it up (home-made), but since it has been gradually fading away until lately, when the wave lengths were changed, I cannot get much of anything; then it is very distorted and faint. I had a list of 72 stations to date, an aggregate mileage of 29,890. At present it usually picks up WDAP and WJAZ with good volume; all others are faint, very faint. I have resoldered all connections and changed and tested the battery, but to all appearances it is the same old set.

Could it be the fault of tube getting old? Is it in the grid condenser?

Could you tell me which is the most sensitive one-tube hook-up?

Have you or are you going to give instructions on how to make a multiplex wave variocoupler?

I have constructed from your instructions a Reinartz tuner without success. Is it absolutely necessary for a B battery of 60 volts?

Is it advisable to construct a cabinet to contain all sets in one, that is, putting in a triple coil, a variometer and variocoupler, a Reinartz and a Flewelling, also a crystal single circuit coil all on one panel? Would they have much inductance from one another, and would the dead ends have much effect? I would like to arrange them so as to be able to switch from one to another.

A.—Many factors may be the cause, although it is impossible to determine without a personal inspection. It may be that the antenna or the ground connections are corroded. It is often found that weak signals are due to the set oscillating below a critical filament temperature. This can be determined by increasing the temperature above the oscillating point when signals will increase in audibility, but become more and more distorted. In such case use less plate inductance, less B battery, higher antenna capacity, lower phone by-pass capacity. The grid condenser may be shorted.

Either the Reinartz or single circuit tuner is a very sensitive type of receiver. B potential depends upon the tube used. If a UV-200 is used, 22½ volts is sufficient. If a 201, 20-A, 21 or UV-199, 45 volts are indicated. Sixty volts is used only in the case of amplifier tubes.

We have not as yet published instructions for making the multiplex wave coupler. It will have our attention as space permits.

It would not be at all advisable to follow your plan of combining in the cabinet the several circuits mentioned on account of capacity losses, dead end losses and the like.

Cage Aerial

(4187) WB, New York, N. Y.

I would like to know more about the hoop aerial. Will you please tell me as to the diameter of the hoop and the number of wires? What is the best length of wire between each hoop and kind to use? Will a hoop aerial receive distant as well as local stations better than a single wire? Is it directional? What is the best position?

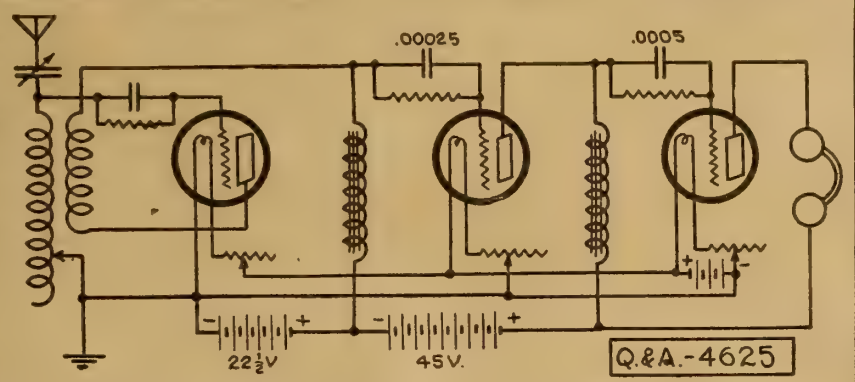
A.—No type is as effective for reception as the single wire; it makes a circuit just as effective as any and far more selective. However, the hoop or cage antenna of which you inquire consists of four to six wires on 4-inch rings. It is effective only for transmission.

An aerial is directional off the lead-in end. Possibly an east and west direction with lead-in off the west end would be most favorable in your location.

Choke Coil Amplifier

(4625) CWC, St. Joseph, Mo.

Have had constructional data for building amplifying chokes from Ford spark coils for some time, but could find no one in this "neck of the woods" who knew anything about the hookup. Thanks to the Digest, which I read, ads and all, regularly, I am beginning to see the light, but not quite. I would like to place the two-stage circuit shown in Figure 45, page 11, Radio Digest, in a separate cabinet for use with my single-circuit regenerative receiver. How will I connect them up? Could UV-199 tubes be used?



A.—Complying with your request, we are presenting detector and amplifier circuit.

UV-199 tubes can be used.

Crystal Set

(4221) CD, Kinmundy, Ill.

I have a crystal set consisting of a two slide tuner, galena detector and phones. My aerial is number 14 wire 175 feet long with a 100 foot leadin. Before May 15th I could hear the stations that were broadcasting on 360 meters to 485 meters. Now I can hear only KSD which broadcasts on 546 meters. Although there are several stations send out on 360 meters and higher. Will you please advise where to locate my trouble?

A.—Noting your specifications and limitations experienced we are advising that it may be that the crystal detector has lost its sensitivity to some degree. It can be washed with soap and water to remedy the condition. It is not our opinion that your difficulties of reception are due to the new wave length. You should be able still to tune to 360 meters wave length.

Neutrodyne Circuit

(4568) KM, Detroit, Minn.

I would like to know if a loop aerial can be used with a Neutrodyne circuit? If so, how?

I would like to know if UV-199 tubes can be used with good results in a Neutrodyne circuit?

A.—A loop aerial may be employed merely by substitution for the secondary of the variocoupler.

The UV-199 can be used although it is not as efficient as the six-volt tube.

Tube Action

(4551) MLM, Chamberlain, S. D.

My tube has not performed correctly since I had it repaired. I have a WD-12; a blue glow is in the tube when using it. This was not noticeable before I had it repaired. To hear anything I have to tap or vibrate the tube. When I do this the signals are heard but soon they die away and I have to tap the tube again. I have a new WD-12; this works fine showing that there are no loose connections in the set itself.

A.—The action of tube is due to the fact that the filament is not quite so good as before the repair was made. However, almost similar results may be obtained if you lower the plate potential until the blue glow disappears. Possibly a decrease of ten volts will be sufficient, although experimentation will best determine the most effective point. When a blue glow is present it is indicated that ionization is taking place and the tube will not function as a detector until it is eliminated.

Trouble in Reinartz

(4535) JBC, Derry, Pa.

I have a Reinartz set and two-stage amplifier which at times work very well, but there seems to be much trouble in the detector which I cannot locate.

At times there is an excessive amount of frying and cracking in the phones, which makes it impossible to put the phones near the ears. At other times it stutters and chops the music or voice and makes clear reception impossible. When receiving on a high wave (over 500 meters) it mushes the sound, which cannot be understood at all. This trouble is in the detector, not the amplifier; I have tested it in every manner that I know.

Ground is a cold-water pipe; aerial—have tried all kinds, inside and out; batteries—22½ volts on detector (UV-200 tube) and 45 volts on detector (two C301-A tubes); tube controls—Filkostats.

Local reception comes in good, but it is the distant stations which give me trouble.

A.—Without the privilege of personal observation, we are venturing the opinion that this is due to improper adjustment of the grid leak. We suggest that a few pencil lines between the grid and filament contacts on the base of the tube UV-200 will eliminate the annoyance.

Exceptionally long distances are heard late at night or early in the morning.

PATENTS ON RADIO
Can you secure a patent on your Radio invention? Does your apparatus or circuit infringe existing patents? These questions and others can be answered promptly by consulting my special library of Radio patents compiled to assist Radio inventors and manufacturers. Send for booklet on Radio patents.
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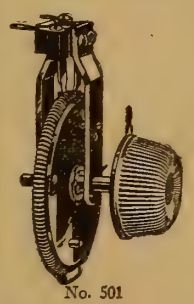

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Radio Illustrated

Field Marshall Haig broadcasts a message to British citizens over Station 2LO, London
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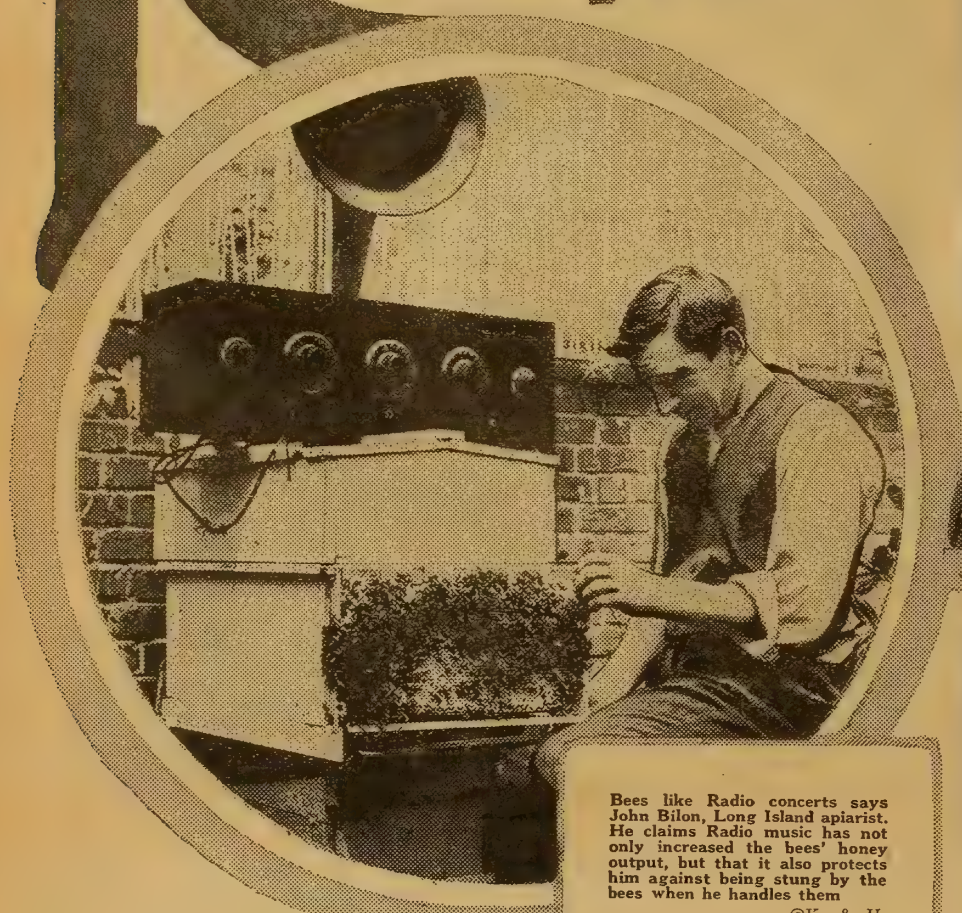
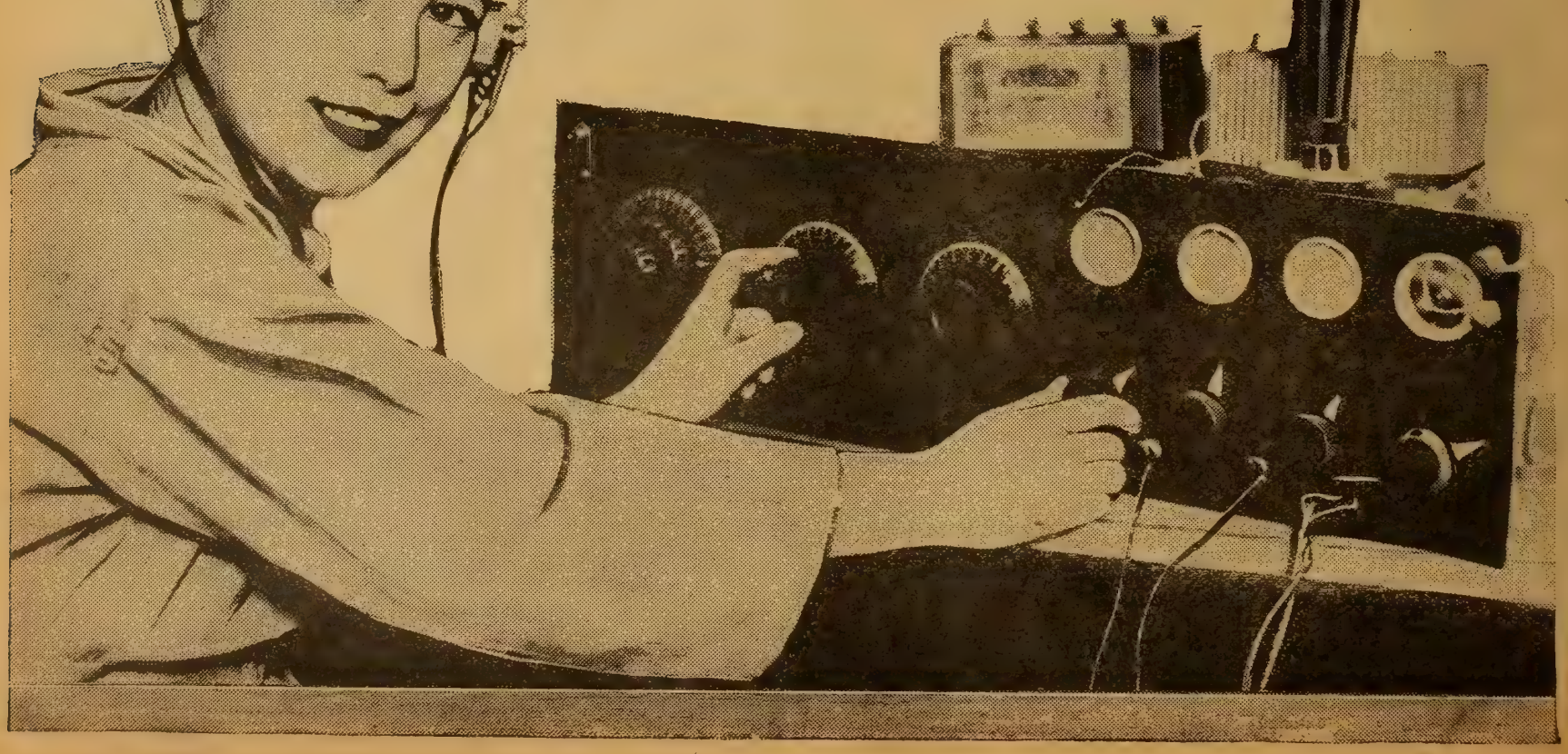


Bees like Radio concerts says John Bilon, Long Island apiarist. He claims Radio music has not only increased the bees' honey output, but that it also protects him against being stung by the bees when he handles them
©K. & H.

Emil Roeder is only one of the many young members of the Chicago Boys' Club who have made their own receiving sets from antenna to phones. The youth of the land is finding excellent use of its time constructing sets, and the Boys' Club is helping along the interest of the boys by training them in Radio © U. &. U.



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1923

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Radio Digest

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Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, SEPTEMBER 15, 1923 | No. 10

RADIO AIDS DOPE FIGHT

Jane Cowl, famous Shakespearian actress, now playing "Juliet" in Oakland, Calif., was wooed via Station WOR, Newark, N. J., by a "Radio Romeo" in the person of W. Wallace Hermann, the concert tenor. He sang to her, "You Are the Juliet of My Dreams"

MRS. WALLACE REID TAKES AIRPHONE INTO DRUG BATTLE

Proclaims Broadcast Stations Arch Enemies of Narcotic Peddlers—Can Warn of Dread Ravages and Help Cure Hopeless Addicts

CHICAGO.—Heralded as the arch enemy of traffickers in crazing, deadly drugs, acclaimed as the savior of hundreds of thousands addicted to the use of narcotics, Mrs. Wallace Reid, widow of the noted motion picture actor who recently was a victim of the needle of nepenthe, emphasized here a few days ago the inestimable value of Radio as a weapon in the war against "dope," and urged broadcasting's wide use. Steps were taken to enlist broadcasting stations throughout the country.

The little woman whose face, saddened by the death of her husband and by the

(Continued on page 2)

GIANT SET SUPPLANTS BAND IN FALL FROLIC

CINCINNATI.—What was said to have been the largest Radio set ever built was the giant which featured the float of the Crosley Company of this city in the recent night pageant of the fall festival here. The horn of the set which was set on a motor fire engine chassis, was twelve feet long. The set supplanted a brass band.

Wallace Reid (from a photo taken just prior to his death) and his wife, formerly Dorothy Davenport, who is waging a Radio warfare against dope peddlers combined with an educational broadcasting campaign to aid the 2,000,000 addicts in this country to discard their death-dealing drug habit

CANADA OPERATOR'S WEDDING IS HEARD

Station CFCN Transmits Nuptials by Means of Microphone at Church Altar

CALGARY, ALTA.—Radiophans recently listened to the broadcast over CFCN, W. W. Grant broadcasting station here, of the first Radio wedding in Canada. And it seemed exceptionally fitting on this occasion that a Radio operator himself should be wed over the ether.

Dale M. Snebley, daughter of Mrs. Fred

(Continued on page 2)

Juliet in Oakland Hears WOR Romeo Carol Love

Actress on Pacific Coast Wires Appreciation to Newark

NEWARK.—Not beneath a bowered balcony, not under the mystic skies of Italy but on etheric waves the love song of a modern Romeo W. Wallace Hermann, noted tenor, was broadcast here a few days ago by Station WOR to Juliet, Jane Cowl, famed actress, who was in a theater in Oakland, Calif., acting as hostess of a Radio party.

WORLD NEWS AIDS INTEREST IN OFFER

HISTORY MAKING SHOWS REFLECTION BY FANS

Coal Quarrel, Ball Pennants, Ruhr Question, Italy and Greece Row Stimulate Radiophony

SPECIAL REWARD OFFER

Coupon Number 16

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

That Radio has served as one of the greatest educative elements in the history especially of the United States, that it is now applied in a manner that will insure a higher mentality for posterity and that the events of the future will tend to develop even more the passion of peoples to learn, are the linked conclusions of publicists all over the earth, according to the recent reports of observers.

The outcome of the coal quarrel in this country, the winning of the baseball pennants, the Ruhr problem, the serious situation involving Italy and Greece—all these tend to spur the interest of Radiophans and, of course, increase the demand for the parts offered by Radio Digest at low cost. During the last few days especially the various political, religious and military conditions throughout the world have excited the interest of fans so much as to show an appreciable reflection in their demand for Radio Digest parts, in the special reward offer for regular subscribers.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. Watch this page next issue for the list of parts you can secure.

AIRPHONE FIGHTS DOPE

(Continued from page 1)

agony of others, is known to millions, pleaded that steps be taken immediately to apprise, by means of Radio, the people of the United States and Canada especially of the ravages of morphine, heroin, opium and the like.

"There are three great media to warn humanity against the drug habit," she said. "These are Radio broadcasting stations, motion pictures and newspapers. When millions hear the voices of those who fight, when they receive the personal touch that Radio conveys, they will realize the peril that besets the nation."

Has Used Five Stations

In her campaign against the purveyors of subtle, soul-deadening poisons Mrs. Reid has utilized broadcasting stations in five cities of the United States. In Chicago she delivered her message over Station KYW. So great was the interest aroused by her combat in this city that great crowds followed the automobile which conveyed her to and from KYW and a motion picture theater. At the theater she appeared prior to the presentation of the picture "Human Wreckage," an anti-narcotic picture in which she was featured as the heroine.

"Radio Digest could do much good," continued Mrs. Reid (formerly known as Dorothy Davenport), "by making known to its readers that the crusade against the drug habit is not against those afflicted by it but against those who sell drugs, against the ring which waxes fat over the misery of hundreds of thousands of men and women."

Radio Diverts Addict's Mind

The use of airphones to quiet those addicted to drugs, to divert their minds from the maddening longing which besets them, was advocated by the fair crusader. "When it becomes generally known," Mrs. Reid said, "that addiction to drugs is a disease, a terrible malady, the apathy and the scorn of most of the people will turn to pity."

Then will ensue, she declared, a demand for sanitaria in which the drug-bedeviled multitude may be housed and treated, calmed in great part by the soothing strains afforded by Radio. "The sooner Radio is included in the treatment for these unfortunates," said Mrs. Reid, "the sooner will this country's burden be lightened. Radio is the best form of audible education."

Life Threats Sent

So persistent, so implacable has been Mrs. Reid's fight against the drug evil that many of those responsible for its spread—the "dope peddlers"—have threatened her life. Several letters bearing threats of death were sent to Mrs. Reid by peddlers while she was in Chicago. "They do not frighten me," she said. "They make me more determined."

Many of the men in this country and Canada who are addicted to drugs are veterans of the world war. "It is they particularly who would appreciate the application of Radio," said Mrs. Reid.

So effective was her Radio appeal in this city that the mayor announced plans for a conference with the commissioner of health to consider the possibility of establishing hospitals for the victims of drugs. Similar encouragement was given Mrs. Reid by the mayor of Kansas City, Mo.

Believes Radio Chief Drug Weapon

"If the 2,000,000 or more drug victims in the United States could be taught and treated by means of Radio," Mrs. Reid continued, "if they could be advised and diverted by speech and music great benefit would result." And if Radio could be utilized as a crusader, if the air would bear the tales of terror that the legion of unfortunates could unfold, if the various broadcasting stations would carry on the fight against peddlers and unscrupulous importers, the curse of drugs soon would be driven away.

As a result of Mrs. Reid's advocacy it is probable that the influence of many United States senators and other publicists will be enlisted to organize a campaign against the drug habit in which Radio will be the chief weapon.

WJZ Sends Music Ovation to Whiteman, Jazz King

Novel Tribute to Composer Includes Air and Sea Strains

NEW YORK.—When the great liner Leviathan of the United States' marine docked here recently the most novel ovation ever accorded a musical composer was given to Paul Whiteman. The famous leader, returning from abroad, was crowned "King of Jazz" as eight orchestras, a submarine band, players on a circling airplane and musicians in diving suits sounded without intermission syncopated strains created by Whiteman. The entire program was broadcast by Station WJZ, Radio Corporation of America.

CFCN "OP" MARRIES

(Continued from page 1)

W. Beggs of Calgary was united in marriage to Morris V. Chesnut, secretary treasurer of W. W. Grant Radio Ltd., the Rev. Robert Johnston, D.D., minister of Grace Presbyterian church here officiating, and the proceedings were broadcast. Immediately after the ceremony was completed letters and telegrams of congratulations were received from all over the country, from people of whom the bride and bridegroom had never heard, while the church from which the ceremony was broadcast was crowded with spectators and guests.

A microphone was placed at the altar and the ceremony broadcast by remote control, two cables having been especially installed from Station CFCN on Crescent Heights.

Microphones with amplifiers are being installed in hotels in Paris for paging.

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Radio Digest, Illustrated, Volume VI, Number 10, published Chicago, Illinois, September 15, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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A Loop Aerial You Can Put in Your Parlor—and not get the wife angry. Designed for present range of broadcast wave lengths. H. J. Marx will describe the De Luxe Loop Aerial next issue.

The Miloplex Single Tube Set Knocks 'Em All Dead—with its simplicity of operation, low cost, few parts. Buy next week's Digest and make a Miloplex. Worth everybody's while.

Three Tube Tuned Impedance Coupled Radio Frequency Circuit—a good hook-up for R. F. hounds—will be R.D.-98 next week.

Pictures Tell the Story Better—for some of us. The easily followed simplex diagram next issue will be an English crystal detector Radio frequency amplified set.

Alternating or House Lighting Current Will Light Your Tubes—Thomas Benson will devote his next chapter for beginners to telling how this can be done.

A Match Box Receiving Set That Works—One of many interesting, practical kinks the Radiophan will read about next week.

Photo Diagram Page of Melco Supreme Acmedyne Circuit Set—Next number. Don't miss this simple exposition of a receiver worth knowing.

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STATION CFCN NOW BOASTS 1800 WATTS

CANADIAN PLANT AT CALGARY REMODELS SET

Twelve Special 500-Watt Tubes Require Input of Eight and One-Half Kilowatts

By Jeffrey J. Dingman

CALGARY, ALTA.—CFCN, broadcasting station of the W. W. Grant Radio, Ltd., here, has been completely remodeled and recently went on the air as the most powerful station on the Western half of the American continent and as one of the two or three super-stations in the United States or Canada. On the initial test the set was operated on only one-third of the maximum power. Since then it has been put up to the maximum power and it is expected that long distance broadcasting records which CFCN in the past has set, will be shattered when mail from far distant points begins to arrive.

CFCN is now equipped with twelve giant tubes of 500 watts each, especially manufactured in Montreal. It is estimated that the regular modulating output power of the station is 1,800 watts, which is the power delivered into the antenna system. The initial input power is eight and one-half kilowatts. In addition an amplification system carrying two fifty-watt tubes has been devised. This amplifier is expected to aid the clarity of the broadcast.

Has Four Times Old Power

As a comparison to show the increased power of the set, before this was constructed only three 500-watt tubes were employed. Radiophans all over America are familiar with the long distance broadcasting records CFCN established on the old set. Its signals were heard off the coast of Yokohama, in Alaska and Mexico, and 700 miles at sea in the Atlantic ocean. It is anticipated that new records will be established in the near future.

"During the time we were necessarily off the air, I have received inquiries from all over the continent regarding the new station," Mr. Grant said in an interview with a Radio Digest Illustrated representative. "It has created even more interest than we anticipated."

The studio has also been remodeled, so that there is now much more space for the artists who entertain nightly. The artists' and reception rooms are richly appointed and delicately decorated. The mural decorations and the color scheme are exceptionally pleasing to the eye.

BIGGEST RADIO ONE OF FIVE FOR CHINA

American Firm Establishes First Communication with U. S. Despite Jap Opposition

PEKING.—The American legation here has confirmed the announcement in San Francisco recently that R. P. Schwerin, president of the Federal Telegraph Company, had signed, in conjunction with the Radio Corporation of America, a new agreement with the Chinese government permitting the immediate construction of five powerful stations in China, establishing for the first time direct communication between the United States and China.

Schwerin made the announcement on his return to San Francisco from China. Two of the five stations will be erected at Shanghai; one of them is to be the most powerful in the world. The others will be at Peking, Harbin and Canton. Their aggregate cost will be about $13,500,000.

The Federal company's executive is credited here with having been of great assistance to the American interests in their eight months' struggle to sign the contract. The Japanese government, claiming exclusive Radio rights in China, had objected to the project.

First Air Lines from U. S. to Holland and Italy Open

NEW YORK.—For the first time in the history of international communication, direct Radiotelegraphic service between the United States and The Hague (Holland) and between the United States and Caltano (Italy) was established recently, according to an announcement by the Radio Corporation of America. The opening of these services raises the total number of direct Radio circuits radiating to European countries from New York city from six to eight, and affects not only Holland and Italy, but provides more direct routes between the adjoining countries and the United States.

Citizens of San Diego, Cal., are making an effort to raise funds for a municipal Radio plant. Fancy dress balls and many other money-making schemes are being restorted to and it is expected that the necessary amount will soon be in hand.

RADIO IN EACH ROOM, NEW HOSPITAL PLAN

CHICAGO.—"How d'ya feel" is not likely to be the usual greeting of patients in the $1,000,000 hospital proposed by a surgeons' syndicate for the north side here. It'll probably be "How'dja like the Radio last night," for reception outlets for every room feature the design, according to the recent announcement of Dr. Benjamin Breakstone, promoter.

LESS READING SINCE ADVENT OF AIRPHONE

NIAGARA FALLS, N. Y.—The librarian at the Carnegie Public Library here, reports that fewer people came to the library to read in the evenings during the past year. Professional men who formerly came to the reading room have discontinued their hours among the books. An inquiry revealed that Radio sets are keeping the people at home.

MAKING TONGUE FOR LEVIATHAN

A girl's deft fingers formed the tongue with which S. S. Leviathan "speaks" at will by Radiotelegraph to either side of the ocean. Miss Marie Prepelik is seen assembling the "insides" of a 10,000-watt vacuum tube. Two of these furnish the power to the Leviathan's big Radiotelegraph transmitter which has power enough to span the Atlantic Western Electric Photo

WCBD Is Zion's Answer to Founder's Prophecy

Illinois City, Seat of Sect, Fulfills Dowie's Forecast

ZION, ILL.—Way back in 1897 Dowie, founder of the city of Zion, saw Radio. In an address delivered in Chicago, September 5, 1897, he said:

"Do you know that one day in the big Zion temple we will have, we are going to have a great big thing to catch the sound, and I am going to have them 'turn on' Zion to Zion's friends in New York. See? And by the beds of the sick and the sorrowing some day I am going to have them hear the testimonies that they cannot hear excepting from their dying beds. Going to get it some day."

Dowie did not call the instrument "Radio"; he called it "a great big thing to catch the sound," but he saw the Radiophone just the same. And his prophecy has come true. Station WCBD, Zion, Ill., the fulfillment of Dowie's prophecy, has been heard in many states and in Canada, and far out on the Atlantic ocean.

Cape May Plant Abandoned

WASHINGTON. — The Naval Radio traffic station at Cape May, N. J., has been closed and abandoned. The transmitter at that station was removed to the compass station at Henlopen, the latter station becoming the compass control station for the group composed of Cape May, Cape Henlopen and Bethany Beach. Traffic formerly handled by the Cape May station will be handled by the station at Philadelphia.

AURIST USES AIRPHONE TO AID DEAF PERSONS

WOR Broadcasts Prescriptions for Hard of Hearing

NEWARK, N. J.—Dr. Paul V. Winslow, consulting ear surgeon of the New York state hospital, recently delivered a lecture entitled, "Radio for the Deaf," at Station WOR, L. Bamberger and company, here.

Dr. Winslow, who is president of the National Round Table for Speech Improvement, advocated new theories pertaining to cures for deafness. Among other things during his broadcast he said that humming and singing will cure head noises and make it possible for persons partially deaf to renew their hearing.

After many experiments, Dr. Winslow prescribed a series of singing and humming exercises. He urged as a form of practice the humming of M in a way that would vibrate the lips, or the singing of the vowel F in two-minute periods three times a day, placing the tone high up in the nasal chambers with a decided twang.

Dr. Winslow has also made a series of experiments with Radio and is of the opinion it can be employed to fine advantage in helping to cure deafness.

WNAC on New Schedule

BOSTON, MASS.—Station WNAC, the Shepard stores, is now operating on a new broadcasting period from 1:00 to 2:00 p. m., excepting Sunday. The programs will consist of selections by the Shepard Colonial orchestra, organ selections from the Modern theater and renditions by phonograph.

ALASKA AIRPHONES AID IN GOVERMENT

COMMUNICATE WITH MAIL STEAMERS FAR OUT

First Troubles Remedied by Training Light Keepers in Radio—Tell Ships Where to Land

By L. M. Lamm

WASHINGTON, D. C.—The use of Radio in Alaska is expediting government business and is of great use in case of emergencies. Complete Radio telephone transmitting and receiving stations were installed at Cape Sarichef and Scotch Cap Light Stations, Alaska, by the navy department in 1921. Some minor difficulties were experienced, it is said, during the first year of operation, due to burnouts of the motor generators and the wrecking of one of the steel antenna masts by a storm.

Repairs were made immediately, however, and since that time but little trouble has been experienced. The keepers at both stations have mastered the mechanical and electrical details of the installations sufficiently to keep them in operating order, and Radiophone communication between the two stations, which are about seventeen miles apart, is maintained without difficulty.

Communicate with Mail Steamer

Owing to the lack of other Radiophones in that part of Alaska, one keeper at each station has taken up the study of the code, and the keepers are now able to communicate with the mail steamer at distances up to 165 miles, and also to keep in touch with each other and to exchange messages by key.

At sixty-five miles the voice of either station can be picked up, it is said, by the steamer, even on the opposite side of high mountains.

This means communication has been of great service both to the stations and to the mail steamer. As the boat is approaching Unimak Pass, information is obtained direct from both stations as to landing conditions, and no time is lost if a landing cannot be effected. When a landing is impossible at Cape Sarichef, the mail boat is instructed to land the mail at Scotch Cap. It is then sent overland by one of the keepers.

Both stations exchange code messages with the naval Radio station at Dutch Harbor and are thus in touch with the outside world, a matter of vital importance in emergencies.

MARCONI SEES ONE WAY AIR MESSAGE

Radio Pioneer Reports Tests Show Direct Transmission Is Possible

LONDON.—In a statement issued to the press on his arrival at Southampton on board his yacht Electra recently, Senatore Marconi said that during the two months he had been away on his research cruise he has been working all the time on the system of directive Radio telegraphy, by which a message could be sent in one direction only, and he was delighted to say that experiments had proved highly satisfactory.

The apparatus with which he had been working was the only installation of its type, but it was likely to come into universal use in the future. The results he obtained proved that communication could be maintained over long distances.

The new system, said Senatore Marconi, effectively eliminated atmospheric disturbances, and he might say that he had experienced no trouble of that sort during the whole of his two months' research. The course of the trip was roughly 2,200 miles or the distance from England to Canada.

Kansas City Mayor Hears Peace Plan by Airphone

KANSAS CITY, Mo.—Frank H. Cromwell, mayor of this city, the first mayor to broadcast weekly talks about municipal affairs as a means of civic education, recently listened in aboard the famous Radio car which, with a trio of New Yorkers, is on a world tour, a venture in international friendship, having presented a parchment letter from Mayor Hylan, of New York, to the mayor of Kansas City. The set on the car had traveled 3,000 miles without breaking a tube; all were mounted in sponge rubber.

U. S. Compares Amplifiers

WASHINGTON.—Measurements of voltage amplification of audio-frequency amplifiers are discussed in Letter Circular 98, recently issued by the United States bureau of standards for free distribution. The circular gives the results of voltage amplification measurements made on sixteen audio-frequency amplifiers which were on the market during 1921-22.

Life Worth Living Even in Prison When Radio Outfit Brings in World

News and Music from the Outside Cheer Condemned Slayers and Other Criminals in Cook County Chicago Jail—Prisoners Become Quieted as They Listen In

By J. L. Newman

Bars do not a prison make as long as Radio carries through them the news of the world, its sweet tones and sad. Stone walls, grim and grimy, the hoarse cries of men and of women, the chilling clang of cell doors, dark dank shadows, even the odor that does not depart—these do not make a prison while Radio conquers space and encompasses the earth.

All this and more was shown recently by means of a set operated in the Cook county jail, Chicago. It was the first time that a Radio set had been placed in a prison. The theory of penologists, sociologists and of poets, that music will soften the hardest hearts was proved when the strains of the classics were wafted by Radio through the tiers of the prison into the breasts of murderers and thugs, of men old in crime.

Digest Installs Set

The set, a Zenith 1R, two-circuit type, with power amplifier and loud speaker, was installed by an expert of the Chicago Radio Laboratories under the auspices of Radio Digest. Permission had been obtained from Captain Wesley Westbrook, chief jailer. "The boys surely will like it," he said enthusiastically. "It will serve to maintain discipline."

Deep down in the prison a stripling paced the stone floor. He was accused of trying to obtain "easy money." The day was dark and so were his thoughts. But when he, a Radio expert, was asked to assist in the installation of the set, he smiled gladly. And when he was appointed operator of the apparatus he became proud.

The set was placed in the library and hospital of the prison, far above the noisy traffic of the streets. The antenna was shoved through the bars and steel mesh of a window, to dangle in the air. A spreader was adjusted to keep the antenna away from the outer wall.

Prisoners Join in Work

A handsome youth, the sun of the Mediterranean in his glowing eyes, helped to string wires through grated doors, down iron stairways and forbidding galleries, to a loud speaker hundreds of feet away. A burly negro laughed, jigged and capered as he unwound a coil of wire. A collegian, precise of speech, haughty in manner, talked glibly of Radio as he watched with the glare of a beast at prey, a uniformed jailer.

The bell at the end of the corridor sounded. The heavy door was opened and the wire writhed and tossed on its way to another loud speaker. Through devious iron and stone bound lanes, past gratings through which peered brutal, eager, gloomy eyes, up and down and around, the wire made its way to still another loud speaker. Near the cells of men and a woman condemned to hang, the wire went; near the cells of lads who had sought gain at the points of pistols, near weaklings who cowered under the sickly glare of arcs, near black and white and yellow, near the sinning and the suspected.

Shout with Delight

Long before the hundreds of feet of wire had been attached to the loud speakers most of the prisoners knew that the Radio set was to be installed. It was to have been a secret, but the prison "underground" was too wary. And when the volume of sound carrying "jazz" reached the lowermost cells, six or seven stories below, the prisoners shouted in delight.

Beside his cell door facing the "bullpen" a condemned slayer squatted. He had killed a woman. Murder was still in his eyes. In a few days he would face eternity at the end of a rope. The loud speaker, a few feet away, skirled and snarled and then brought the dulcet drone of a saxophone. The killer, startled, sprang to his feet. He shook the bars. As they rattled a woman prattled of snuggling and petting. The loud speaker was alive. The moment was tense, tragic. A jailer hummed.

"Say, bo," bellowed the murderer, "is that a Radio?" Then, the noose impending, he shuffled his feet. The loud speaker enticed him. "Keep it up, kid," the slayer yelled, "keep it up." And high above the clamor from other homicides, the murderer's throaty whine accepted the snuggling and the petting of the women of the loud speaker.

Woman Asks for Classical Music

Down, down, down—from the depths of a cell at whose door lay a crumbled loaf and a pan of water, came the demand for baseball scores.

"Do we get any real music?" a woman, wide of eye, full of bosom, a slayer, inquired, as she swayed with the strains from a Chicago station. The woman, who had killed her husband so as to live with a younger man, wanted real music. She was answered by "Miserere."

'Way up, on the topmost floor, the Radio expert prisoner continued to tinker with the knobs of the set. In the farthest cell house a colored boy danced gleefully. In the offices of the jail clerks and turnkeys grinned and stepped in sprightly fashion.

Want Set Permanently

"There is no question that music induces quiet," said Captain Westbrook. "The Radio set will be operated day and night by one of our inmates." Steps were to be taken, he said, to purchase a set for permanent installation. "The county hasn't the money for a Radio machine," Captain Westbrook said, "but perhaps some kindly person will donate enough to buy one."

CHAMPAGNE BUCKETS FIND USE ONCE MORE

Liquor Pails Serve as Amplifier Bases Aboard Leviathan

NEW YORK.—Silver champagne buckets were put to a use recently which was a commentary on the times during a "good-will luncheon" given by the United States Lines aboard the Leviathan at her dock at Southampton, England. These receptacles, once a necessary part of a ship's dining service, were inverted on a table and on them were placed the loud speakers of an amplifying system installed to make the speeches audible to all of the 500 guests.

As the great dining room of the Leviathan was designed for dining rather than public speaking, it was feared that the speakers would be unable to make themselves heard by everyone. So when the ship was docked a public address system such as is in use in many American hotels was installed.

Army Airphone's 'Paper' Saving $52,535 in Year

U. S. Spends Only $13,840 for Military Messages, Data Show

WASHINGTON.—The army Radio net, valued at approximately $500,000, made a return to the government of more than ten percent during the last fiscal year—on paper. From June 30, 1922, to July 1, 1923, the traffic handled by the signal corps Radio net would have cost the government $66.375 at government rates via commercial wires. The actual cost of these operations was $13,840, which shows a "paper" saving of $52,535.

Actually, official messages are handled without cost; the few private and commercial messages which are handled, where other Radio service is not available, are sent at rates slightly higher than the commercial. The money is turned over to the federal treasury.

During the fiscal year ended in July, 120,968 official messages were handled by the army's message center, Munitions Building, Washington.

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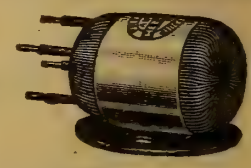

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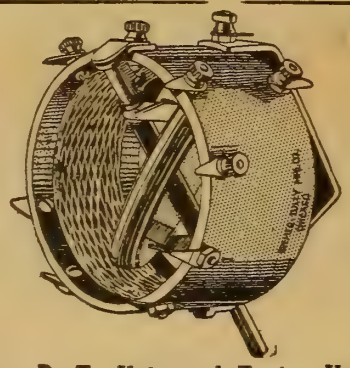

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The D-7 A Reflex Radiophone is a three-tube set at $125.00; the D-10 Portable Reflex has a drawer in its cabinet for dry batteries and is a four-tube set at $150.00. No matter what you pay, you can't get greater radio satisfaction.

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WJAZ—"THIS END OF NORTH POLE"

Announcing, first by red light, then by voice, both controlled by board in the famous studio, a violin solo before microphone concealed in a lamp in Station WJAZ. The announcer pictured is L. M. E. Clausing, designer of the control apparatus and other features of the famous Edgewater Beach Hotel Station © U. & U.

Crystal Studio and Immense Power Help Make Chicago Station Leader

By J. L. Newman

CHICAGO.—On a gleaming strand of a great lake hard by a mighty city there rises like a fan a tall slender mast. From its top, on waves of air, go and come rare words and music. It is the point of a wonder spot that has drawn hundreds. Its voice is known to myriads of all colors, climes and castes as Station WJAZ—"This End of the North Pole."

Opened about four months ago by the Chicago Radio Laboratory, the achievements of the plant, its operation and equipment, have attracted the attention of many prominent Radio engineers. Its location, too, has set it apart; in fact, it is the studio of WJAZ which has brought distinction.

At the far end of a magnificent dining salon in the Edgewater Beach hotel, looking upon the steely blue expanse of Lake Michigan, is what men and women have described as a bower of beauty—the crystal studio. There are no walls. Instead there are clear, bright sheets of heavy double or triple plate glass in white frames. These enclose the studio. The glass admits the light, and the wondering gaze of guests. But the transparent sheets exclude sound. The silence thus afforded aids those in charge of the studio to control in part the volume and variance of transmission, to temper its tone, and to make smooth the way of temperamental artists.

Studio Artistically Decorated

Red, white and blue form the color scheme. Above are billows of rich red velvet which shield a system of lights whose hues may be varied to accord with the verbal and musical themes that compose the programs. The glass partitions too are draped in red velvet. Here too are two grand pianos, a console phonograph, a number of bizarre lamps, bits of artistry and antique pieces. Under foot is a blue carpet of yielding texture.

One of the lamps lightens in two ways. It sheds a mellow radiance over the singers or speakers and at the same time conceals in its fringe a microphone. A violinist, as an instance, stands by the lamp, sees his audience through the glass and thus is inspired. There is nothing to show that he is playing too to hundreds of thousands of others within a radius of 3,000 or more miles, depending on broadcasting conditions.

From the microphone under the lamp shade a wire leads to the control board in the adjoining room which is part of the crystal studio. From the board another wire (telephone) leads to the transmitting plant. In various parts of the studio proper, at the base of the glass frames, are devices for the insertion of jacks by means of which the microphone is connected with control board. Microphones are located too, near the "jazz" orchestra which WJAZ broadcasts nightly and near the orchestra on the marble dance floor on the beach.

Control Board Important Phase

Perhaps the most important phase of the crystal studio is the control board and modulating device beside it. These contrivances and others of the studio and plant were designed in large part by Leroy M. E. Clausing, formerly in the Radio service of the United States bureau of standards in Washington, D. C., and of the Radio service in the navy yard at Charleston, S. C.

There are ten microphone lines controlled by the board. There are jacks for placing on the air the strains of the orchestra in the dining salon, one for the first studio desk (reserved for oratory), two for piano and song, one for the announcer, one for the marble dance floor on the beach (about 200 feet away), one for the transmitting station (in a house especially built, about 300 feet away) and two to be used in emergency.

The board controls too the lights which signal the various numbers of the programs. When a plug is inserted a red light, mounted attractively, flashes to those in the studio and to the audience without that next number is about to be broadcast. This too is a signal for silence. The same method is applied to the beach dance floor and to the orchestra in the dining salon.

Sensitive Modulator Control

What is said to be one of the most remarkable and efficient devices ever used in relation to Radio is that which modulates or gages the volume of sound in the crystal studio's control room. On a dial mounted on a large wooden cabinet is a needle which swings almost instantly in response even to a breath. When Mr. Clausing, designer of the device, whistled sharply in the direction of the microphone from a point about four feet away the needle swung violently to the right.

As Clausing lowered the whistling sound the needle retreated accordingly. The modulator control is used to judge the amount of voice frequency power being sent into the transmitter. It is constructed so as to enable the announcer to hear his own orders, instructions or directions, thus enabling him to judge the volume of his own voice. The modulator amplifies sound about 8,000 times which sound then is amplified several million times in the transmitter.

Design Oversize Throughout

Another interesting phase of the plant is a device which enables the announcer in the studio to talk to the operator in the station regardless of the latter's position. This is done by means of an electrical connection of the control board with a loud speaker in the station. By this contrivance the operator in the station is freed from the annoyance and loss of time usually caused by hurrying to and answering a telephone.

As many as sixteen tubes have been fitted to the transmitter. The tubes are arranged in a circle to enable equidistant connections. A low resistance aerial, fan-like as to construction, its lead-in caged, distinguishes Station WJAZ. The natural period of the antenna is about 230 meters; it works on an assigned wave length of 447 meters. The generator capacity is ten kilowatts at 4,000 volts. The entire set was purposely built oversize so as to enable the carrying of more than twice the usual load.

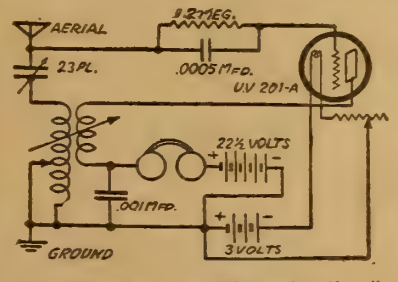
It is this unusual capacity; it is the scientific manner in which WJAZ is operated that has given it the name of "This End of the North Pole" and has enabled it to apprise an eager, anxious world of the movements of the MacMillan expedition to the top of the earth.

RECEIVING RECORDS? SEND 'EM IN—

(The following items are based on letters from Radiophans, who have been doing good distance work. Readers submitting letters for publication must diagram their sets.—DX Record Editor.)

Week-Old Set Gets Distance

J. F. Hooper, 204 Kindersley Road, Montreal, Canada, reports regularly receiving over two dozen distant broadcasters using the regenerative single tube circuit shown herewith. In his letter he states that the set as yet is less than a week old and that "static is something awful, but I find good results may be had by listening in between 11:00 p. m. and



1:00 a. m., Eastern daylight saving time."

Mr. Hooper uses a UV-201-A tube with 3 volts on the filament and 22½ volts on the plate. The diagram illustrates the arrangement. It should be noted that Radio Digest uses the variable condenser symbol shown to indicate that the side with the arrow through the black dot is the connection to the rotary plates.

Vessels at sea may now obtain free medical advice through the Radio station at Gothenburg, Sweden. The Radiogram telling the symptoms of the person afflicted is forwarded to the Allmanna and Sahlgrensha Hospital, from where free advice is sent to the ship through the Gothenburg transmitter.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA, Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:45- 7:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	6:00- 9:00	3:00- 4:30
KDKA, E. Pittsburgh, Pa.	326	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	5:00- 9:00	6:30- 7:30
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	.....
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	6:00- 7:00
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas.	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:00- 8:00
WCX, Detroit, Mich.	517	7:00-10:00	7:00-12:00	7:00-10:00	7:00-10:00	7:00-10:00	.....	4:00- 5:00
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	11:45- 1:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	9:00- 1:00	.....	9:00- 1:00	.....	9:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 6:00	5:30- 8:00	5:30- 9:00	5:30- 6:00	6:00- 1:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-10:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	.....	8:30- 9:30	8:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	6:00- 8:00	.....	6:00- 8:00	.....	6:00- 8:00	.....	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	5:00-10:00	5:00- 5:30	5:00- 8:00	5:00- 5:30	5:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	.....	.....	.....	.....
WJAZ, Chicago, Ill.	448	.....	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	5:00- 8:00
WJY, New York, N. Y.	405	.....	.....	.....	5:30- 9:30	5:30- 9:30	.....	1:15- 4:00
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:25-10:55	.....	.....	.....	9:25-10:55	.....
WLAG, Minneapolis, Minn.	417	6:30-10:30	6:30-10:30	.....	5:30-10:30	6:30-10:30	6:30-10:30	7:30- 8:30
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	.....	9:30-10:30
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	5:15- 6:30	6:00- 9:00	5:15- 6:30	5:15- 6:30	6:00- 9:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00 12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	4:30- 5:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

RELAY CONVENTION STIRS ALL CHICAGO

PUBLIC INTEREST CENTERS IN TECHNICAL PHASES

More Than 1500 Delegates to Second Annual Meeting — Many Notables on Program

CHICAGO.—One physical law at least was broken here September 11 when instead of radiating from, all roads Radioed to Chicago where, beginning September 12 and ending on the 15th, more than 1,500 delegates, representing all phases of Radio, were to attend the second annual convention of the American Radio Relay League. The meeting, under the auspices of the Chicago Radio Traffic association, was preceded by unusual enthusiasm not only on the part of delegates but of the public. The latter evinced great interest especially in the technical sessions scheduled for September 13 and 14 in a high school.

Those Who Are to Speak

Among the many Radio notable speakers on the program were such experts as W. D. Terrell, chief supervisor of Radio, United State Department of Commerce; R. Y. Cadmus, supervision of Radio, third district, the oldest inspector in the service; Arthur Batcheller, supervisor of Radio second district, Charles C. Kolster, supervisor first district, S. E. Edwards, supervisor seventh district, and E. A. Beane, supervisor ninth district.

Many Notables Taking Part

Other notables to take part in the program were C. D. Tuska of Hartford, Conn., who was to talk of the New Miner Circuit; J. H. Miller of the Jewell Electrical Instrument company, "Vacuum Tube Characteristics," demonstrated on the platform; M. B. West, laboratory superintendent Chicago Radio laboratory, "Underlying Characteristics of Receiver Design"; Leroy M. E. Clausing of Station WJAZ (Chicago), formerly of the United States bureau of standards, "Tube Transmitter Design," and William Dubilier, "The Condenser, Its Application to Radio."

These are the names of experts who have been invited to deliver addresses: Edwin H. Armstrong, inventor of the circuit bearing his name; Dr. Lee DeForest, of the DeForest Radio Telegraph and Telephone company; Dr. Ernest E. W. Alexanderson of the General Electric company; Dr. H. C. Hazeltine of Neutrodyne fame, and Dr. Bowden Washington of the Cutting and Washington Company.

Station WJAZ was ready to broadcast resumés of the convention and especial addresses by H. P. Maxim, president of the American Radio Relay league, and W. D. Terrell.

Other phases of the program were athletics, tours to stations in Chicago, banquet, "stunts" and a "Night of Mystery" by the royal order of Wouff-Hong.

LEARN RADIO

Here's your opportunity. Radio needs you. Win success in this fascinating field. Trained men in demand at highest salaries. Learn at home, in your spare time.

Be a Radio Expert

I will train you, quickly and easily, to design, construct, install, operate, repair, maintain, and sell all forms of Radio apparatus. My new methods are the most successful in existence. Learn to earn

$1,800 to $10,000 a Year

FREE Wonderful, home-construction, tube receiving set, of latest design. Write for "Radio Facts" free. Engineer Mohaupt.

American Electrical Association
Dept. 4513 Ravenswood Ave., Chicago

Elks' Parade Described by WSB on Fire Escape

Cable Connects Microphone to Distant Transmitter

ATLANTA.—Perched on a fire escape, WSB's microphone recently registered a unique description of the eight-mile parade of Elks, which ended the national convention of the B. P. O. E. in Atlanta.

The city blocks separating the station from the line of march were bridged by stringing several hundred yards of cable across a stretch of tin roofs, thus hooking the microphone with the transmitter. This apparently primitive method required no inconsiderable technical skill; it functioned perfectly.

As the great procession passed beneath WSB's aerial point of vantage, the blaring of many bands, the shouts of the patrol leaders, the cheers and applause of the great crowd and a description of the maneuvering of the gaily caparisoned marchers was broadcast by "the Voice of the South."

Station WHA Will Resume Broadcasting October 1

MADISON, WIS.—The closing program for the summer was given recently by Station WHA, of the University of Wisconsin. The station will be closed until October 1, when services will be resumed under the direction of Prof. E. M. Terry, and Robert Ray, chief operator for the coming school year.

During the regular school year, daily programs, with the exception of Sunday, have been given, and during the summer session tri-weekly evening programs were broadcast.

Plan Pullman Airphones

LONDON.—Pullman cars equipped with Radio receiving sets will be running shortly on the various railway services in England.

Experiments carried out by Radio engineers on express trains, using both inside and outside aerials, have been successful. It has been possible to pick up concerts from broadcasting stations while traveling at sixty miles an hour. Passing trains do not interfere, nor do tunnels make any difference to the clearness of the music and messages.

FORMICA
A Laminated Phenolic Condensation Product
SHEETS TUBES RODS

RADIO PANELS
POLISHED BLACK FINISH

CUT PERFECTLY SQUARE TO ANY SIZE

1/32"	THICK	1/2¢	PER SQ. INCH
1/16"	THICK	3/4¢	PER SQ. INCH
3/32"	THICK	1¢	PER SQ. INCH
1/8"	THICK	1 1/2¢	PER SQ. INCH
3/16"	THICK	2¢	PER SQ. INCH
1/4"	THICK	2 1/2¢	PER SQ. INCH
3/8"	THICK	4¢	PER SQ. INCH
1/2"	THICK	5 1/4¢	PER SQ. INCH

SEND FOR COMPLETE PRICE LIST
PROMPT ATTENTION TO MAIL ORDERS
DEALERS PRICES ON APPLICATION

STARRETT MFG. CO.
519 SOUTH GREEN ST. CHICAGO

The New Grebe Broadcast Receiver

Point No. 3 The two chief factors of modern radio—Regeneration and Tuned Radio Frequency Amplification—find their first successful combination in this Receiver.

Just One of its Seven Points of Satisfaction

Licensed under Armstrong U. S. Pat. No. 1,113,149

Ask Your Dealer

A. H. GREBE & CO., Inc.
Richmond Hill, N. Y.

GREBE RADIO

WHAZ, BREAKER OF RECORDS, YEAR OLD

OPENING GROUP PRESENTS ANNIVERSARY PROGRAM

Among First Plants Heard Abroad, Renselaer College Celebrates Its Achievements

TROY, N. Y.—Station WHAZ, the Rensselaer Polytechnic Institute here, the oldest engineering college in America, celebrated its first anniversary September 10, with a program by the same group which presented the first program when this station was opened a year ago. Dr. Palmer C. Ricketts, president of the institute, delivered a brief address.

Station WHAZ has already performed many unique feats. Installed through a gift of $30,000 by the Roeblings, graduates of the institute, famous as the builders of the Brooklyn Bridge, this station was primarily intended for use in connection with the electrical engineering course at the Rensselaer Polytechnic Institute and for Radio experimental purposes, which are regularly carried out with many interesting scientific developments. It was decided to devote it one evening each week to the entertainment of the Radio audience, and during the cooler season its programs, which run the whole gamut of entertainment and instruction, are heard regularly from coast to coast, from Alaska to Panama, in Hawaii, Cuba and at sea.

Known for Distance Records

WHAZ was one of the first stations in America heard in continental Europe last November. It was the first eastern station heard in Hawaii last December. This station established the long distance record of the world in February, when early morning test programs were picked up on four days at Invercargill, New Zealand, a distance of 10,000 miles from Troy, farther than the human voice had ever been carried before without wires. It accomplished the first transcontinental two-way Radiophone transmissions in January and February with station CFCN at Calgary, Alberta, Canada, with programs and messages interchanged simultaneously.

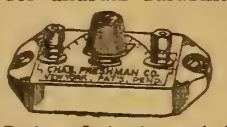
A new summer distance record was made in June when a midnight concert by Doring's Band and soprano solos by Mrs. William T. Lawrence were clearly heard in complete form at Hollywood, California. Even during the periods of greatest static interferences reports show that its programs are heard with remarkable clearness as far West as the Rockies. able clearness as far West as the Rockies. WHAZ was also heard clearly during the summer months in eastern Canada and the Carolinas.

ERLA REFLEX
Bulletin 14 Now Ready
Dealers: Attractive Discounts.
Note: We are the largest exclusive Radio Jobbers in the Middle West.
HUDSON-ROSS
123 W. Madison St. Chicago

FRESHMAN RESISTANCE LEAKS

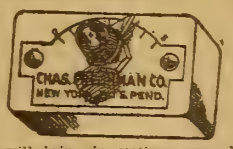
The largest and most Complete line in the World

Our new construction of all types Variable Resistance Leaks produces a product which we can now guarantee indefinitely as being scientifically correct, mechanically perfect and built for unusual durability.



BASE MOUNTING TYPE VARIABLE RESISTANCE LEAKS

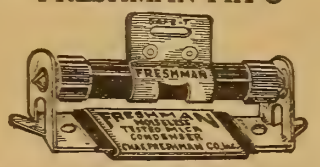
Freshman Leaks give an absolute unbroken range of 180 degrees from zero to 5 Megohms.
With either .00025 or .0005 Freshman Condenser $1.00
Without Condenser ..... .75



PANEL MOUNTING TYPE VARIABLE RESISTANCE LEAKS

will bring in stations never heard before. Can be mounted on any panel in a few seconds. When mounted, only the knob shows on the panel. The latest and most essential part of an efficient tube set.
With either .00025 or .0005 Freshman Condenser $1.00
Without Condenser ..... .75

FRESHMAN FIX-O



Fixed Resistance Leak Combination—4 in One

Freshman Condenser .00025
Leak Mounting
Freshman Resistance Leak
Safe-T Handle
} Price Complete 65c

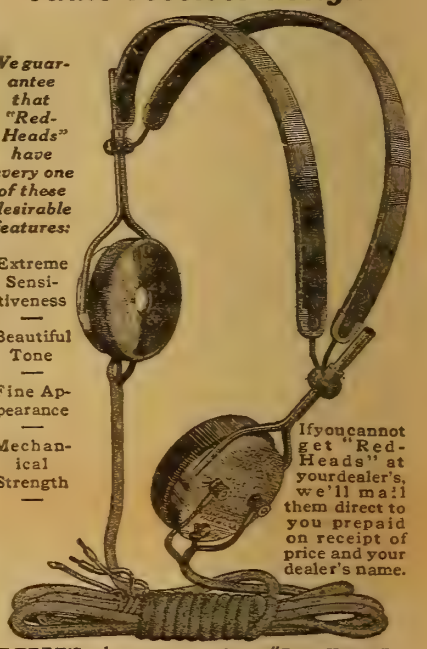
Separate Leak & Safe-T Handle 80c
Separate Condenser & Mounting 40c
All Freshman Products at your dealers—otherwise send purchase price and you will be supplied without further charge.
Also ask your dealer for our free diagrams of the Neutrodyne, Flewelling and Kaufman Circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE NEW YORK

"RED-HEAD"
—a triumph in radio receiver design

We guarantee that "Red-Heads" have every one of these desirable features:

Extreme Sensitiveness
—
Beautiful Tone
—
Fine Appearance
—
Mechanical Strength
—



If you cannot get "Red-Heads" at your dealer's, we'll mail them direct to you prepaid on receipt of price and your dealer's name.

HERE'S what we say about "Red-Heads"—they're *extraordinary* radio receivers. We believe they're the best receivers on the market today. Superlatives are easy to say and hard to back up. Here's how we back ours up. We *guarantee* that you'll like "Red-Heads." You take no risk in buying them. We'll refund your money plus postage if you don't agree with us after trial.

"Red-Heads" are the lowest priced, high-grade, aluminum-tipped receivers on the market. Nine years of receiver experience are behind their quality.

What One User Says

Waupun, Wis., July 26, 1923

The Newman-Stern Co.,
Gentlemen:
In 1915 I purchased a pair of your "Red-Head" phones. This pair of phones was one of the first you put out. They are still in good condition and, I believe, beat most of the other phones on the market.
Very truly yours,
D. J. SAXTON,
And "Red-Heads" are better today than they ever were.

1923 1922 1921 1920 1919 1918 1917 1916 1915

Since 1915
Pioneers in Radio—year after year striving to achieve one purpose—better radio receivers.

READY NOW!
The New 1924 Model F—3000 Ohms

The new standard "Red-Heads" have ELEVEN improved features—new this year. Beautiful and graceful in appearance; light in weight; aluminum case; the famous brown-red ear caps; military headband; high-grade cord; exquisitely sensitive and fine toned. 3000 OHMS PER PAIR.

At your dealer's or prepaid on receipt of price. **$6.50 PAIR Complete**

THE NEW "RED-HEAD" JR.
2000 Ohms

Makes its bow to the public this year in response to a demand for an extra fine 2000 Ohm phone. A remarkable production with the same workmanship and guarantee as on our standard Model F. Complete with headband and cord.

At your dealer's or prepaid on receipt of price. **$5.00 PAIR Complete**

THE GUARANTEE

Money back if after 7 days trial you're not satisfied that "Red-Heads" are the BEST receivers on the market at the price.

The NEWMAN-STERN Co.
Dept. RD, E. 12th St., Cleveland, O.

The Week's Advance Broadcast Programs

Tuesday, September 11

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program. Selections Star Concert Orchestra; Mrs. Willis Hohner, soprano; Jacques Sterin, cellist.

KDKA (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola, Hamilton Company; Piano Rolls, C. C Mellor; 5:15 P. M., Dinner concert; Grand Symphony Orchestra; 6:45, Children's period; 7:20, Concert, Elizabeth Besland, pianist, Bernice Caraccia, reader; Wayne R. Jamison, saxophonist.

KGW (Pacific, 492), 10:00-11:00 P. M., Dance music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert program presenting Baisden's Bon Ton Ballroom Orchestra, of Ocean Park, Calif.; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, Program arranged by Leona Neblett.

KSD (Central, 546), 8:00 P. M., Musical program.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program; Herbie Mintz, pianist; Sallie Menkes, accompanist; Isham Jones and his orchestra; 8:01-8:28, Program, American Farm Bureau Federation.

PWX (Eastern, 400), 9:00-11:30 P. M., Concert by the Cuban Navy Band.

WBZ (Eastern, Daylight Saving, 337), 6:30 P. M., Bedtime story for children; 7:00, Concert, Ruth Ray, violinist, Irene Atkins, pianist; 8:00, Bedtime story for Grownups, Orison S. Marden.

WDAP (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Blackstone String Quintet; 10:00, Frederick W. Agard, tenor; Bob Cougle, pianist; Frances Stadiola, soprano; Jack Chapman and His Dance Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Talk on "Care of Children"; 4:30-5:55, Song recital; Talk, "Affairs of the Heart," Betsy Logan.

WDT (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Musical programme, Chipping Choppy Chips from Chateau Catalogue; Overture, Original St. Louis Five; Jimmy Clark, comedian; Fay Barnes, Colombia Record Artist, Allie Moore, accompanist; Song, Lizzie Miles and Arthur Gibbs; Spencer Williams, Lizzie Miles, Arthur Gibbs, singing latest hits.

WFAA (Central, 476), 8:30-9:30 P. M., Musical and dramatic entertainment by the Tell Me This Club, Dallas Journal; 11:00-12:00, Paul E. Ashley's orchestra.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, stories by Cousin Eliza; 8:00, Boy Scout Radio Corps; 9:00, Short talks; 9:15, Musical program; 10:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:35-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news, topics of scientific interest; "The American Boy;" 7:45, Banquet music, convention of National Association of Cost Accountants.

WGY (Eastern, 380), 9:00 A. M., Morning Service from Temple Beth Emeth, of Albany, N. Y.; 7:45, Musical program, Margaret Waterman, pianist; William Shaw, bass.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Orchestra; Ollie Jones, conductor; Selections on the Rialto Theater organ; 7:30-9:00, Concert, Al Gorman's Novelty Orchestra; Al Gorman, pianist and director; Henry Miller, saxophonist; Cliff Gorman, banjoist; Homer Mutti, trombonist; Robert Cohen, trumpeter; Hubert Elkins, drummer; Reading, "An Interesting Historical Episode."

WHK (Eastern, 360), 8:00 P. M., Dance program, WHK Trio; Babson's Radio Release. Automobile Road Report.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:02, Dinner music, Dick Regan and his WIP Little Symphony Orchestra; 7:00-7:30, Bedtime stories, Uncle Wip; 8:15, Recital.

WJAX (Eastern, 390), 7:30 P. M., Cleveland News Concert, Dance music, Joe Smith-Martha Lee Club Orchestra; Sadie Thomas, soprano; J. E. Schroder, baritone; Mrs. Lillian Paddock, pianist.

WJAZ (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Musical program, R. Warren K. Howe, director; Oriole Orchestra; Dan Russo, director; Ted Fiorito, coach; Edith Berry, soprano; Frederick W. Agard, tenor; James Fiske, baritone; Hazel Goodman, violinist.

WLW (Eastern, 309), 10:00 P. M., Selections by the Circle Dance Orchestra; "Absent," "Roll On, Beautiful World, Roll On," "My Dreams," Chester Markward, baritone; Mrs. C. Taylor, accompanist; One act play, "Sintran of Fkagerrak," Sintran, Larry Day; Gunhilde, Marie Farrell; Descriptionist, Frank Back.

WMAQ (Central, Daylight Saving, 447), 4:30 P. M., Program, Glenn Dillard Gunn School of Music; 9:00, LaSalle Roof Garden Orchestra, E. E. Sheetz, Jr., director; 9:15, Elsa Phenning Kaulbarka-Musgrave, Polish pianist.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., A. G. Hinricks, lecturer; music; 5:45, Chimes concert.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 9:45 A. M., "Ironing Day," Fred Shaw, pianist; Margery Richmond, pianist; 12:05 P. M., Detroit News Orchestra; 8:30, Detroit News Orchestra; Town Crier; Albertine Schmidke, soprano; Antonio DiGilio, tenor; Mrs. Mildred L. Williams, contralto.

Wednesday, September 12

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Music, Selections Star Concert Orchestra; Albert Downing, tenor; Harry Aduskin, violinist.

KDKA (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Co.; Piano and piano rolls, C. C. Mellor Co.; 5:15 P. M., Dinner concert, KDKA Little Symphony Orchestra; 6:30, Literary program, Margery Stewart; 6:45, Children's period; 7:20, Concert, KDKA Little Symphony Orchestra; Mrs. F. W. Myler, contralto.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's programme; 10-11, Dance Music, George Olsen and Orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert program; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Program, "Uncle John"; 8:00-10:00, Program, Walter M. Brown Motors Company.

KSD (Central, 546), 8:00 P. M., Program by Steve Cady, Joseph Gallagher, William Teasdale, Elmer McDonald, John McKinnen, Charles Voerge, vocalists; Kathryn Pulley, ukulele soloist.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Harry Geise, pianist; Herbie Mintz, pianist; Mary Lee, soprano; Isham Jones and his Orchestra; 8:05-8:28, Reviews of the latest books, Llewellyn Jones.

WBZ (Eastern, Daylight Saving, 337), 5:00 P. M., Dinner concert, WBZ Trio; 6:30, Bedtime story for children; 7:00, Mrs. William J. Warner, contralto; WBZ Trio; 8:00, Bedtime story for grownups, Orison S. Marden.

WDAP (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Blackstone String Quintet; 10:00, Corydon Trio, Xylophones and Piano; J. E. Stevens, bass; Jack Chapman and His Dance Orchestra.

WDAR (Eastern, Daylight Saving, 395), 1200-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Song recital; 4:30-5:55, Short talks and musical program; 7:30-8:00 P. M., Bedtime stories; 8:00 P. M., Recital; dance music, Howard Lanin's Orchestra from Arcadia Cafe.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Musical, Frank Marshall, solo, Roy King, pianist; Harry Cox, solo; 7:00-7:55, Musical, Piano recital, Tom Hughes; Song Recital, Norman Colvin; Hungarian Folk Songs, Marie Kalla, soprano.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital; John Vanderslot, bass; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, Vera Groves, pianist.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections on the Rialto Theater Organ; 7:30-9:00, Concert, auspices of Mrs. John E. Harmon, Jr.; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Popular song recital; 6:02, Jordan Lewis Dance Orchestra; 7:00-7:30, Bedtime stories, Uncle Wip.

WJAZ (Central Daylight Saving, 448), 10:00 P. M.-2 A. M., Musical program, R. Warren K. Howe, director; Oriole Orchestra; Dan Russo, director; Ted Fiorito, coach; Russel Longmeyer, baritone; Ethel Heide, contralto; Fyrne Bogle, pianist; Hugh Sansone, cellist.

WLW (Eastern, 309), Selections, St. John's S. S. Orchestra; Clifford Fricke; director; Violin solo, Raymond Vonbergen; Cornet solo, Clifford Fricke; Vocal solo, Clarabelle Pendry; Cello solo, C. Geiger; Piano solo, Alice Deehl; Reading, Ruth Lindille.

WMAQ (Central, Daylight Saving, 447), 4:30 P. M., I. K. Russell, lecturer; 7:00, Children's stories; Georgene Faulkner, the story lady; 7:30, Dorothy Talbot, soprano; 9:00, La Salle Roof Garden Orchestra; 9:15, The Whitney Trio.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Clyde G. Kern, lecturer; Music; 6:30, Sandman's visit; 8:00, Organ recital, Erwin Swindell, organist; 10:00, Musical program, Erwin Swindell, director; Irene Jensen, pianist; Anna Schoenigh, soprano; Ralph Holmes, tenor; Toher Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00 P. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 8:30, Detroit News Orchestra; Town Crier; Margaret Waterman, contralto; Rebecca Katzman, pianist; Emily Zampella Duff, soprano.

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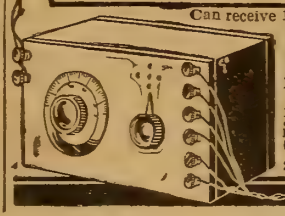

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Thursday, September 13

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Program, Selections Star Concert Orchestra; Arthur Semple, flutist; Mannie Roth, violinist.

KDKA (Eastern, 326), 11:30 A. M., Music, Victrola and Victor records, S. Hamilton Co.; Piano and piano rolls, C. C. Mellor; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:30, "My Trip Abroad," Ella Gibson; 6:45, Children's period; 7:20, Concert, Universal Chiropractic College.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's Programme, "Child Training"; 10:00-11:00, Dance Music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Musical features; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, Program, Mable Strock, soprano; Isabel Nave, pianist; Rev. Thomas Lutman.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Betty Bazter, contralto; Sallie Menkes, accompanist; Mabel Lyons, pianist; Mary Lee, soprano; Herbie Mintz, pianist; Isham Jones and his orchestra; 8:05, Twenty Minutes of Good Reading, Rev. C. J. Pernin.

WBZ (Eastern, Daylight Saving, 337), 6:30 P. M., Bedtime story for children; 7:00, Concert, Laura Jones, violinist; Mary Steele, pianist; 8:00, Bedtime story for grownups, Orison S. Marden.

WDAP (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Blackstone String Quintet; 10:00, John Stamford, tenor; Rosemary Hughes, soprano; Jack Chapman's Orchestra; 11:30, Play, "The Fool," with Alexander Carlisle and original New York cast.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Cafe Concert Orchestra; Fashion talk, Betsy Logan; Arcadia Cafe Concert Orchestra; 2:00-3:00, Arcadia 4:30-5:55 P. M., Song recital.

WDT (Eastern, Daylight Savings, 405), 12:00-12:50 P. M., Musical Medley, Bert Kaplan; Song, Walter Hirsch, Hugo Frey, accompanist; Rudy Wiedoff, saxophonist; Robert Hood Bowers, solo, William Axts, accompanist; Frank Banter and George Weinberg, singing, "An Arkansaw Mule."

WFAA (Central, 476), 8:30-9:30 P. M., Musical recital, Prof. Harold Hart Todd, pianist; Henry Kramer, violinist.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital and piano solos; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 8:00, Musical program; 8:30, Dance music.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; Boy Scout Radiograms; 9:00, Ball room music.

WGY (Eastern, 380), 1:00 P. M., Music and address, Mrs. Katherine V. Steers; 7:45, Radio Plays, "The Noble Lord," comedy; Cast, John Loftus; Ruth Bentley; W. H. Ward; Scene, A Little Wood at a summer resort in Maine; "The Traitor," drama; Cast, Charles Baumis, W. H. Ward, J. A. Berry, A. E. McCotter, John Loftus, Harry Evans, Jerome Lovenheim; Orchestra selection; "The Villain in the Piece," comedy-drama, Cast, Rose Cohn, John Loftus, E. H. Smith; Scene, A living room; Orchestra selection.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selection on the Rialto Theater Organ; 7:30-9:00, Concert, Memphis Syncopators; J. Clark Martin, director; Elmore Weirsock, cornetist; Eugene Mulvin, saxophonist; Louis Abel, saxophonist; William Miller, banjoist; John Klein, drummer; Roy Lawrence, trombone player.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, "Where to Go and How to Get There," Eugene E. Hogle of the Automobile Club of Philadelphia; 8:15, Dance music, Ace Brigode and his Ten Virginians, Hotel Walton Roof Garden; 10:00, Dance music.

WJAX (Eastern, 390), 8:00-9:30 P. M., Special anniversary all-solo program by favorite entertainers; 10:00, Special musical program by the Winton Hotel Orchestra.

WJAZ (Central, Daylight Saving, 448), 10:00 P. M.-2:00 A. M., Musical program, R. Warren K. Howe, director; Oriole Orchestra; Dan Russo, director; Ted Fiorito, coach; Charles Green, tenor; Phyllis Feingold, violinist; Jerome Feingold, violinist; Elizabeth Brasnick, pianist; Nathalie Parker, cellist.

(Continued on page 8)

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ADVANCE PROGRAMS

(Continued from page 7)

WLW (Eastern, 309), 4:00 P. M., Classical piano selections, Adelaide Apfel; Reading, "The Chair Mender," Fred Smith; 10:00, Wurlitzer concert; Gordon sterhaut, baritone; Miss Vosberg, pianist; Vocal duet, Anna Varrelmann and Hilda Dahmann; Margaret Doerr, contralto; Henry Risch, violinist; Mrs. Henry Risch, soprano; Short story for children, Flora Shenk; Piano duet, Mrs. Allen Holbrook and Mrs. William Duning; Olive Kaiser, soprano; Rudolph Kafka, violinist; Bruce Wright, tenor; Eastern Hills Dance Orchestra; Louis Steman, pianist; Joseph Uhl, saxophonist; Alexander Demck, banjoist; Woodie Beall, drummer.

WMAQ (Central, Daylight Saving, 447), 7:00 P. M., Weekly Boy Scout talk; Auto Trails, by Rockwell Stevens; 9:00, La Salle Roof Garden Orchestra; 9:15, Illinois Merchants Trust Company Glee Club.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:40-5:00, Organ recital, Mary E. Vogt.

WWJ (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 8:30, Detroit News Orchestra; Templeton Moore, tenor; Lillian Nehman, soprano; Alf D. Fleming, baritone; 11:00, Detroit News Orchestra.

Friday, September 14

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Selection, Star Concert Orchestra; Alex Elder, baritone; Harry Adaskin, violinist.

KDKA (Eastern, 326, 9:00 A. M., Music; 11:30, Victrola music, S. Hamilton Co.; Piano rolls, C. C. Mellor; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period; 7:20, Concert, Andrew Calhoun, violinist.

KGW (Pacific, 492), 3:30-4:00 P. M., Woman's programme; 8:00-8:15 Vocal solos; 8:15-9:00, Studio programme, George Olsen and orchestra; 10:30-12:00, Hoot Owls.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert numbers; 2:30-3:30, Matinee Musicale; 6:45-7:00, Children's program, "Uncle John"; Helene Pirie; 7:00-7:30, Organ recital, First Methodist Episcopal Church; Prof. Arthur Blakeley, organist; 8:00-10:00, De Luxe program, Armand Totatyan, operatic tenor.

KSD (Central, 546), 8:00 P. M., Broadcasting Dempsey-Firpo fight round by round.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 9:00-10:30, Isham Jones and his orchestra; Herbie Mintz, pianist; Harry Giese, pianist; Mary Lee, soprano; Sallie Menkes, accompanist.

WBZ (Eastern, Daylight Saving, 337), 5:00 P. M., Dinner concert, WBZ Trio; 6:30, Bedtime story for children; Current Book Review, R. A. MacDonald; 7:00, Concert, St. John's Glee Club and the WBZ Trio; 8:00, Bedtime story for grownups, Orison S. Marden.

WDAP (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Blackstone String Quintet; 10:00, George R. Hill, Jr., baritone; Monthly program, Sun-Dodger Club; Jack Chapman's Dance Orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert; Orchestra; 2:00-3:00 P. M., Musical program; short talk by Betsy Logan; 4:30-5:55 P. M., Concert; Special WDAR feature; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Playlet by the Greenough players.

WDT (Eastern, Daylight Savings, 405), 12:00-12:50 P. M., Piano selections, Leslie Smith; Jane Nagle, solo; William Dawson, tenor; Marion Doran, solo; 11:00-11:50, Musical, Jules Lavoys and harmonists; Vaugh Dee Leath, "The Original Radio Girl," singing original songs; Jean Swartz in Fisher song Revue.

WFAA (Central, 476), 8:30-9:30 P. M., Musical Recital, Edwin Lisman, basso, with assisting musicians.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00, Piano solos, Caroline Hoffman; 6:30, Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, direction of H. B. Mengle.

WGY (Eastern, 380), 1:00 P. M., Music and address, Dr. William Burgess Cornell; 7:45, Musical program, Orchestra selection; Peter Schmidt, clarinet solo; Theresia Berberich, contralto; Kitty Meinhold, pianist; Ernest Burleigh, cellist; Edward Rice, violinist; 10:30, Musical program, Orchestra selection, WGY orchestra; Mrs. Sumner Parkhurst, soprano; Ollie G. Yettru, pianist.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections on the Rialto Theater organ; 7:30-9:00, Concert, Beechmont Trio; Mrs. J. Harry Trent, soprano; Mrs. Blanche Thorp, mezzo soprano; Hedwig Peerman, contralto; Mrs. Hazel Willingter, accompanist; Reading, "An Interesting Historical Episode."

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Selections by WIP Instrumental Trio; Dick Regan, director; 6:45, "Radio Baseball Dope," by Monte Cross, old-time player; 7:00 Short talk.

WJAZ (Central, Daylight Saving, 448), 10:00 P. M., 2:00 A. M., Musical program, R. Warren K. Howe, director; Oriole Orchestra, Dan Russo, director; Ted Fiorito, coach; "A La Claire Fontaine," "By Gone Days," "To An Old Love," "Der Schenied," "The Silver Ring," Margaret Smitacek, soprano; "Fantasies," "En Route," Ruth Alexander Tracy, pianist; "On the Road to Mandalay," "Until," John S. Stanford, tenor.

WMAQ (Central, Daylight Saving, 447), 4:30 P. M., Chimes concert; 7:00, Children's program; Mrs. Frances Ford, "Wide Awake" editor; 7:30, Weekly musical lecture; Mrs. Marx E. Oberndorfer; 9:00, La Salle Roof Garden Orchestra; 9:15, Mrs. Herbert T. Gielow, soprano.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., C. E. Wilent, lecturer; Music; 5:45, Chimes concert; 6:30, Sandman's visit.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4.45-5:00, Organ recital, Mary E. Vogt; 7:40, Dinner music, Hotel Adelphia Roof Garden; 8:45, Dance music, Hotel Adelphia Roof Garden Dance Orchestra; 11:10 P. M., Continuation of dance music from Hotel Adelphia Roof Garden.

WWJ (Eastern, 517), 12.05 P. M., Detroit News Orchestra; 8:30, Detroit News Orchestra; Town Crier; Anne Campbell, News Poet; Edward Lockett, baritone; Mrs. May Walker Goward, mezzo-soprano.

Saturday, September 15

CFCA (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Selections, Star Concert Orchestra; Eileen Law, contralto; W. Woods, cornetist.

KDKA (Eastern, 326), 9:00 A. M., Music; 11:30, Music, S. Hamilton Company; C. C. Meller Company; 2:00 P. M., Grand Symphony Orchestra; 5:15, Dinner concert, Westinghouse Band; 6:45, Children's period; 7:05, Humor from "Judge;" 7:20, Concert, Westinghouse Band; Charles Wilbur Foden, baritone.

KGW (Pacific, 492), 3:30-4:00 P. M., Children's program; 10:00-11:00, Dance music, George Olsen and orchestra.

KHJ (Pacific, 395), 12:30-1:15 P. M., Concert program; 2:30-3:30, Matinee Musicale, Miss Briceno, pianist; 6:45-7:30, Children's program, "Uncle John;" 8:00-10:00, Mexican Holiday program.

KSD (Central, 546), 8:00 P. M., Missouri Theater Program, orchestra, organ recital, vocal and instrumental specialties.

KYW (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program; Harry Geise, pianist; Mary Lee, soprano; Grace King Cranston, soprano; George Cranston, tenor; Sigurd B. Sjoberg, pianist; Aerial Potter, violinist; Betty Pendergast, dramatic reader; Isham Jones Orchestra; 8:05, Under the Evening Lamp, Youth's Companion.

PWX (Eastern, 400), 9:00-11:30 P. M., Typical Cuban concert, Elvira Roca, director; Maria Fantoli, soprano; Carrasco, tenor.

WBZ (Eastern, Daylight Saving, 337), 6:00 P. M., Dinner concert, Hotel Kimball Trio; 6:30, Bedtime story for children; 7:00, Concert, Kathryn Graveline, pianist; Mrs. Carrie E. Goodell, soprano; Mrs. Robert E. Case, accompanist; 8:00, Bedtime story for grownups, Orison S. Marden.

WDAP (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Blackstone String Quintet; 10:00, Misses Carpenter and Ingram, The Harmony Girls; Fred Rose; Bob Brown and his famous overseas ukelele and songs; Marigold Trio, entertainers; Jack Chapman and his orchestra.

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Acadia Cafe Concert Orchestra; 2:00-3:00, Piano solos, Edna Finestone; 4:30-5:55 P. M., Musical selections.

WDT (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Musical, Henderson's Happy Harmonists.

WFAA (Central, 476), 8:30-9:30 P. M., Musical, Gussie Montgomery and her Harmony Six Orchestra; 11:00-12:00, Belcanto Male Quartet.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00, Concert, Caroline Hoffman, piano accompanist; 6:30, Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 8:00, Dance music; 9:00, Concert.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30, George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist.

WGY (Eastern, 380), 8:30 P. M., Program of Dance Music, Meyerhoff's Orchestra, Ten Eyck Hotel, Albany, N. Y.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections played on the Rialto Theater organ; 7:30-9:00, Concert, auspices Crescent Hill Presbyterian Church Choir; Farris A. Wilson, director; Melva Husak, soprano; Levana Gosnell, contralto; George K. Harman, tenor; Arthur Findling, baritone.

WIP (Eastern, Daylight Saving), 509), 3:00 P. M., Song recital; 6:02, Dinner music; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Song recital and dance music.

WJAZ (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Oriole orchestra; "The Star," "The Rosary," "The Swallows," "Doan Ya Cry Ma Honey," "Mighty Lak a Rose," "Kentucky Babe," Laurette Rietz, soprano; "Grillen," "The Prophet Bird," "Impromptu in E. Flat," "Etude de Concert in D Flat," Elsie Barge, pianist; "Cycle of Life," "Love I Have Won You," "The Winds Are Calling," "My Pretty Jane," "Duna," H. Arnold Michel, baritone.

WMAQ (Central, Daylight Saving, 447), 8:00-10:00 P. M., La Salle Orchestra, E. E. Sheetz, Jr., director; Music from the Chicago Theater.

WOC (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., C. C. Hall, lecturer; Music; 5:45, Chimes concert; 6:30, Sandman's visit, 9:30, Dance program, P. S. C. Orchestra.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital and band concert.

WWJ (Eastern, 517), 12:05 P. M., Detroit News Orchestra.

Sunday, September 16

KHJ (Pacific, 395), 10:00 A. M., Sacred Service; 10:30-11:00, Organ recital, First Methodist Episcopal Church; Arthur Blakeley, organist; 7:00-7:30 P. M., Organ recital, First Methodist Episcopal Church; Arthur Blakeley, organist.

KYW (Central, 345), 10:00 A. M., Church service, St. Chrysostom's Episcopal Church; Rev. Norman J. Hutton, rector; 5:00-8:00; Sisson Trio; A. L. Shynman, pianist; Theodore Ratzer, cellist; George Bass, violinist.

WBZ (Eastern, Daylight Saving, 337), 5:45 P. M., Sunday Vespers, Springfield Municipal Chimes; Ernest Newton Bagg, chime ringer; 7:30, Church services.

WDAP (Central, Daylight Saving, 360), 10:00 P. M., Milla Ybarro, soprano; Henry Selinger; Drake Concert Ensemble.

WFAA (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. Wm. M. Anderson, Jr., Pastor, First Presbyterian Church, Dallas, Tex.; 10:00-11:00, Music, Britling's Dallas Cafeteria Orchestra; Lou Goldberg, director.

WFI (Eastern, Daylight Saving, 395), 7:30 P. M., Church service and sermon, Arch Street Presbyterian Church; Organ recital.

WGR (Eastern, Daylight Saving, 360), 3:00 P. M., Vesper service, Rev. G. S. Eldridge, Presbyterian.

WGY (Eastern, 380), 9:30 A. M., Church Service of Emmanuel Baptist Church, Schenectady, N. Y., Rev. A. W. Rogers, D.D., Pastor.

WHAS (Central, 400), 9:57 A. M., Organ music; 10:00, Church Service, Edenside Christian Church, Rev. Dr. George Swan, Pastor; 4:00-5:00 P. M., Concert, Mrs. Jane Webster Murrell.

WHK (Eastern, 360), 8:00 P. M., Selections from favorite operas, WHK Orchestra; Vocal and instrumental solos.

WJAZ (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Oriole Orchestra; "A Dream," "I Hear You Calling Me," "Somewhere a Voice Is Calling," "I Hear a Thrush at Eve," "The Little Lark," "When I Was a Little Lass," Dorothy Davis Dillow, lyric soprano; "Florence Waltz," "Song Without Words," "Art Wein," "Hungarian Rhapsody No. 6," Vinnie Thompson, pianist; "Spanish Dance No. 3," "Mighty Lak a Rose," Phylis Feingold, violinist.

WWJ (Eastern, 517), 11:00 A. M., Church Service, St. Paul's Episcopal Cathedral; 4:00 P. M., Detroit News Orchestra.

Monday, September 17

WDAR (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Short talks and musical selections; 4:30-5:55, Song recital.

WFI (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra; 3:00, Song recital and readings; 6:30, Dinner music, Meyer Davis Bellevue-Stratford Concert Orchestra.

WGR (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Ball room music, Armbruster's orchestra.

(Continued on page 9)

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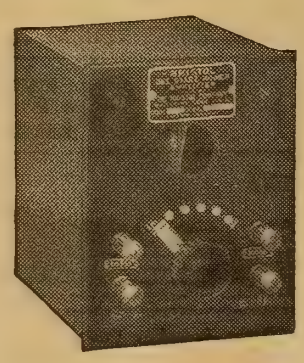

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WCAP REQUIRED TO SHOO BIRDIES AWAY

SWALLOWS ON STATION'S ANTENNA STOP TALK

Bodies of Feathered Migrants Increase Plant's Wave Length and Interrupt Broadcast Program

By Carl H. Butman

WASHINGTON.—Even the birds in Washington are Radiophans; their insistence on attending broadcasting events is causing some of the stations here considerable embarrassment.

Engineers of the Chesapeake and Potomac Telephone company, Station WCAP, found themselves in trouble during the recent broadcasting of the dinner given to Paul Whiteman in New York, which was received here by land wire from WEAF, because of the antics of a flock of swallows which had settled on the station's antenna.

Shortly after the program began the wave length of the station suddenly was increased from 469 to 479 meters; the vacuum tubes in the transmitter became heated and the plate current units raised greatly. To save the tubes it was necessary to reduce the plate voltage from 1,600 to 1,450, but even then the plate current required was 850 milliamperes instead of the normal 700 milliamperes.

Shoo Wicked Birdies Away

Emergency apparatus was placed in readiness as the engineers scurried to seek the cause of the trouble. One of them went out to look at the antenna; he almost collapsed when he saw the swallows on the wires. The lead-in wire was shaken sufficiently to cause the unwelcome Radiophans to seek another resting plate for the night and conditions in the operating room again became normal.

Engineers of Station WCAP said that the effective size of the antenna was increased by the size of the birds' bodies.

ADVANCE PROGRAMS

(Continued from page 8)

WGY (Eastern, 380), 1:00 P. M., Music and Reading, Mrs. Minn; 7:45, Concert program; Louis Skoff, pianist; Ruth Olive Halford, soprano; Joseph Kreinis, violinist; Earl Rice, accompanist; Louise Skoff, Walter Hoff, piano duet.

WHAS (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selection played on the Rialto Theater organ.

WHAZ (Eastern, 380), 9:00-10:30 P. M., Concert, Art Vinett and His Dance Orchestra; Address, "Advantages to the Consumer of Co-operative Advertising," Byron G. Moon.

WIP (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45, "Radio Baseball Dope," by Monte Cross, old-time player; 7:00-7:30 P. M., Bedtime stories, Uncle Wip.

WLW (Eastern, 309), 4:00 P. M., Special music, Jennie Kehrt; 8:00-10:00, Roger Hill Dance Orchestra; Special Odd Fellows' program.

WOO (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Luncheon musical, Wanamaker Tea Room; 4:45-5:00, Organ recital; 7:45 P. M., Dinner music, Hotel Adelphia Roof Garden Orchestra; A. Candelori, director; 8:30, Song recital; 9:30 P. M., Grand organ recital, Mary E. Vogt.

Music is supplied at a Presbyterian church in New York city by use of an amplifier attached to a receiving set. By timing the services just right, an organ prelude broadcast from another church is picked up.

MORE MONEY NEEDED FOR RADIO SCRUTINY

Congress to Be Asked for $100,000 Extra for Inspection

WASHINGTON.—When the next session of congress considers the appropriations for the conduct of the federal government during the coming fiscal year a greatly increased appropriation will be asked for the operation of the Radio division of the department of commerce, which now is struggling with funds but little greater than those available three or four years ago, when broadcasting as it is known today was nonexistent.

If the Radio division is to perform its functions efficiently, at least $100,000 more than is now appropriated will be necessary, it is believed. A greatly increased force of inspectors is needed if broadcasting stations and amateur plants are to be checked properly.

At present practically all of the time of inspectors on the coast is required for the examination of ship stations and similar governmental work.

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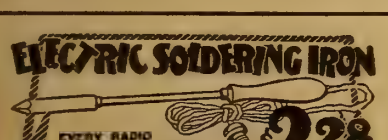

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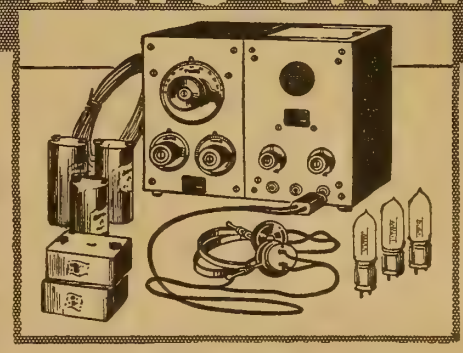

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
Harry J. Marx, Technical Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
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58

PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies, 10 cents.

Vol. VI Chicago, Saturday, September 15, 1923 No. 10

Public Discontent

Interference from Ship Stations Causes Trouble

PUBLIC discontent, we read, continues to grow regarding the range of wave lengths allotted to broadcasting stations. In defense it is urged that manufacturers should provide more selective apparatus but in reply to this attitude it is urged that selective apparatus requires expert handling. Listening in on many coastal towns is impossible, owing to interference from poorly tuned ship stations. This reads like a chapter out of our own experience.

Rural Districts to Have the Best

Education by Radio, Not by Mail

PERHAPS not so very many years from now one of the really great accomplishments of Radio will have been recorded. The old school house will be cast aside and in its place will arise a new mode of education, much more broad for the rural dweller. Radio broadcasting is bound to make inroads to the children of the country. Radio education will be the thing of the future, how near is to be determined.

Colleges will establish and conduct Radio courses especially designed for students of the country districts. The enrollment of such students and their final graduation will be developed, beyond a doubt, on a logical, workable basis. Nearly all the functions of a high school or college can be accomplished, and will be accomplished, by Radio.

Some of the more progressive universities are planning lectures. The far-seeing and deep-thinking among educators, sociologists and statesmen are beginning to understand what this will signify. Thousands of America's best youth will be trained as their fathers and forefathers never were. Young folks, who live far away from centers of learning, who could never go to high school, nor to college, will have high schools and colleges brought to them.

The limitations of the country school will be swept away. The earnest but often inexperienced and ill-paid country school teacher will be reinforced, perhaps supplanted, by the best type of college professor through Radio. The shortcomings of the district school, some usually open only two or three months, will vanish.

Behind the Scenes in Broadcasting

The Public is Not Pleased with a Junket Program

DID YOU even picture in your mind's eye just the sort of person playing a part in a movie act? Many of us have figured the good little girl or young man as saintly. There have been many instances in which you have talked to a person, over the telephone, for years perhaps, yet have never seen him nor her. A correspondence may have sprung up between persons which may have brought great friendship; yet the picture in the mind's eye remains, a picture for good or bad; it cannot be brushed away.

Some day you are awakened; the saintly girl or good young man has met some tragedy that has bared her or his home life. You are brought face to face with the underworld act in real life where these two have played the important parts. The man at the other end of the telephone may be a "dub" when you first see him. The correspondent may be uncouth, far from the person with whom you want to associate.

Radio broadcasting is very similar to the persons in real life. However, some of the bad features come out in the Radio broadcasts and the unseen audience has a better chance to determine who is who at the sending station. It is very regretful to say that we have the broadcaster or station manager who is very indiscreet in his management, who will permit a hoodlum party which slips low street talk into the concerts. This is not only harmful to the station but to the broadcasting situation as a whole.

The cheap way of giving prizes and a lot of uncalled-for talk turns many listeners away with disgust. Remember, such a station will tickle the fancy of the low class but the best will not be reached. Are we to pass into the low class or will we advance to higher levels?

RADIO INDI-GEST

The Lay of the Last Repair Job

A crystal set that worked was built by Jonnie Bone
So he opened up a store, all his very own,
Hung up signs all over, just to advertise,
"Come in here and get expert advice."
He built all hook-ups, never skipped a one,
Sure all would work as his crystal set had done;
Sold all the sets, took in the jack,
But knew not why they started coming back;
Took in repair jobs, just on a guess,
Started changing wire. My, what a mess!
Left his customers raving, closed up the store
When he blew all the tubes in a set of four.

Frank Tessler

Show Him This: He'll Laugh to Death

Dear Indi: There is an amerchewer round our way who wasn't brought up right. I have tried hitting him Indi Chest, but he keeps on hogging the air. Suggestions for a remedy are in order. MIKE ROFARADS.

Contest Entry No. 3: Fairly Bum

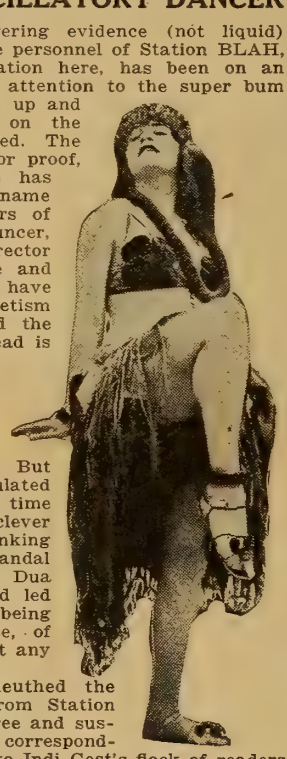
Dear Indi: In response to Gess Hoo's noble petition for a limerick contest in which Mike and Izzy are to be featured and the worst limerick wins, allow me to present the following:

Mike and Izzy of aerial raising fame,
Sat in on a little poker game,
Raising a full to the limit,
They called but were not in it.
Since then they've not been the same.

In conclusion I wish to claim that this is bad enough; it really ought to win. SPIDER WEBB.

STATION BLAH IS SCANDALIZED BY MISS HULA, OSCILLATORY DANCER

WALLA WALLA.—Staggering evidence (not liquid) that the entire if not all the personnel of Station BLAH, Indi-Gest's broadcasting station here, has been on an awful orgy and not paying attention to the super bum equipment, has been turned up and a picture of the reason on the beach at Walla Walla secured. The reason, depicted herewith for proof, is named Dua Hula. She has managed to live up to that name so well that the condensers of Brambdin Bray, dumb announcer, Wattle Knees, program director on silent nights, and Mike and Izzy, chief antenna raisers, have become charged with magnetism and radiant energy and the ground upon which they tread is counterpoised in thin air.



Dua started shaking a wicked antenna just when the summer static season began and has kept the entire force of BLAH in the air and off of it ever since. But the tables have been tabulated and Dua is outaluck for the time being, all on account of the clever staff snapshooter. This thinking member of the Indi-Gest scandal gathering organization, told Dua to pose for her picture and led her to believe that it is still being snapshot. Holding the pose, of course, she can't oscillate at any appreciable frequency.

Having satisfactorily sleuthed the mystery of the unheard from Station BLAH and stopped Dua's free and sustained oscillations, the staff correspondent and snapshooter report to Indi-Gest's flock of readers that they believe the plant can now be kept on the sharp and narrow wave length. As a conclusion to the interview with Indi-Gest's station employees, Brambdin Bray, dumb announcer, announced, "I will announce a lot next time I don't have anything to announce," and Wattle Knees, programless director, curtly remarked that although his remarks were not for publication, he hoped we'd tell the world that he, "will give a very beautiful noiseless program on the very next silent night."

A-B-C Lessons for Indigest Beginners

Chapter XIII—It's Senatore Guglielmo Marconi

BY GOSH

M IS for Marconi,
Who started all the holler,
That fills the ether everywhere
And makes the world grow smaller.

Sure, But We Don't Know What

Dear Editor of Indigest: I have hooked a spark plug in shunt across the primary of the teakettle in my Stebbins Degenerating set, and have changed the carburetor lead to the positive side of the rear tire and ever since have listened to every program from Walla Walla without hearing anything. Does this prove anything? GRID LEAK.

Muffle the regimental drums
And toll loud the bell;
J. Brown added water to acid
In a Battery Cell.

Looking Ahead

In Response to Many Calls from Indi-Gest's Corps of Enthusiastic Readers, next week will be given the first half of a poem entitled, "Radio in Cactus Center," written by Arthur Chapman, the well-known poet and author. Don't miss this rough and ready epic of the growth of Radio popularity on the plains where ranch bunk shacks are the largest buildings for miles around.

Condensed

By DIELECTRIC

The season for using portable sets may be considered by some as about over since vacation time is drawing to a close. I believe the portable set will continue to be used through the winter months, certainly by those seeking the location of coal piles. If it is popular this winter, tubes requiring only dry cell batteries to operate them will be steadily in demand.

Birthday resolutions are not like some brands of New Year's resolves—made to be broken. No one who has listened to the programs broadcast by Station WSY in "sweet Alabam" can recall a single instance of an objectionable feature during the first year of broadcasting. On entering the second year the announcement was made that WSY would continue to maintain a standard in music, religion and education second to none. In all three realms Radio broadcasting is providing a great service.

As an announcer remarked recently, the experience of entertaining from a studio is at best rather trying—no applause, no noise. A great deal has been done to make the interior of modern broadcasting studios really attractive and beneficial psychologically to the artist. WSB, the well known "voice of the south," was never behind in these particulars. At present the station is one of the finest and most attractive of any in the United States, having undergone extensive changes. Its acoustics, always good, are even better.

A tentative plan for maintaining broadcasting in Sweden has been presented to the Swedish government for its approval. In the event of acceptance a joint monopoly on Radiophone broadcasting between the government and a corporation just formed would result, giving to the government the erection of all sending stations and to the company their use for five hours daily. Programs like those known to us will be broadcast. It is further proposed that each owner of a receiving set shall pay a fee; the make of the set is not to be stipulated. This evidences progress.

Although Station WOR suffered an adverse decision in the United States district court relative to the broadcasting of music controlled by the "interests," that fact has not dimmed the optimistic vision of the National Association of Broadcasters—and it should not. In response to the association's invitation to musical composers to submit new songs and popular airs the listeners in are now assured entertainment subject to no tax or fee to the stations. Radio audiences have never been taxed for the pleasure of listening to music but the stations have had to procure their own compositions to escape taxes.

To the majority of listeners in Radio is resorted to as a diversion, a purely entertaining feature. Such it is; yet over the ether lanes may come without warning news that will turn joy to sadness and make one fearful for some time to listen. While sitting with the headphones comfortably adjusted during an excellent program from WHAS, the announcer broke in to tell of the sudden death in an auto accident of a man in Virginia. To me it was an incident; to the brother, who may have been listening, for whom the news was broadcast, it would bring distress. Yet who would be without a set?

Recently Dr. Steinmetz was credited with the assertion that all of the smaller broadcasting stations should seek favor with the big ones in the near future, for the reason (as he sees it), that only a few of the latter will be broadcasting; they will utilize some of the lower powered stations for relaying concerts. The number of Radio stations has increased by 1,126 since June 30 of last year, according to the department of commerce; of these, 191 are broadcasting stations. So long as good programs carefully transmitted are given listeners in, their source will be of little moment.

First Steps for Beginners in Radio

Chapter XVI—Plate Batteries

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XVII—Using Alternating Current on Tubes.

Chapter XVIII—Testing Radio Instruments.

Chapter XIX—Locating Trouble in the Set.

Chapter XX—Useful Information and Formulas.

THE plate, or as it is usually termed, the B battery, builds up the energy that operates the loud speaker or other reproducing device. And no set can operate at its best unless the batteries are in good condition. The question is sometimes raised as to why they are termed B batteries—the answers are ofttimes amusing. The truth is that in the early days of the audion or triode tube the filament battery was usually lettered A in the circuit, and the battery for the plate, B. In speaking of the battery it was referred to as the B battery; the name has stuck to the present day.

Use of Dry Batteries

Small flashlight batteries connected in the series were used in the early days but special batteries of the dry cell type are now being manufactured for the purpose. The wide application of multi-stage amplifiers made this a necessity; the old type batteries had too high an internal resistance. A good B battery has a very low internal resistance for the following reason: we learned in a previous chapter that it was possible to couple tubes in cascade with resistances, the principle being to locate a high resistance in both the plate and grid circuits of adjacent tubes. Now, were the B battery to have a high resistance it will be clear that when two tubes are fed from such a battery there is a resistance coupling between them.

The action taking place is as follows: as additional current is drawn from the battery by changes in the resistance of the tube due to changes in grid potential the voltage of the battery will vary. Thus when the plate current in the last tube of a two stage audio frequency amplifier increases it pulls down the voltage of the battery which affects the current in the plate circuit of the first tube and by induction through the transformers acts upon the grid of the last tube, giving a feedback effect.

Noises Produced by B Battery

And for the same reason an old B battery makes a set noisy. As the battery becomes run down its resistance increases the coupling between circuits so formed and gives rise to noises that are annoying to say the least. When the voltage of the plate battery has dropped 20 per cent it is advisable to replace them; thus a 22½-volt battery becomes useless when it has dropped to about 17 volts. Larger batteries can be figured in the same proportion.

In testing B batteries do not use an ammeter. A high resistance voltmeter should be used for the purpose while the battery is under load, that is, while operating the set. When a battery is old it is said to polarize quickly. When current is being drawn from a battery the chemical action taking place liberates hydrogen gas at the carbon rod. Certain chemicals in the battery absorb this hydrogen and prevent its collecting. After a time these chemicals become exhausted and are unable to absorb the hydrogen as rapidly as it is formed and the bubbles collecting on the carbon offer a high resistance to the flow of the current.

Reliability of Voltage Reading

After standing unused awhile the battery will recuperate, that is, the hydrogen will either escape through the sealing compound on the battery or will be slowly absorbed by the weak chemicals remaining. Therefore a battery that has stood unused for a time will show a good reading on the voltmeter but when put into service the voltage will drop off rapidly. For that reason a voltage reading is reliable only when the battery is actually working.

Many fans have discovered that heating the B battery gives it a short lease of life after it is seemingly exhausted. The reason is apparent—the application of heat always assists chemical reactions—the hydrogen absorbing chemicals are made to work more energetically when nearly exhausted while no doubt the heat assists in the escape of the hydrogen around the seal. This revival of action is at best very short and serves only in an emergency.

As mentioned under filament batteries, a dry cell contains much moisture; this is necessary for the chemical reaction to take place. It is the gradual loss of this moisture around the sealing compound which accounts for a dry cell's going bad even when not in use. Therefore any method of preventing loss of moisture would prolong the active life of the battery. To that end it is advisable to keep the B battery in a cool place.

Fuse for B Battery

A short circuit on a B battery will destroy it in a very short time because the cells are small and the chemicals are rapidly exhausted under heavy currents.

Too often the first warning of this condition is when the warmth of the battery is noted. The only preventive is to connect a fuse in the circuit that will blow when too much current is drawn. This is a protection that few sets have; it is standard practice in all other fields of electrical application. A fuse can be easily made by mounting two brass bolts on a small piece of slate or formica and connecting the device in series with the B battery, locating it close to where the positive lead enters the set or better still, right at the B battery itself. A short length of ½-ampere fuse wire should be clamped under the nuts on the bolts to serve as a protection to the circuit. Should the wires become shorted this fuse will blow and open the circuit.

Many of us have had the unpleasant experience of accidentally connecting the B battery to the filament circuit and thereby burning out the filament. It is extremely difficult to protect the filament of the dry battery tubes with fuses, the current consumption of the filament being so low. Accidents of this nature can be eliminated only by removing the tubes from the sockets while making changes in the wiring. It takes only a minute; if it saves a tube it's a well paid bit of work. Where only one tube is in use it is possible to prevent the B battery burning out the filament accidentally by connecting a limiting resistance close to the B battery. This resistance may take the form of a 25 watt incandescent lamp.

The high resistance of the lamp will prevent enough current flowing to damage the filament. One lamp should be used for every 22½ volts in the plate circuit. These lamps cannot be used when more than one tube is employed because the feedback phenomena will enter as mentioned in the first paragraph of this chapter. The best way is to take the tubes out of the set.

Storage B Battery

From the above discussion it is apparent that a storage battery is the ideal form of B battery, not only because of its rechargeable feature but because of its low resistance. For broadcast receiving they are not usually desired; this is due to their bulkiness. Their use is advised where possible and where compactness is not essential. When of the lead and acid type the same instructions for maintenance apply to the B as the storage A battery, the only special care being not to charge the former at too high a rate. The charging rate advised by the manufacturers should not be exceeded; otherwise they will heat badly; the plates may buckle and the paste fall out. Cells of the nickel-iron, caustic soda type are more rugged and stand more abuse but the voltage is lower per cell and the efficiency is very low, rarely exceeding 60 per cent; lead batteries run as high as 80 per cent. By following these suggestions the Radiophan may be able to reduce the frequency of his B battery renewals and prevent noises that are now puzzling him.

(TO BE CONTINUED)

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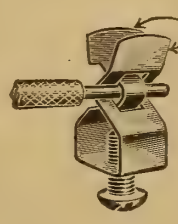

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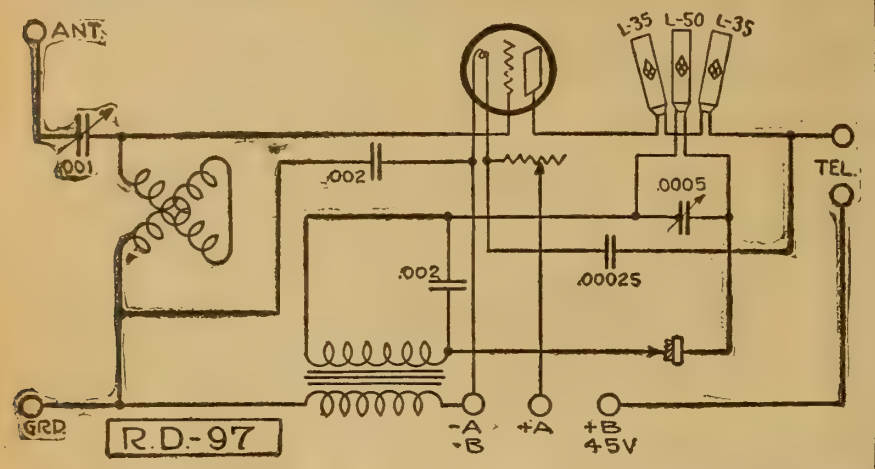

HERE'S a new way to use a triple coil mount and three honeycomb coils as a Radio frequency transformer. The two outside coils, both 35 turns, are used as the primary and the center coil; 50 turns is the secondary, which is tuned to wave length by means of a .0005 mfd. variable condenser shunted across it.

A .001 mfd. variable condenser, preferably with vernier control, and a variometer in series form the primary tuning controls.

The grid circuit of the first tube is bypassed with a .002 mfd. fixed condenser, as is the primary of the audio frequency transformer.

The plate circuit of the tube uses a .00025 mfd. condenser as by-pass to the positive filament terminal of the tube. At least 45 volts are used on the plate of the tube; this can be increased in most cases.

This circuit is very selective but is somewhat difficult to tune due to the numerous controls. It is not designed for a loop but has good volume when a good antenna system is available.

Scientists Seek After Wherefores of Fading

Scientists who are specializing in Radio are devoting a great part of their attention to the phenomenon called "fading."

This is a form of interference to the reception of Radio messages that comes from the interception of certain physical causes, as for example, mountains, tall buildings and open "pockets" in the atmosphere.

These obstructions to the transmission of Radio waves cause shadows in the area of which it has been difficult, and in many cases practically impossible, to hear a distant station. For example, some areas along the Atlantic coast are within Radio shadows, where listeners have found it hard to hear certain stations distant from them. At one spot the fans may hear stations within the area and others to the south and west, but stations to the north are almost totally out of range.

It is for the causes and cures for these conditions that Radio scientists are searching. They have set up experimental stations in these shadows and have been collecting valuable information concerning the phenomenon of fading.

Sun as a Cause

In the course of their experimentation, these searchers have come across a curious form of fading, caused, they believe, by the sunrise and sunset.

Marconi, trying to send his signals across the Atlantic, found an obstruction when it happened to be light in London and dark in New York. He noticed a depression in the intensity of his signals, which he ascribed to the interference of the sunrise line in the ocean. As soon as the sun rose in New York, the signals picked up.

The same difficulty occurred when it became dark in London and was still light in New York. As soon as the sun set in New York, Marconi's signals increased in intensity.

This interference is not experienced to any noticeable extent by the powerful long-wave Radio stations along the coast but they are felt by the short-wave stations. The regular broadcasting stations of the country come within this scope.

Beats Cause Trouble

Another form of interference which of late has made itself a nuisance is the linking of the Radio waves of two broadcasting stations, so as to produce a singing note with a constant beat. This is caused when the stations are broadcasting within a meter or so of each other.

The waves seem to fade into one another, causing a beat note and producing interference which can not be overcome. The Radio listener may as well tune them out and try to get another broadcasting station.

Sharper modulation and closer tuning are needed nowadays to avoid such interference.

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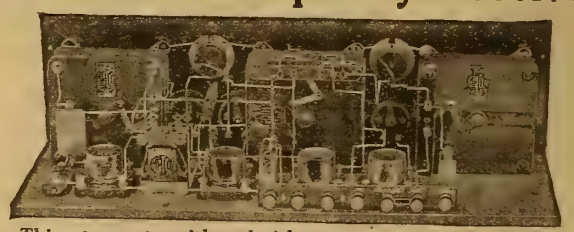

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How Your Voice Looks "Taken" on a Movie Film

A Description of the Famous Pallophotophone

By Peter J. M. Clute

TO TRANSLATE sound in terms of light and then through light to reproduce the sound seems to be almost impossible of accomplishment by science.

The photographing of sound waves themselves is nothing new. Figure 1 shows three separate lines, representing various sounds photographed on a single strip of film. The wavy lines, however, that represent the voice convey through the eye no sound impression. The next logical step, then, is to make these wavy lines do something that will make a telephone receiver diaphragm move in synchronism with it.

Figure 1

An extraordinary device or machine which accomplishes this purpose is the pallophotophone, which has recently been brought to a state of perfection by Charles A. Hoxie, an engineer engaged in special development work at the laboratories of the General Electric Company. The outfit derives its name from the Greek words that signify "shaking light."

Movement of the Diaphragm

Let us first consider what makes the diaphragm vibrate in a telephone receiver. It is actuated by an electromagnet, the pulling power of which is being affected by an electric current, whose variations are in accordance with the vibrations of another diaphragm moving under the influence of a speaker's voice. Although, perhaps, separated by miles, both diaphragms vibrate in unison, and speech is thus transmitted.

The telephone transmitter is in reality a valve, regulating the amount of current flow. If there was a valve wherein light and shadow would affect the current, a positive connecting link between light and sound would be established. Such a device has been known to scientists for years and is called a "photo-electric cell." It is a device which in the dark does not permit ordinary current to pass through it, but if a ray of light falls upon its sensitive structure, current flow is started. Successive light and shadow cause current variations, following instantly and in strict accordance with every change in the light that impinges upon it. If a film carrying a sound record is passed before the light-controlled current valve, there is immediately produced a fluctuating current through the cell, which, if passed in turn through a telephone receiver, will actuate the diaphragm.

There are two distinct devices in the pallophotophone, one for recording sound and one for reproducing the sound, either of which may be used independently.

Recording Sound

The recording device consists essentially of a tiny mirror, scarcely larger than a pin head, on which is reflected a beam of light. This mirror is attached to a most delicately adjusted vibrating diaphragm. When sound waves, originating from any source, reach the diaphragm, causing it to vibrate, the mirror oscillates and the reflected beam of light moves with it. This moving ray of light falls upon a strip of photographic film, which passes in front of the mirror in a continuous motion. The film when developed in the usual way shows a succession of delicate, dark up-and-down markings on a clear background. These markings constitute the sound record and represent the oscillations of the reflected beam of light.

The record produced on the film is a marvelously faithful reproduction of the sound because of the extremely small size of the mirror and diaphragm and their low inertia. These characteristics enable the "shaking light" to produce a sound record on the film that catches all the fine overtones, the delicate shadings of speech, in fact, every feature that distinguishes different voices. In this particular, the sound record is more nearly exact than any record thus far obtained with devices of this nature.

The recording device operates on mechanical principles, inasmuch as there is no essentially electrical process involved in the procedure.

Reproducing the Voice

The reproducing device, as previously mentioned, is an entirely different contrivance, and the two devices are so independent of one another that either can be removed from the apparatus while the other is in use. This procedure has been followed repeatedly by the inventor in his demonstrations of the pallophotophone.

The reproducing system is electrical in its nature of operation in contrast to the mechanical features involved in the recording device. The film carrying the sound record is wound on a reel, so that it passes in front of an extremely sensitive electrical apparatus. The essential part of this equipment is a photo-electric cell, which is connected with two batteries in the grid circuit of a vacuum tube. One of the electrodes of the photo-electric cell may be either potassium or sodium, either of these metallic substances possessing the property of giving off electrons when illuminated. If the other electrode is made positive, with respect to the potassium, and a beam of light allowed to shine on the potassium, there will be a passage of electrons from the potassium to the positive electrode, the flow of electrons being proportional to the intensity of the light.

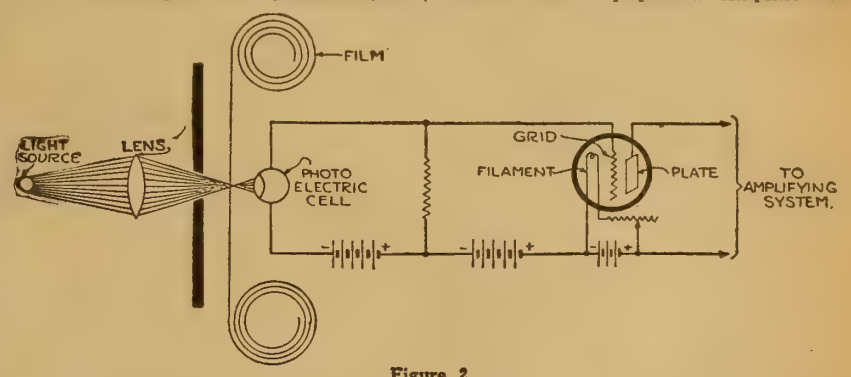

Figure 2

Referring to the simple schematic circuit diagram in Figure 2, any change in the resistance of the photo-electric cell will produce a corresponding change in the electromotive force impressed on the grid of the vacuum tube. When the film carrying the sound record passes between the cell and the light source, the varying degrees of illumination which it allows to pass to the cell cause a corresponding amount of electronic emission within the cell, thereby creating a potential difference in the grid circuit. Current then flows in that circuit in amounts directly proportional to the intensities of the light passing to the cell through the film, and at frequencies corresponding to the frequency of the sound vibrations recorded on the film. The remainder of the circuit and its action are quite similar to those of the standard Radio equipment. Amplification is obtained in the ordinary way by means of tubes.

Sensitive Reproducing Apparatus

The particularly notable characteristic of the sensitive reproducing apparatus is that it responds to variations in the light falling upon it with such instantaneous speed that it is only comparable to the speed of light itself, or to the speed with which Radio waves traverse space. Hence when the film is passed continuously in

(Continued on page 14)

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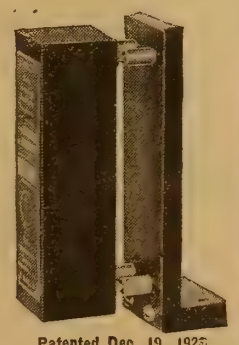

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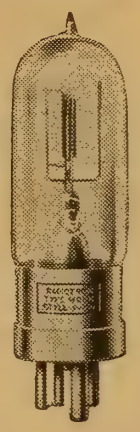

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RECORDING THE VOICE

(Continued from page 13)

front of the device, an electric current is created, which corresponds with great accuracy to the original sound waves, as recorded by the markings on the films. This current is then used to actuate a telephone receiver, a loud-speaking device, or to operate directly Radio broadcasting apparatus without the use of pick-up devices ordinarily employed.

The pallophotophone has introduced into Radio broadcasting an entirely new element—the possibility of making a master record of a speech or lecture at a convenient place and time, and broadcasting it days or weeks later from scores of Radio sending stations throughout the country. The same holds true of reproducing musical selections. In using the reproducer in broadcasting, the electrical impulses are not again converted into sound, but are impressed directly on the amplifying system, thus eliminating the distortion that would otherwise prevail. Those who have listened in to speeches and lectures transmitted from WGY by this new device have reported that it was a noticeable improvement, in fact, it could talk by Radio even better than persons who spoke directly into the regular microphone transmitter. It also has a big advantage over the phonograph in this particular, inasmuch as it is possible to record and reproduce lengthy speeches or a whole concert program.

Radiophans within the range of WGY have been given an opportunity of hearing short talks by a number of this country's most prominent business and professional men. The pallophotophone was instrumental in this performance, inasmuch as the recording device was used to photograph the voices of these celebrities without inconveniencing them by coming to the broadcasting studio.

Speaking Moving Pictures

The perfect talking moving picture has been sought for years, but until the pallophotophone was developed there did not seem to be any very great prospect of early success. Now, however, a film can be made, the pallophotophone working with the camera, and this film thrown on the screen, the pallophotophone being used with the movie projector to reproduce the sound of the actors' voices. The reproducing device of the pallophotophone being mounted on the projector itself, the film, with both the picture and the sound record upon it, will then be projected in synchronism.

While the speaking movies and broadcasting possibilities are the applications of the most immediately popular appeal, there are other potential uses of the pallophotophone. It has the possibility of being developed into a film-phonograph for use in the home, just as disc-phonographs are now used. It is an excellent telephone transmitter for use in voice communication. It can be used to advantage in Radio telegraphy in producing signals. It can also be used in the electrical laboratory to do the work of the ordinary oscillator without the local interference commonly encountered in using the oscillator. And it can be used for audio-amplification in Radio.

The interconnection of sound and light has thus been accomplished and the future only can reveal the extent of its application to our every-day life.

As to Ground Potential

In tube transmitters the sets should be so connected that the center tap of the filament coil and also the negative lead of the direct current source of high potential are at ground potential with respect to the rest of the system.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

Resistance of Grid Leak

(Submitted by H. J. R., Hampton, Va.)

Question. I have been very much interested in the Flewelling circuit, using the three condenser type. Have been able to obtain little or no reception on the loop alone, but with a ground or ground and loop, signals come in strong. Which do you prefer for use with your circuit, a variometer in the plate or a tickler coil? Can you also advise me as to the resistance of the grid leak in the circuit?

Answer. I believe one of our recent answers took up the question of which was preferable, a variometer or a tickler coil, but I will repeat here because so many letters are still coming in asking about this point. A previous issue of the Digest, if I am correct, gives the reasons why and I will simply confine myself to stating that for general use the tickler type of circuit is preferable and refer you to previous Digest article for more specific answer.

With regard to the resistance of a grid leak in a single condenser set. We have often been asked this question and as often have been unable to give a definite answer. The resistance of the grid leak will run from 200,000 to 5,000,000 ohms, depending entirely upon the adjustment of the set, the characteristics of the individual parts being used and as to how hard it is to bring in a station. By this last, I mean that it is no work at all to bring in a local station, a little work to bring in a 500-mile station and sometimes quite hard to bring in a 1,000-mile station. Now, amplification with any super circuit depends, other factors being disregarded, upon the frequency rate of what we will call the whistle. The lower the frequency within limits, the higher the amplification.

On your 1,000-mile station, it might be necessary to bring into play the greater amplification secured by lowering the frequency of the whistle. This is done in several ways, the one which we have preferred to use being by changing the value of the grid leak resistance.

If you have worked with the Flewelling circuit much, you have no doubt found that this same thing can be done by changing the value of the grid leak condenser. It is often the preferable way of doing it. Use a fixed grid leak in the circuit of about one to two megohms and use instead of the regular fixed grid condenser a regular variable condenser, such as is used for tuning, having a capacity up to .001 mfd. If this is done, you need not worry any further as to what the value of the grid leak is, securing all necessary changes by manipulation of the variable grid condenser.

Roll of Gummed Paper Tape for Speaker Horn

BOSTON, MASS.—E. W. Whittier of this city tells how to make a loud speaker horn that is indestructible, easy to make, which gives clear tones with a good volume of sound at a cost of thirty cents, in thirty minutes.

The only material needed is a roll of gummed paper tape, the diameter of the roll representing the diameter of the mouth of the horn. From three-quarters of an inch to an inch is the width to use. After removing about ten yards of the tape from the outside of the roll, the center of the roll should be pressed gradually outward, one hand being used to shape the horn as desired. As the roll slowly grows outward from the center, the left hand should be used to pull from the outside with a slightly twisting motion.

Care should be exercised to keep the spacing of the turns, as the horn or cone shape forms, at equal distances all round, to prevent collapse. A novice should start first with a straight cone shaped horn, rather than try to make one with a curved mouth. After the shape has been obtained and the cone is complete, the paper should be moistened inside and outside under a faucet, no longer than necessary to wet it all over. Then put it in the sun to dry. These horns should be made when the sun is shining.

As the tape has been wound on a wooden block, this leaves a hole at the small end, of the same size, to which the phone piece can be attached with the adhesive paper tape. If a smaller hole is desired, to fit a unit adapter, the ten yards removed at the beginning can be wound around the snout of the adapter just enough to fill the small end of the horn; then set and let dry.

The paper horn thus made may be varnished or painted.

Aerial Construction

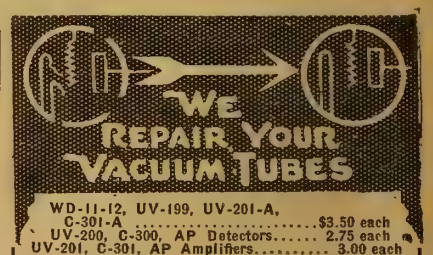
Do not use a kite aerial.

The aerial should have one or more insulators at each end. It is better to have too many than not enough.

Always attach aerials to substantial supports, so located that if either the support or aerial breaks it cannot come in contact with other wires.

Never string aerials over or under any other wires. Should the antennae wires come into contact with the power lines, the antennae might become dangerously charged.

From time to time the aerial should be lowered, and the insulators should be cleaned to avoid leakage.



WD-11-12, UV-199, UV-201-A, C-301-A ..... $3.50 each
UV-200, C-300, AP Detectors..... 2.75 each
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Inductance Coil Used in Reinartz Set

Many Turns of Wire on Tube Increases Range

Recently Reinartz advised using a spider-web inductance in conjunction with an extra coil, consisting of several turns of wire on a tube for the reception of 600-meter commercial stations. I put this coil on my set and was surprised to find it very efficient for broadcast reception. I wound a coil, as shown, and it certainly exceeded my fondest hopes. The coil used is wound as follows: the coil L_1 has 70 turns on a tube of 3-inch diameter, the coil being tapped at 0, 5, 10, 15, 20 turns, and at point X the 50th turn. The coil L_2 is wound on the end of the same tube, leaving ¼-inch space between coils. This coil consists of 45 turns with taps at 15, 30 and 45 turns. The coils were wound with Number 22 dcc wire. The diagram is self-explanatory. It gets the stuff a great deal louder than the other hook-up and there are less switches and switch points to bother the operator.—Donald M. Hood, Fall River, Mass.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

How to Make Tube Socket

The following instructions for making a tube socket will produce a very serviceable and economical socket if followed closely.

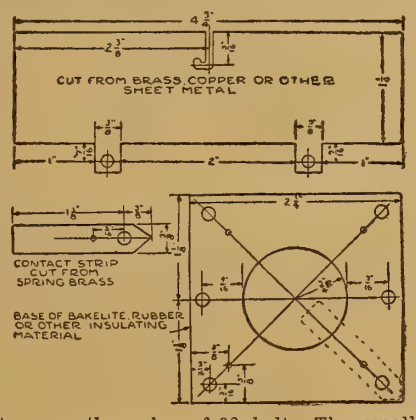
The main advantage of this socket lies in the fact that it may be made in the sub panel upon which the ordinary socket is often mounted. This feature conserves space and being combined with the sub panel and extending beneath it is very convenient to clean and adjust contact springs.

More than one socket can be made on one base.

The walls of the socket are bent around any round object of suitable size and the ends soldered—very little solder should be used. A piece of wire may be wrapped around the walls to hold them in place while soldering. The projecting legs are then bent out at right angles to the sides of the socket.

The base is cut from the rubber of an old battery jar. This rubber should be thoroughly washed and cleaned with steel wool to get out the acid which may be in the pores of the rubber. Warm the rubber and the center hole may readily be cut out with a large drill or knife. The base is drilled as shown. The four large holes at the corners are to hold the contact springs in place, and the four small holes are to take the pins on the contact springs to prevent the contact springs from moving sideways with the movement of the tube.

The contact springs are also cut as shown, the large hole being large enough

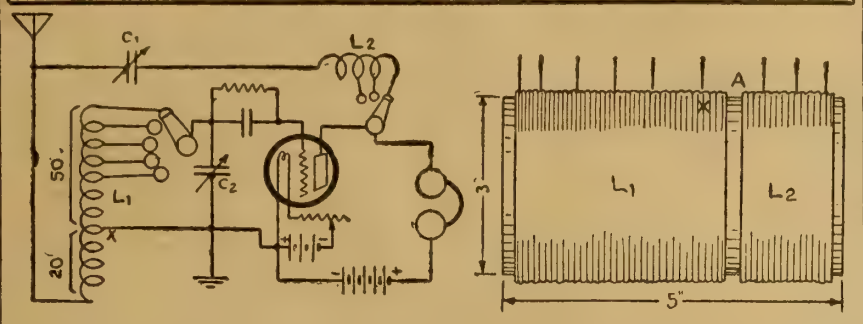


to pass through a 6-32 bolt. The small hole may be punched in if a drill small enough is not available. This hole should be large enough to just take a small brass brad. The brad is put through the hole, up to the head, then the head soldered to the contact.

The contact spring is bolted underneath the base by means of a 6-32 bolt. The bolt should be long enough to have an extra nut on it under the base by which means connection is made to the springs. It is better to solder the leads directly to the contact spring if the wiring of the set is to be permanent. The brad on the contact spring should extend slightly through the base when no tube is in the socket.—E. A. Johnstone, Pocatello, Idaho.

For each step of amplification you require an amplifying tube, transformer, rheostat and socket.

COIL ON TUBE USED IN CIRCUIT



Protection Against Lightning

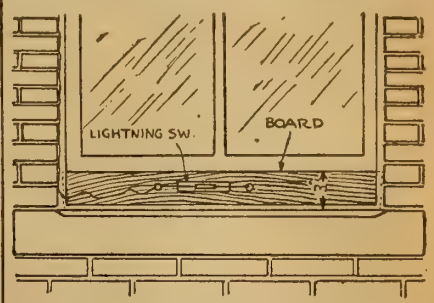
It is not necessary to dismantle a Radio set during the summer weather because of the danger of lightning striking the aerial. The aerial is actually a protection against lightning, and the chances of a real bolt hitting such a small target are very remote. The aerial, if properly grounded, either through a switch or arrester, will serve to drain the electricity from any really heavy discharges. Do not be afraid of lightning; its actual danger in the city is very small indeed, on account of the grounded steel frames of the buildings absorbing all the energy. The Radio set may be used successfully all summer with the exception of the time when a storm is in the immediate neighborhood.

Use for Bits of Old Panels

Odds and ends of old panels, even if they are full of holes, make good battery terminal panels for the interior of the set. Put small bolts through with binding posts on each side or with the wires from the set soldered to the bolts. Then bring your battery wires in through small holes in the back of the cabinet. It makes a neat job, keeps the tangle of battery wires from the front panel, allows more direct connection and utilizes junk. Pieces of the rubber cells of old storage batteries are also good for this use.—Guy M. Chase, Elizabeth, N. J.

Board in Window Makes Place for Lead-In Wire

Very often it is impossible to drill a hole in a window or anywhere near it for the lead in wire. To overcome this difficulty procure a board about 3 inches wide and long enough to fit securely under the window sash. All the holes are drilled through this board; the lightning switch



may be mounted on the outside of it. No damage is done to the window sash or casing when using such a board.—Arthur F. Flinner, Wichita, Kansas.

Batteries for Tube Filaments

It is not advisable to use wet batteries as a source of current supply for heating the filaments of the ordinary types of six volt vacuum tubes inasmuch as constant use of the tubes will cause the batteries to become exhausted in a comparatively short time. This would necessitate frequent renewal of the elements of the battery and the electrolyte.

For a circuit employing one or more stages of amplification, a storage battery should be used unless it is desired to heat the filaments of the amplifier tubes by stepping-down the 110 vole house-lighting circuit to a potential of six volts by means of a special transformer. Alternating current should should not be used to heat the filaments of detector tubes as the hum due to the rapid reversal of current drowns out the Radio signals.—Peter J. M. Clute, Schenectady, N. Y.

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ELGIN BOOK CONDENSERS

Can be used in any circuit specifying rotary plate condensers with the following advantages:

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2nd. No Hand Capacity, if the plate nearest the hand is connected to the grounded, or dead side as we direct.

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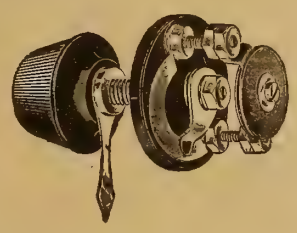

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The variation of the capacity is from zero to six megohms, and is varied by moving the knob only one-half turn.

The variable grid resistance will last indefinitely, without deterioration or loss in efficiency. It is not a make-shift like the lead pencil type, but a scientific instrument which our radio engineers have successfully produced.

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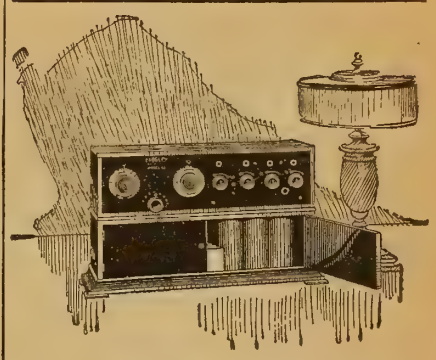

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Questions and Answers

Phantom Circuit

(4522) RZZ, Laredo, Texas.

Can a Freshman variable grid leak 0 to 5 megohms be used on the phantom?

Can the set be used on a regular antenna and ground; what results does it give?

When used with a 4-foot antenna, where are the antenna and ground connected?

A.—A Freshman grid leak 0 to 5 megohms will serve.

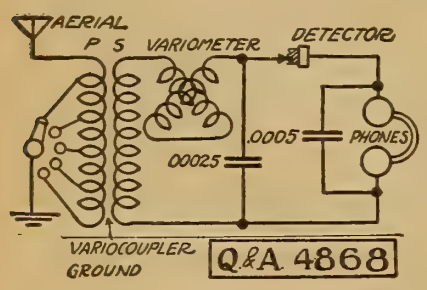
The circuit in question is designed primarily as a portable receiver, and can be used with the usual antenna and ground connections. If a smaller antenna is used, no change is necessitated as to the method of connecting.

Long Distance Crystal Set

(4868) JWJ, Terre Haute, Ind.

I should like a hook-up that will receive two hundred miles or more with a crystal detector. I have never received music except from WEAC, one mile away. I accomplished this with a detector, two slide tuner, 3000 ohm. phones and 90-foot aerial.

A.—We present a diagram of a crystal



detector circuit. The apparatus used in this circuit makes it possible to obtain much finer tuning properties, which naturally increases its receiving range. In ordinary crystal detector circuits the signals in most instances reach the crystal for detection but are not audible because the tuning mechanism is not sufficiently sensitive.

The diagram shows a circuit capable of a receiving range of three hundred miles where an adequate antenna system, 150 feet of wire in a single strand including lead in, is employed.

Good Reception

(4545) EBA, Port Gibson, Miss.

If you can spare the time, I want you to tell me if I have really hit upon anything better than is common. I am situated way down south in the "land of static," and have few opportunities to visit other bugs to compare results, but I am advised by a Radio salesman in New Orleans that my results are way ahead of those he has heard in the south.

Pardon a long description, but I feel it necessary that you may know all the facts.

I am situated in a small country town, 200 miles from New Orleans, 250 from Memphis, 250 from Birmingham, and 400 from Dallas and Fort Worth, about 550 from St. Louis, Kansas City and Louisville, and more than 700 from Chicago and Omaha. I bought my present set one year ago. It is a 6-tube set, 3-step Radio detector and 2 audio. I got fair results last fall and winter, but very poor during last summer. During January and February I was able to get stations in the above cities with sufficient volume, using 2-step audio amplifier to operate a Magnavox loud speaker, enough to fill two rooms, and on rare occasions on first step audio to operate Magnavox loud enough to hear directly in front.

Early in April I failed to get anything but static, very rarely getting any part of a program. I decided to use a loop. I bought two and made one with Springfield braided antenna wire. I got poor results, or none at all. I added a third step audio, then changed the hook-up inside, and accidentally connected both loop and outdoor aerial at the same time without the ground being connected, and found I got wonderful results, frequently getting signals too loud to use phones on the detector jack, and getting plenty of volume to operate a Magnavox on first stage audio.

My antenna is 75 to 85 feet high, has two strands 150 feet long, lead-in 70 feet more. Also have a lower antenna running north and south, one wire 70 feet, with 35 feet lead-in. But I do not get nearly the volume with this antenna.

The set is very critical and delicate to tune, and I have to keep detector (C-300) turned well down. I use C-301 A in Radio frequency, and Western Electric power tubes in the audio circuit.

WMC at Memphis is the nearest station; it often comes in with terrific loudness. The loop is of the pancake type with 120 feet of number 16 fixture wire; even with the antenna on the loop is fairly directional, but the connecting of the ground wire immediately stops all signals.

If I tune in a station on the loop only, with the loud speaker on second stage, the aerial signals will immediately increase at least ten times as loud.

Now, as I see it I am getting signals with the same set and tubes louder than I did in winter. There is a difference between first and second stage amplification. I feel sure that this winter I will not need any amplifiers in the audio circuit, as I will be able to get signals loud enough directly off the detector. In fact I have operated a loud speaker directly off the detector and have been able to hear across the room, but very faintly.

I would like to have your honest opinion as to whether I have run across anything that is above the average. If I have, would you advise me what to do with it?

During the winter I used a 4-strand cage type antenna 120 feet long and at the present height 80 feet. This has blown down; I tried two wires, hoping to escape some static.

I find that I can get stations even when static is so bad that I can hear nothing but 'static' on my friend's Westinghouse.

I assure you that I will appreciate any advice or comment that you have to make as to my results or experiments.

A few nights ago I heard WWJ for the first time since March, and I am also getting Edgewater Beach loud and clear, also WDAP, but never KYW. During the winter before making changes I had no trouble in reaching both New York and Los Angeles.

A.—Although your apparatus is exceptionally good, it is not without precedent.

You are to be congratulated upon the good fortune of being very favorably located and doubtless in having a high-grade equipment and skillful construction, which are essential to the excellent results you have recited.

Commercial Production

(4628) DWS, Dushore, Pa.

I have, in a homemade set, what I call a 3-coil variocoupler which I find highly efficient. As there is no similar instrument now on the market, I would like to ask your opinion as to whether or not I would be able to manufacture and sell them without getting tangled in red tape.

There is no need of a lengthy description of it on which to base your answer. It is nothing more than a 180-degree coupler with somewhat less than the usual clearance between the primary and the secondary, and a second rotary coil, used as a tickler, revolving inside the secondary rotor. It gives a high degree of selectivity and powerful regeneration. Regeneration is very easily controlled; one can tune closer to the "spilling over point" and still obtain undistorted signals with this tuner than with any other I have ever used. At a distance of 125 miles I receive WGY with sufficient volume to operate a loud speaker; this on a single WD-12 used as a detector, and with no amplification. Of course, the results are far from deafening, but are loud enough to be heard clearly all over the room. With one stage of audio frequency added, using the same type of tube, results compare favorably with my Westinghouse RC with its detector and two stages.

What I would like to do is manufacture the tuners, unmounted, and also put up complete sets in cabinet with two stage amplifier and loud speaker built in. Could this be done without infringing on existing patents? Would the tuner be patentable, and would it be advisable to patent it before beginning its manufacture?

A.—The circuit of your description is regenerative in principle and as such comes under the Armstrong patent rights. To construct for commercial purposes would make you amenable to the law.

The tuner unit could doubtless be manufactured for sale, but not the completed sets.

We advise that you take the matter of patent to the United States patent office, Washington, D. C., for authoriative information. It is the better part of wisdom to be well informed and protected before proceeding.

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AA3, Denver, Colo. 440 meters. 1,500 mi. Fitzsimmons Gen. Hospital. (Educational Dept U. S. Army). Fri. 8-9 pm, music, entertainment. Mountain.

AQ6, Canton, O. 425 meters. 500 mi. Hospers. 135th Field Artillery O. N. G. Wed. Fri. music. Sun. church services. Eastern.

AS6, San Antonio, Tex. 360 meters. 200 mi. U. S. Army, Ft. Sam Houston. Mon. Thurs. irregular.

AV7, St. Paul, Minn. 400 meters. 500 mi. 6th Inf. Minn. Nat'l Guard. St. Paul Armory. Daily ex Sun. 2-2:30 pm, music, announcements. Tues. 8:30-10 pm. Thurs. 8:30-9:30 pm. Central.

BEI, Tacoma, Wash. 400 meters. 100 mi. Camp Lewis, U. S. Army. Third Signal Co. Daily ex Thurs. Sun. 6-7 pm, music, announcements, lectures. Pacific.

CFAC, Calgary, Alta., Can. 430 meters. 1,000 mi. Calgary Herald. Daily ex Sun. 12:30 pm, 3:30-4:00, 7:45-8:45, Thurs. 10:30, music, entertainment, news, market, weather. Mountain.

CFCA, Toronto, Ont., Can. 400 meters. 1,000 mi. Toronto Star. Daily ex Sun, 12 m, 2:30-3:30 pm, 5:30-6, 8-9, weather, market, news, music, entertainment. Sun, 6:45 pm, concert. Eastern Daylight Saving.

CFCF, Montreal, P. Q., Can. 440 meters. 1,000 mi. Marconi Co. Daily 1-1:45 pm, Monday, Wed. Fri. 7:30-9 pm, music, entertainment, reports. Eastern.

CFCH, Iroquois Falls, Ont., Can. 400 meters. 500 mi. Abitibi Power & Paper Co., Ltd. Daily, 9 pm, reports, music, entertainment. Experimental station. Eastern.

CFCJ, Quebec, Que., Can. 410 meters. 50 mi. La Ce de L'Evenement.

CFCK, Edmonton, Alta., Can. 410 meters. 500 mi. Radio Supply Co. Daily ex Sun, 8-8:45 pm, music. Sun. 3:30-4:30 pm, Concert. Mountain.

CFCL, Victoria, B. C., Can. 400 meters. 500 mi. Centennial Methodist Church.

CFCN, Calgary, Alta., Can. 275, 440 meters. 1,500 mi. W. W. Grant Radio Ltd. Slogan, "Voice of the Prairies." Mon, 9 pm, music. Fri. 10:30-12:30 pm, dance music. Sat. 10-12 pm. Wed. Sat, Sun, after 11:30 pm using test call 9AC. Mountain.

CFCO, Bellevue, P. Q. 450 meters. 50 mi. Daily ex-Sat, Sun, 10 pm, news, markets. Sat, 9-10 pm, music. Sun, 9-10:30, music, entertainment.

CFCW, London, Ont., Can. 420 meters. 50 mi. The Radio Shop. Tues, Thurs, Sat, 8:30-9:30 pm, music, entertainment. Eastern.

CFQC, Sask., Sask. Can. 400 meters. 500 mi. The Electric Shop, Ltd.

CFUC, Montreal, P. Q., Can. 400 meters. 1,000 mi. Univ. of Montreal.

CHBC, Calgary, Alta., Can. 410 meters. 1,000 mi. W. W. Grant Radio Ltd. (Morning Albertan.) Daily ex Sat, 8:45-9:45 pm, news, stock quciations, music. Mountain.

CHCD, Quebec, Que., Can. 410 meters. 50 mi. Canadian Wireless and Electric Co.

CHCE, Victoria, B. C., Can. 310 and 400 meters. 500 mi. Daily ex Sun, 4:30-5:30 pm, 7:30-9:30. Sun, 6-10 pm, music, entertainment. Pacific.

CHYC, Montreal, Que., Can. 410 meters. 1,500 mi. Northern Elec. Co. No regular schedule.

CJCA, Edmonton, Alta., Can. 450 meters. 1,000 mi. Edmonton Journal, Ltd. Slogan, "The Sunniest Spot in Sunny Alberta." Club, "Igloo Hut." Daily ex Sun, 12:30 pm, weather, markets, 7:30-8 pm, Children's half hour. 8:30-9:30 pm, concert, reports. Mountain.

CJCD, Toronto, Canada. 410 meters. 200 mi. T. Eaton Co. Daily ex Sat, Sun, 4-5 pm, Sat, 11am-12 m. Wed, Fri, 7-8 pm, music.

CJCE, Vancouver, B. C., Can. 420 meters. 150 mi. Sprout-Shaw Radio Co. Daily ex Sun, 12:30-1:30 pm, 3:30-5, 8-10, music, news. Pacific.

CJCI, St. John, N. B., Can. 400 meters. 500 mi. Maritime Radio Corp., Ltd. Mon, Wed. Fri. 7:30-9 pm, music. Sat. 9-11 pm, music. Eastern.

CJCN, Toronto, Ont., Can. 410 meters. 1,000 mi. Simons, Agnew & Co.

CJCX, Olds, Alta., Can. 400 meters. 500 mi. Percival W. Shackleton. Slogan, "The Best Town in the West." Tues, Thurs. 9:45-11 pm, music. Sat. 8:45-10 pm, music. Mountain.

CJGC, London, Ont., Can. 430 meters. 500 mi. London Free Press. Daily ex Sun. 9:30-10 am, 12-1 pm, 3:30-6, news, market and weather, 8-9, music, entertainment. Eastern.

CJSC, Toronto, Ont., Can. Evening Telegram. 430 meters. 500 mi.

CKAC, Montreal, Que., Can. 430 meters. 1,000 mi. La Presse. Daily, 4 pm, Tues, Thurs. 7-9, music, entertainment, market, weather. Eastern.

CKCD, Vancouver, Ont., Can. 410 meters. 1,000 mi. Vancouver Daily Province. Daily ex Sun, 8:30-9:30 pm, music, news, entertainment.

CKCE, Toronto, Ont., Can. 450 meters. 1,000 mi. Can. Ind. Telephone Co. Daily ex Sun, 11:55 am-12 m. Arlington Time Signals.

CKCK, Regina, Sask., Can. 420 meters. 1,500 mi. Leader Pub. Co. Mon, Wed, Fri, Sat. 10-10:30 am, 1:15-2 pm, 7:30-8:15. Tues, 7:30-9. Sun, 9, music, entertainment, news, market, weather. Mountain.

CKOC, Hamilton, Ont., Can. 410 meters. 100 mi. Wentworth Radio Supply Co., Ltd. Wed. Fri. 8-9 pm, music, entertainment. Sun, 11 am-12 m, 7-8 pm, church services. Eastern.

CKY, Winnipeg, Man., Can. 450 meters. 1,000 mi. Manitoba Tel. Co. Daily ex Sun, 12:30-2 pm. Tues, Thurs, Fri, 8:30-9:45. Sun, 9-9:30 am, music, entertainment, weather. Central.

DN4, Denver, Colo. 360 meters. 200 mi. Colorado National Guard. Daily ex Sun, 8:15 pm, weather, news, concert. Thurs, 8:15-9:30 pm, special concert, speech. Mountain.

KDKA, E. Pittsburgh, Pa. 326 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun. 10-10:15 am, 12:30-1 pm, music; 5-9 pm, news, features, markets, concert; 9:55-10, time. Sun, 10:45 am, church service; 2:45 pm, Bible story; 3 pm, concert; 4:45 pm, 7:30, church service. Eastern.

KDOW, New York, N. Y. S.S. America. Home port is New York.

KDPM, Cleveland, O. 270 meters. Westinghouse Elec. & Mfg. Co.

KDPT, San Diego, Calif. 244 meters. 500 mi. Southern Elec. Co. Daily ex Sun, 7-7:30 pm, news, weather, concerts, lecture. Tues, Sat, 8-10 pm. Sun, 11:30-12:00 am, sermon. Pacific.

KDYL, Salt Lake City, Utah. 360 meters. 1,800 mi. Salt Lake Telegram. Daily ex Sun, 7-8 pm, news, music, entertainment. Mountain.

KDYM, San Diego, Calif. 252 meters. Savoy Theater.

KDYQ, Portland, Ore. 360 meters. 200 mi. Oregon Institute of Technology. Temporarily discontinued.

KDYS, Great Falls, Mont. 360 meters. 1,000 mi. Great Falls Tribune. Mon, Wed, Sat, 8-10 pm, concert. Sun, 4 pm, church services. Mountain.

KDYW, Phoenix, Ariz. 360 meters. 100 mi. Smith Hughes & Co. Temporarily discontinued.

KDYX, Honolulu, T. H., Hawaii. 360 meters. 500 mi. Honolulu Star-Bulletin Co., Ltd. Daily ex Sun, 12:15-1:15 pm, reports; 6:30-7:30 pm, entertainment, music, talks. Sun, 11 am-12:15 pm, church services. 120th Meridian.

KDZB, Bakersfield, Calif. 240 meters. 500 mi. Frank Siefert. Daily ex Sun, 8-9 pm, reports, music. Sun, sacred program, irregular. Pacific.

KDZE, Seattle, Wash. 455 meters. 500 mi. Seattle Radio Assn. Daily ex Sun, 10:30-11 am, 3:30-4:30 pm, news, music. Mon, Fri, 7-8 pm, concert. Wed. 8-9 pm, concert. Pacific.

KDZF, Los Angeles, Calif. 278 meters. Automobile Club of Southern California.

KDZI, Wenatchee, Wash. 360 meters. 700 mi. Elec. Supply Co. Daily ex Sun, 4:30-5:30 pm, music. Mon. Wed. Fri, 8-9 pm, music. Sun, 11 am-12:30 pm, church services. Pacific.

KDZK, Reno, Nev. 360 meters. 50 mi. Nevada Machine & Elec. Co. (Nevada State Journal). Sun, 7-8 pm. Pacific.

KDZQ, Denver, Colo. 360 meters. Pyle & Nichols.

KDZR, Bellingham, Wash. 261 meters. 200 mi. The Bellingham Pub. Co. Mon, Wed. Fri. 7-8:30 pm, music, news, reports; 7:30-7:45, code practice. Tues, Sat, Sun, 7-8 pm. Pacific.

KDZT, Seattle, Wash. 360 meters. Seattle Radio Assn.

KFAD, Phoenix, Ariz. 360 meters. 200 mi. McArthur Brothers. Daily ex Sun, 7:30-8:30 pm, news, weather, stock reports. Mountain.

KFAE, Pullman, Wash. 360 meters. 1,500 mi. State College of Washington. Mon, Wed, Fri, 7:30-9 pm, lectures, music, readings. Pacific.

KFAF, Denver, Colo. 360 meters. 1,500 mi. Western Radio Corp. Slogan, "Voice from the Rockies—Out Where the West Is." Daily ex Thurs and Sun, 8-9 pm, Thurs, 7:30-8, music, reports, news. Mountain.

KFAJ, Boulder, Colo. 360 meters. 800 mi. Univ. of Colo. No definite schedule. Univ. activities. Mountain.

KFAN, Moscow, Ida. 360 meters. 200 mi. The Electric Shop. Tues, Thurs, Sat, 7:30-8:30 pm, music, reports. Sun, church services. Pacific.

KFAP, Butte, Mont. 360 meters. Standard Pub. Co.

KFAQ, San Jose, Calif. 360 meters. City of San Jose.

KFAR, Hollywood, Calif. 280 meters. Studio Lighting Service Co.

KFAU, Boise, Ida. 270 meters. 200 mi. Boise H. S. Daily ex Sun. 3-3:30 pm, markets, news; 8:30 pm, weather. Tues, Fri. 8-9 pm, concert. Thurs, 7:30-8:15 ;m, music. Mountain.

KFAV, Venice, Calif. 288 meters. 50 mi. Abbot-Kinney Co. Mon, Tues, Wed, Fri, 8:30-9:30 pm, music. Pacific.

KFAW, Santa Ana, Calif. 280 meters. 100 mi. Radio Den. Daily ex Sun, 4:30-5 pm, news, reports, music. Mon, Thurs, 6:30-7:30 pm, concert. Pacific.

KFAY, Medford, Ore. 360 meters. 500 mi. Virgin Radio Service. Temporarily discontinued.

KFBB, Havre, Mont. 360 meters. 150 mi. F. A. Buttrey Co. Daily ex Sun, 12:30 pm, agriograms, weather, news. Tues, Fri, 8-9:30 pm, music. Mountain.

KFBC, Phoenix, Ariz. 233 meters. Nielson Radio Supply Co.

KFBE, San Luis Obispo, Calif. 360 meters. 50 mi. R. H. Hern. Mon, Wed, Fri, 4:30-5:30 pm. Pacific.

KFBG, Tacoma, Wash. 360 meters. First Presbyterian Church.

KFBK, Sacramento, Calif. 283 meters. 300 mi. Kimball-Upson Co. Slogan, "Heart of California." Daily ex. Sun, 6-6:45 pm, concert, news, codes. Wed. 8-9:30 pm, concert. Pacific.

KFBL, Everett, Wash. 224 meters. 50 mi. Leese Bros. Daily ex Sun, 7:15-8:15 pm. Sun, 2-3 pm. Pacific.

KFBS, Trinidad, Colo. 360 meters. Chronicle News & Gas & Elec. Supply Co.

KFBU, Laramie, Wyo. 283 meters. Bishop N. S. Thomas.

KFCB, San Diego, Calif. 278 meters. 100 mi. W. K. Azbill. Thurs, Sun, 8-9 pm, Bible lesson, sermon. Pacific.

KFCD, Salem, Ore. 360 meters. 100 mi. F. S. Barton. Tues, Wed, Fri, 7-8 pm. Pacific.

KFCF, Walla Walla, Wash. 360 meters. Frank A. Moore.

KFCH, Billings, Mont. 360 meters. 500 mi. Electric Service Station, Inc. Wed, Fri, Sun, 7:30-9 pm, music. Mountain.

KFCK, Colorado Springs, Colo. 242 meters. Colorado Springs Radio Co.

KFCL, Los Angeles, Calif. 360 meters. 1,500 mi. Los Angeles Union Stock Yards. Daily ex Sun, 10-10:30 am. 1:15-1:45 pm, 4-4:30, 8-8:20, live stock reports. Thurs, 9-9:20 pm. Pacific.

KFCM, Richmond, Calif. 244 meters. 500 mi. Richmond Radio Shop. Slogan, "Out Where the West Ends." Daily ex Sun, 1-2 pm, music. Tues, Fri, 8-9 pm, music. Pacific.

KFCP, Ogden, Utah. 360 meters. Ralph W. Flygare.

KFCV, Houston, Tex. 360 meters. 1000 mi. Fred Mahaffey, Jr. Daily ex Sun, 7:30-8 pm, markets, entertainment. Sun, 2-3 pm, entertainment. Central.

KFCY, Le Mars, Ia. 360 meters. 300 mi. Western Union College. Fri, 8-9 pm, music, educational. Central.

KFCZ, Omaha, Neb. 258 meters. Omaha Central H. S.

KFDA, Baker, Ore. 360 meters. 25 mi. Adler's Music Store. Daily ex Sun, 5-6 pm, 7-8, music. Sun, 6-8 pm. Pacific.

KFDC Spokane, Wash. 283 meters. 25 mi. E. B. Craney. Temporarily discontinued.

KFDD, Boise, Idaho. 252 meters. St. Michael's Cathedral. Sun, 11:15-12:30 pm, 8-9:15 church services. Mountain.

KFDH, Tucson, Ariz. 360 meters. 200 mi. Univ. of Ariz. Temporarily discontinued. Mountain.

KFDJ, Corvallis, Ore. 360 meters. Oregon Agri. College.

KFDL, Denver, Colo. 360 meters. Knight-Campbell Music Co.

KFDO, Bozeman, Mont. 248 meters. H. Everett Cutting.

KFDP, Des Moines, Iowa. 278 meters. 300 mi. Hawkeye Radio & Supply Co. Daily ex Sun, 3-3:45 pm, reports, music. Mon, 9-10 pm, music. Thurs, 9-10 pm, 11 pm-12:30 am, music, entertainment. Central.

KFDR, York, Neb. 360 meters. Bullock's.

KFDS, San Francisco, Calif. 360 meters. John D. McKee.

KFDU, Lincoln, Neb. 240 meters. Neb. Radio Elec. Co.

KFDV, Fayetteville, Ark. 360 meters. 300 mi. Gilbrech & Stinson. Slogan, "Southern Gateway to the Ozarks." No regular schedule. Central.

KFDX, Shreveport, La. 360 meters. First Baptist Church.

KFDY, Brookings, S. D. 360 meters. S. D. State College of Agri. & Mech. Arts. Mon, Sat. 8:30 pm, music. Tues, Thurs, 11 am, music, lectures, news. Central.

KFDZ, Minneapolis, Minn. 360 meters. Harry O. Iverson.

KFEC, Portland, Ore. 360 meters. 75 mi. Meier & Frank Co. Inc. Daily ex Sun, 12 m, weather, reports. 4-5 pm, music; 6:30 pm, weather, crop, markets, reports. Thurs, 9-10 pm, concert. Sat, 11 am 12 m, children's hour. Pacific.

KFEJ, Tacoma, Wash. 360 meters. Guy Greason.

KFEL, Denver, Colo. 360 meters. Winner Radio Corp. Daily ex Sun, 9 am, 10, 11, 11:45, stock reports; 3-4 pm, music. Mon, Fri, 9-10 pm, 12-1 am, concerts. Sun, 9-10 am, church services. Mountain.

KFEP, Denver, Colo. 240 meters. Radio Equipment Co.

KFEQ, Oak, Neb. 360 meters. J. L. Scroggin.

KFER, Fort Dodge, Ia. 231 meters. Auto Electric Service Co.

KFEV, Douglas, Wyo. 263 meters. 250 mi. Felix Thompson Radio Elec. Shop. Weather reports and special warnings. Mountain.

KFEX, Minneapolis, Minn. 275 meters, 600 mi. Augsburg Seminary. Tues, Sat, 6 pm, music. Sun, 9:15 pm, church services. Central.

KFEY, Kellogg, Ida. 360 meters. Bunker Hill & Sullivan Mining & Const. Co.

KFEZ St. Louis, Mo. 360 meters. American Society of Mech. Engrs.

KFFB, Boise, Ida. 273 meters. 70 mi. Jenkins Furn. Co. (Owyhee Hotel). Daily, 8-9 pm, concert. Mountain.

KFFE, Pendleton, Ore. 360 meters. 100 mi. Eastern Ore. Radio Co. Daily ex Sun, 8:30-9:30 pm, music. Pacific.

KFFO, Hillsboro, Ore. 229 meters. Dr. E. H. Smith.

KFFP, Moberly, Mo. 275 meters. 300 mi. First Baptist Church. Slogan, "The Gospel Messenger of the Air." Sun, 10:45 am, 8 pm, church services. Central.

KFFQ, Colorado Springs, Colo. 360 meters. 250 mi. The Markscheffel Motor Co. Daily, 8:15 am, weather; 4-5 pm, concert. Mon, Wed, Fri, 8-9:30 pm, special program. Mountain.

KFFR, Sparks, Nev. 226 meters. 50 mi. Jim Kirk. Wed, Fri, 8-9 pm, "Sagebush Canaries." Pacific.

KFFV, Lamoni, Iowa. 360 meters. 600 mi. Graceland College. Wed, 9:20 am, music appreciation. Thurs, 8 pm, entertainment. Central.

KFFX, Omaha, Nebr. 278 meters. 600 mi. The McGraw Co. Daily, 2:30-3:50 pm. Central.

KFFY, Alexandria, La. 360 meters. Pincus & Murphy, Inc.

KFFZ, Dallas, Tex. 360 meters. Al. G. Barnes Amusement Co.

KFGC, Baton Rouge, La. 254 meters. Louisiana State University. No regular schedule.

KFGD, Chickasha, Okla. 248 meters. 50 mi. Chickasha Radio & Elec. Co. Slogan, "Queen of the Washita." Daily ex Sun, 11:30-12 am; 9-9:30 pm, music. Central.

KFGH, Stanford Univ., Calif. 360 meters. 500 mi Leland Stanford Junior University. No regular schedule.

KFGJ, St. Louis, Mo. 266 meters. National Guards Missouri.

KFGL, Arlington, Ore. 234 meters. Arlington Garage.

KFGP, Cheney, Kans. 229 meters. Cheney Radio Co.

KFGQ, Boone, Ia. 226 meters. Crary Hardware Co.

KFGV, Utica, Nebr. 224 meters. 50 mi. Heidbreder Radio Supply Co. No regular schedule.

KFGX, Orange, Tex. 250 meters. First Presbyterian Church. Sun, 11 am, 7:30 pm, church services. Central.

KFGY, Baudette, Minn. 224 meters. Gjelhang's Radio Shop.

KFGZ, Berrien Springs, Mich. 268 meters. Emanuel Missionary College.

KFHA, Gunnison, Colo. 360 meters. Colorado State Normal School. "Where the Sun Shines Every Day." Daily ex Sun, 8:30 am, weather, markets. Tues, 7:30 pm, entertainment. Mountain.

KFHB, Hood River, Ore. 250 meters. 50 mi. Rialto Theatre. Daily ex Mon, 6:20-6:35 pm, sports, news. Sun, 1-1:45 pm, music. Special programs 11 pm, Pacific.

KFHD, St. Joseph, Mo. 226 meters. 100 mi. Utz Electric Co. Daily ex Sun, 5:30-6 pm. Mon, Thurs, Sat, 8-9:30 pm, concert. Central.

KFHF, Shreveport, La. 266 meters. Central Christian Church.

KFHH, Neah Bay, Wash. 283 meters. Ambrose A. McCue.

KFHI, Wichita, Kans. 224 meters. Charles V. Dixon.

KFHJ, Santa Barbara, Calif. 360 meters. Fallon Company.

KFHL, Oskaloosa, Ia. 227 meters. Penn College.

KFHP, Kearney, Neb. 246 meters. Radio Bug Products Co.

KFHQ, Los Gates, Calif. 242 meters. Curtis Bros. Hdwe. Store.

KFHR, Seattle, Wash. 270 meters. Star Elec. & Radio Co.

KFHS, Hutchinson, Kans. 229 meters. Robert Nelson.

KFHU, Mayville, N. D. 261 meters. M. G. Sateren.

KFHY, Trinidad, Colo. 242 meters. R. S. McEwan.

KFI, Los Angeles, Calif. 469 meters. 2,000 mi. Earl C. Anthony, Inc. Daily ex Sun, 5-6 pm. 6:45-7:30 pm. 8-11 pm, Wed, Fri, Sat, 8-12 pm. Sun, 10:30-11:30 am, 4-5 pm, 8-11. Pacific.

KFIB, St. Louis, Mo. 244 meters. Franklin W. Jenkens.

KFID, Iola, Kans. 246 meters. Ross Arbuckles Garage. Daily, 5:15-5:45 pm. Tues, 9-10 pm. Thurs, 8-9 pm. Central.

KFIF, Portland, Ore. 360 meters. Benson Tech. Student Body.

KFIJ, Platte S. D. 236 meters. Sidney I. Threan.

KFIK, Gladbrook, Iowa. 234 meters. Gladbrook Elec. Co.

KFIL, Louisburg, Kans. 234 meters. Windisch Elec. Farm Equip. Co.

KFIO, Spokane, Wash. 252 meters. North Central High School.

KFIQ, Yakima, Wash. 224 meters. 200 mi. Yakima Valley Broadcasting Assn. Slogan, "The Station That Will Make 224 Famous." Daily ex Sun, 7:30-8 pm, weather, markets. Mon, Fri, 8-9 pm, concert. Pacific.

KFIU, Juneau, Alaska. 226 meters. Alaska Elec. Light & Power Co.

KFIV, Pittsburg, Kans. 240 meters. V. H. Broyles.

KFIX, Independence, Kans. 246 meters. Reorganized Church of Jesus Christ, of Later Day Saints.

KFIY, Seattle, Wash. 236 meters. Brott Laboratories.

KFIZ, Fond du Lac, Wis. 273 meters. Daily Commonwealth.

KFJA, Grand Island, Nebr. 244 meters. Central Power Co.

KFJC, Seattle, Wash. 233 meters. Post Intelligencer.

KFJD, Greeley, Colo. 236 meters. 300 mi. Weld County Printing & Pub. Co.

KFJF, Oklahoma City, Okla. 252 meters. National Radio Mfg. Co.

KFJH, Selma, Calif. 273 meters. The Sugar Bowl.

KFJI, Astoria, Ore. 252 meters. Liberty Theatre.

KFJJ, Carrollton, Mo. 256 meters. Carrollton Radio Shop.

KFJK, Bristow, Okla. 233 meters. Delano Radio & Elec. Co.

KFJL, Ottumwa, Ia. 242 meters. Hardzoog Mfg. Co.

KFJM, Grand Forks, N. D. 229 meters. University of North Dakota.

KFJQ, Grand Forks, N. D. 252 meters. Valley Radio Div. of Elec. Construc. Co. (Portable station.)

KFJR, Stevensville, Mont. 258 meters. Ashley C. Dixon & Son.

KFKA, Greeley, Colo. 248 meters. Colorado State Teachers College.

KFKH, Lakeside, Colo. 226 meters. Denver Park Amusement Co.

KFLE, Denver, Colo. 268 meters. National Educational Service.

KFZ, Spokane, Wash. 283 meters. 300 mi. Doerr-Mitchell Elec. Co. Slogan, "In the Heart of the Inland Empire." Tues, Fri, 7:30-9 pm, music. Sun, 6-7 pm. Pacific.

KGB, Tacoma, Wash. 360 meters. 200 mi. Tacoma Daily Ledger—William A. Mullins Elec. Co. Daily ex Sun, 7-9 pm. Sun, 5-7:30 pm, entertainment. Pacific.

KGB, Tacoma, Wash. 252 meters. Tacoma Daily Ledger.

KGG, Portland, Ore. 360 meters. 500 mi. Hallock & Watson Radio Service. Slogan, "The Rose City." Daily ex Sun, 5-6 pm, music, entertainment 7:30-8 pm, reports. Sat, 8-9 pm, answers to Radio questions. Sun, Wed, 9-10 pm, music. Pacific.

KGN, Portland, Ore. 360 meters. 100 mi. Northwestern Radio Mfg. Co. Irregular schedule.

KGO, Altadena, Calif. 360 meters. 300 mi. Altadena Radio Lab. No regular schedule.

KGU, Honolulu, Hawaii. 360 meters. 150 mi. The Honolulu Advertiser. Daily, 7:30-9 pm. Tues, Thurs, Sat, special program. 150th meridian. (Three hours later than Pacific.)

KGW, Portland, Ore. 492 meters. 1,500 mi. Oregonian Pub. Co. Slogan, "KGW. Keep Growing Wiser." Daily ex Sun, 11:30 am, weather; 3:30-4 pm, woman's program; 7:30 pm, weather, 10-11 pm, music. Mon, Wed, Fri, 8-9 pm, concert. Mon, Fri, 7-7:30 pm, lecture; 11-12 pm, Hoot Owls. Sun, 7-8 pm, concert. Pacific.

KGY, Lacey, Wash. 258 meters. 250 mi. St. Martins College. Slogan, "Out Where the Cedars Meet the Sea." Tues, Fri, Sun, 8:30-9:30 pm, news, concert, lecture, bedtime story. Pacific.

KHJ, Los Angeles, Calif. 395 meters. 2,000 mi. Los Angeles Times. Daily ex Sun, 12:30-1:15 pm, 2:30-3:30, 6:45-7:30, 8-10. Sun, 10-11 am, 8-10 pm. Pacific.

KHQ, Seattle, Wash. 360 meters. Louis Wasmer.

KJQ, Stockton, Calif. 360 meters. 100 mi. Gould, The Light Man. Daily ex Sun, 5-6 pm, concert. Mon, Wed, 9-10 pm, concert. Sun, 10-11 am, church services. Pacific.

KJR, Seattle, Wash. 270 meters. 1,500 mi. Northwest Radio Service Co. Daily ex Sun, 5:30-6:15 pm, reports. Mon, 7:30-8:30 pm, music. Tues, Fri, Sat, 8:30-9:30 pm, concerts, lecture, bedtime stories. Thurs, 9-10:30 pm. Pacific.

KJS, Los Angeles, Calif. 360 meters. 500 mi. Bible Inst. of Los Angeles. Tues, 7-7:30 pm, Thurs, 8-9, sacred music, lectures, etc. Sun, 11:30-12:30 pm, 6-6:45, 8-9, church services. Pacific.

KLN, Del Monte, Calif. 261 meters. Monterey Elec. Shop. Daily, 12-1 pm, weather, markets, news; 7-8 pm, concert. Tues, Fri, 7-7:30 pm, 8-8:30, concert. Pacific.

KLS, Oakland, Calif. 360 meters. 1,500 mi. Warner Bros. Radio Supply Co. Daily, 11:30-1 pm. Fri, 8-9 pm. Sun, 12-1 pm. Pacific.

KLX, Oakland, Calif. 360 meters. 500 mi. Oakland Tribune. Daily ex Sun, 3:15-5:15 pm, sports; 7-7:30, news, entertainment. Tues, 8-9 pm. Fri, 9-10 pm. Sun, 10-11 am, church services. Pacific.

KLZ, Denver, Colo. 360 meters. 1,000 mi. Reynolds Radio Co. Daily ex Sun, 7:30-8 pm, news, markets, bedtime story. Thurs, 8-9 pm, concert. Sun, 8:30-10:30 pm, concert. Mountain.

KMJ, Fresno, Calif. 360 meters. 300 mi. San Joaquin Lt. & Pr. Corp. Sun, 8-10 pm, music. Pacific.

KMO, Tacoma, Wash. 360 meters. 200 mi. Tacoma Times. (Love Electric Co.) Daily ex Sun, 6-7 pm, 9:15-10, concert, news, lecture. Pacific.

KNJ, Roswell, N. M. 250 meters. Roswell Public Service Co.

KNT, Aberdeen, Wash. 263 meters. 600 mi. Grays Harbor Radio Co. Daily ex Sun, 7-8 pm, news, concert. Pacific.

KNV, Los Angeles, Calif. 256 meters. Radio Supply Co.

KNX, Los Angeles, Calif. 360 meters. Elec. Lighting & Supply Co.

KOB, State College, N. M. 360 meters. 500 mi. N. M. Agri. & Mech. Arts. Daily 11:55-12 m, 9:55-10 pm, time, reports. Mon, Wed, Fri, 7:30-8:30 pm, concert. Mountain.

KOP Detroit, Mich. 286 meters. 1,500 mi. Detroit Police Dept. Slogan, "Safety First." Daily ex Sun, 1 pm, 6:30, reports, police information, emergency. Eastern.

KPO, San Francisco, Calif. 423 meters. 1,500 mi. Hale Bros., Inc. Daily ex Sun, 1-2 pm, 4:30-5:30 pm, music. Mon, Tues, Thurs, Sun, 8-10 pm, concert, lectures. Sat, 8-12 pm, music. Sun, 11-12:30 pm, church services. Pacific.

KQI, Berkeley, Calif. 360 meters. Univ. of Calif.

KQP, Hood River, Ore. 360 meters. Apple City Radio Club. Slogan, "Apple City of the West." Mon, Wed. Fri, 6:30 pm, music. Wed, 9 pm, special. Pacific.

KQV, Pittsburgh, Pa. 360 meters. 300 mi. Doubleday-Hill Elec. Co. Daily ex Sun, 12-12:30 pm; 4:30-5, music. Mon, Wed. Fri, 10-10:55 pm, concert. Fri, 4:30-5:15 pm, children's program. Eastern.

KQW, San Jose, Calif. 360 meters. 1000 mi. Chas. D. Herrold. Daily ex Sun, 1-1:30 pm. Wed, 8-9 pm, concert. Pacific.

KRE, Berkeley, Calif. 278 meters. 600 mi. Daily Gazette. Mon, 8-10 pm. Wed, 9-10 pm, concert. Pacific.

KSD, St. Louis, Mo. 546 meters. 1,500 mi. St. Louis Post Dispatch. Daily ex Sun, 8:40 am, 9:40, 10:40, 11:40, 12:40 pm, 1:40, 2:40, 4, 8. Thurs and Sun, silent nights. Central.

KSL, San Francisco, Calif. 360 meters. 50 mi. The Emporium. Temporarily discontinued.

KSS, Long Beach, Calif. 229 meters. Prest & Dean Radio Co. No regular schedule.

KTW, Seattle, Wash. 360 meters. 500 mi. First Presbyterian Church. Sun, 11-12:30 pm, 3-4:30, 7-9:30, church service. Pacific.

(NOTE—The second part of the station schedule list will appear next week.)

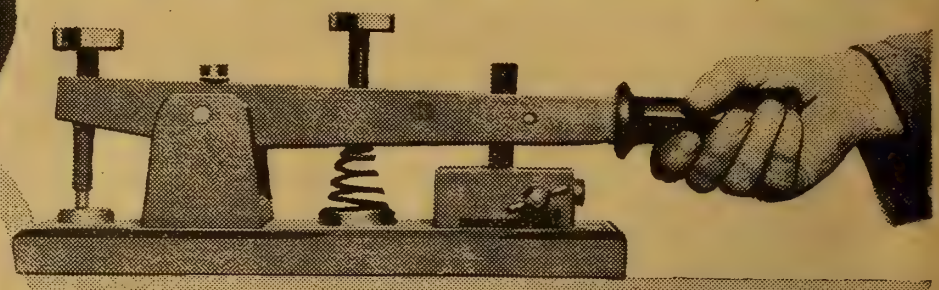
Serially Continuously—

THE BROADCASTING station directory is the most complete and authentic list of Radiophone plants. Letters are being sent various stations every day for information. No other paper or source provides the data given here. The idea is original and a service which Radio Digest has maintained from the start. Every public service broadcasting station is to be found now, not only in the location index, but in the schedule list. The latter, however is divided, one-fourth appearing this week, the second quarter to appear next week, and the third part the week following and the fourth will have the state, city and station index.

The station schedules given here are listed alphabetically by call letters. Following the call is given the city and state, the wave length, estimated sure miles range of the station, the owner's name, the slogan of the station if one is used, name of listener in "club," the schedule of operating hours, and the kind of time used.

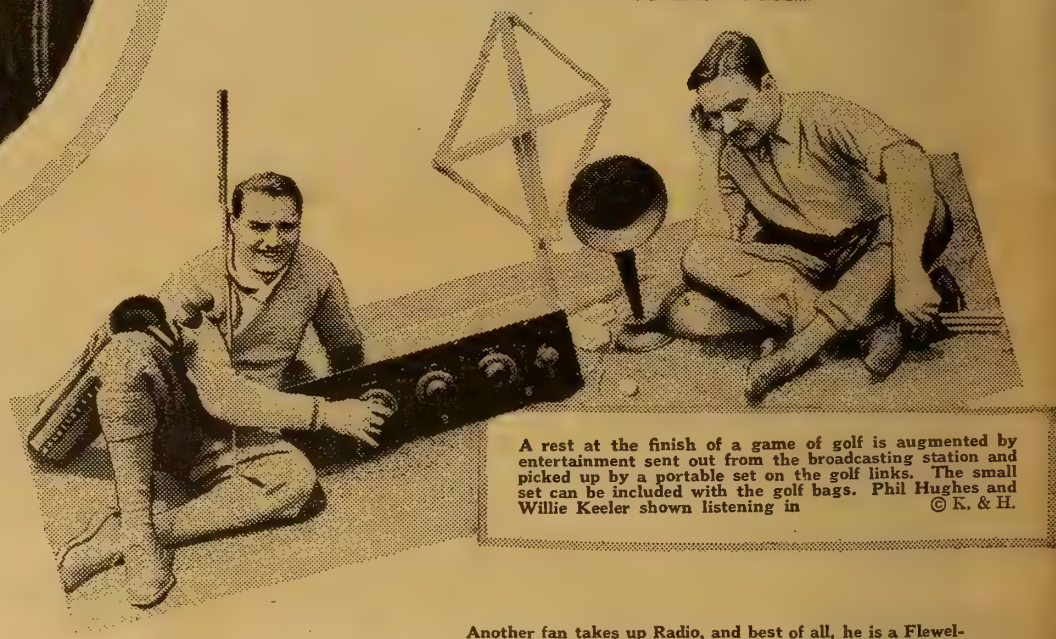
The state, city and call list appears with the last week and is merely an index. One wishing to find the calls of the stations in his vicinity, will find this index useful. Three successive issues of Radio Digest will give one the most complete and accurate list of broadcasting stations obtainable.

Radio Illustrated



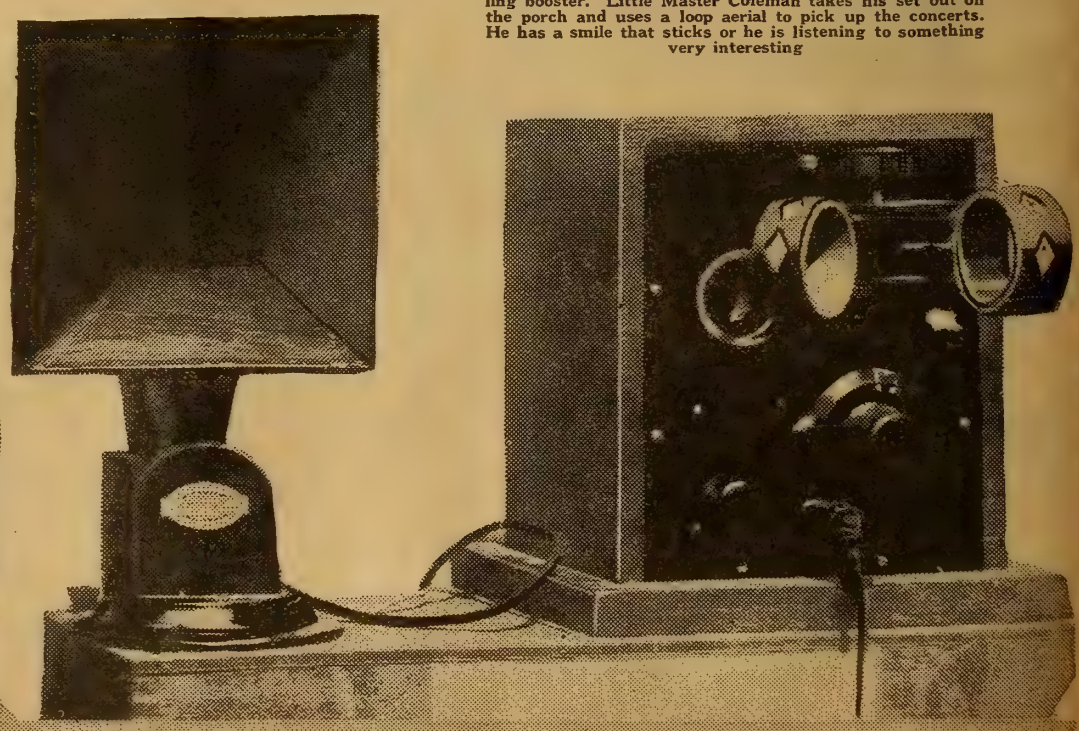
We look with a smile on the old apparatus first used in Radio communication. A "pump key" is shown which was used to transmit messages at a speed of thirty words a minute. It was made to handle high voltage currents © Photonews

Rather young to broadcast. Baby Alfred Jerome giving station call signal GOO —and finishes with a concert perfectly suitable to the baby audience
© K. & H.



A rest at the finish of a game of golf is augmented by entertainment sent out from the broadcasting station and picked up by a portable set on the golf links. The small set can be included with the golf bags. Phil Hughes and Willie Keeler shown listening in © K. & H.

Another fan takes up Radio, and best of all, he is a Flewelling booster. Little Master Coleman takes his set out on the porch and uses a loop aerial to pick up the concerts. He has a smile that sticks or he is listening to something very interesting



SEP 28 1923 © CI B586863

New De Luxe Loop Aerial; Simplex; Flewelling

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

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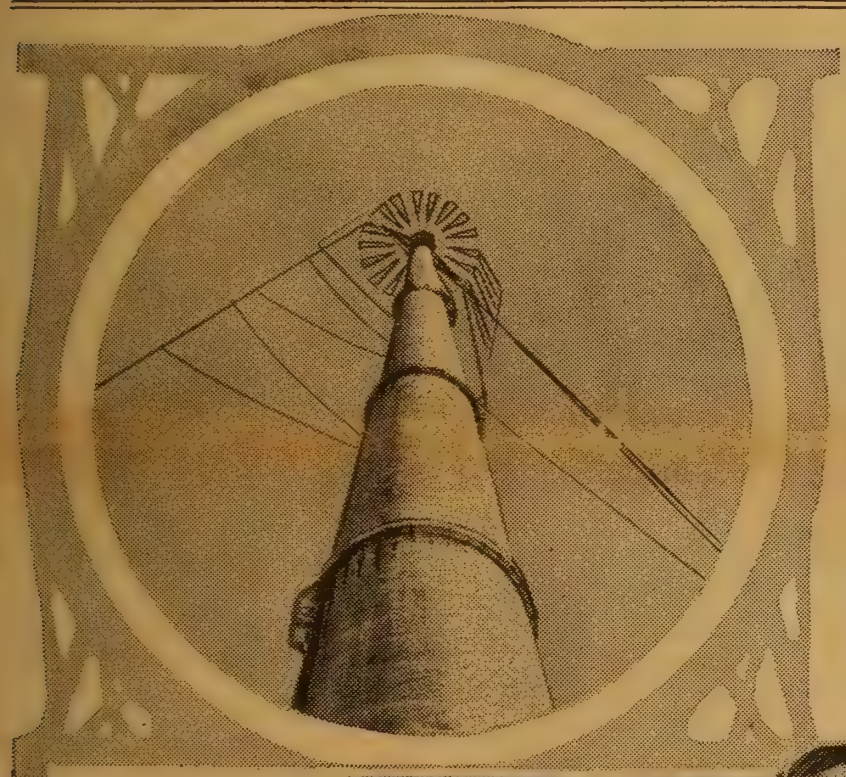
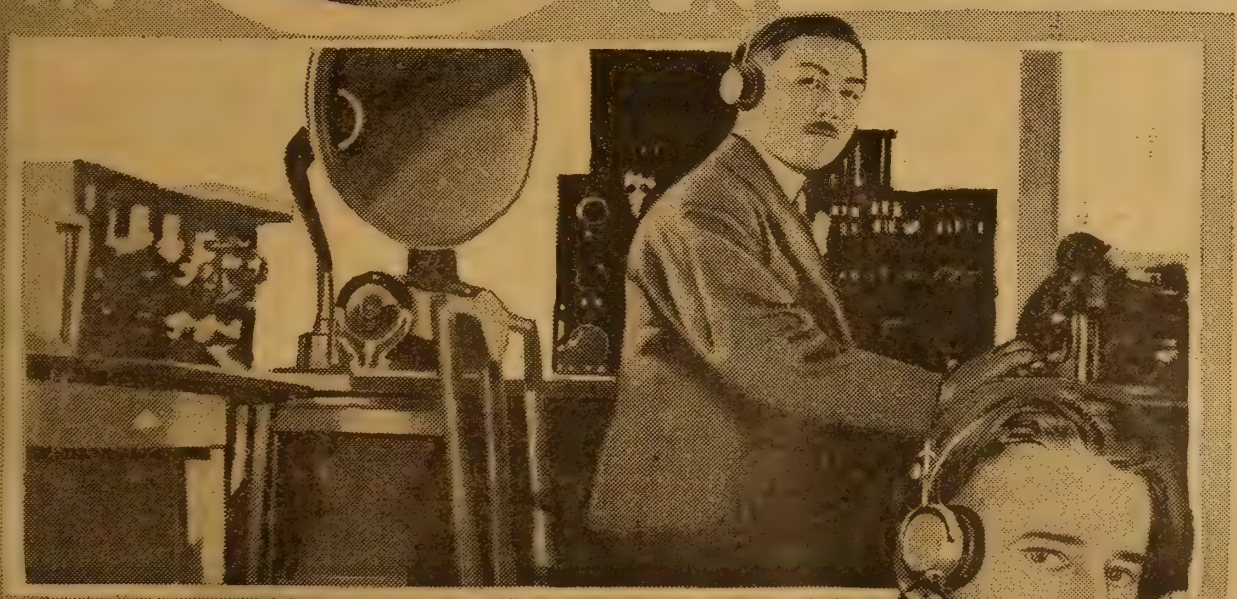
Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, SEPTEMBER 22, 1923 | No. 11

RADIO PREDICTS QUAKES





Looking up giant 660-foot mast supporting the antenna of the Japanese station at Haranomachi, only means of communicating news of the Japanese disaster to the outside world. Below, center, is the heroic Jap operator, T. Yonemura, who stuck to his post, many times forced to make his own repairs to send the news. Below, right, is Irving Brown, commercial operator at San Francisco, who first heard Yonemura calling

Photos below © Int.

SHOCK EXPERTS WILL MAKE AIRPHONE TO WARN PEOPLE

Dr. L. Day, Famous Seismologist, Suggests Ether Device as Forecaster—Jap Plant with Hero Operator Tells World of Earthquake

(*Special to RADIO DIGEST.*)

LOS ANGELES.—No more will terrifying earthquakes catch a sleeping public in a horrifying holocaust! No more will hundreds of thousands of lives be sacrificed as in the Japanese disaster, not if the recent suggestion of Dr. Arthur L. Day, famous seismologist, to apply Radio principles to the forecasting and warning of quakes, is acted upon and realized.

Dr. Day, director of the Carnegie Geophysical Laboratory in Washington, D. C., is responsible for the statement, made at a luncheon here of the Southern California Chapter of the Seismological Society of America, that the principles of Radio have great scientific possibilities in seismography, the study of earthquakes. Dr. Day was speaking before a group of internationally known earthquake specialists who were meeting here to discuss earth tremors and ways and means to eliminate such catastrophes, and the frightful loss of life following in their wake.

Would Warn of Quake

Dr. Day believes that application of Radio principles and specially designed apparatus to the already sensitive and delicately adjusted seismographs, which register earthquakes, would enable the Radiophan in the threatened area to be warned in advance of the coming shock. Such a forecast would be possible early enough so that the inhabitants of the region could move to safe parts of the country, or at least to the open spaces where their lives would be less in danger.

Although the exact system the famous scientist has in mind was not divulged, he indicated that automatic seismograph stations equipped to send Radio alarms, were a part of his general plan. Such stations might be compared to the automatic Radio compass stations now used to send out bearings to ships at sea.

Find Direction of Tremor

Such a system, Dr. Day believes, would enable the observers to calculate the strength and direction of the tremors so accurately that relief trains could be dispatched to remove the people from the threatened cities long in advance of the disaster, thereby saving the lives that would otherwise be lost.

(Continued on page 2)

NEED A DERRICK FOR WQAL "BIG" PROGRAM

MATTOON, ILL.—Station WQAL of this city challenges all others to a night "bigger" than that which is recently observed when it broadcast a musical program given by five men who weighed more than 1,800 pounds. The artists were weighed together and required the use of a grain scale. Listeners in failed to realize the program was very "heavy."

Radio C. of C. Opens Eyes to Farming Field

Plans to Educate Tillers of Soil to Benefits

NEW YORK.—Realizing the great buying power of farmers in the United States, the National Radio Chamber of Commerce, assisted by manufacturers and distributors of Radio devices, has begun a campaign to educate tillers of the soil to the practical value of the airphone.

ORDERS FOR PARTS CLOG DIGEST MAIL

CLASS H GETS HEAVY ONSLAUGHT FROM FANS

Appearance of Sixteenth Consecutive Coupon Shows Readers Have Been Saving Whole Series

SPECIAL REWARD OFFER
Coupon Number 17

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

With the publication of the sixteenth coupon of the special reward offer for regular Digest readers, as was expected, during the past week bags of mail poured into the publication's office containing letters from thrifty fans who had been saving the whole series in order to secure one of the many valuable accessories listed under Class H, and requiring sixteen consecutive coupons. Now coupon No. 17 appears. Even more orders from Radiophans are expected this week as a result of many readers starting with the second coupon of the series rather than the first.

In the meantime letters continue to flow in from fans who desire Radio parts listed in the classes of items requiring less coupons than those in Class H.

The onslaught of orders, however, will not delay shipments to readers, as the special offer department is fully prepared to meet the large demand. Subscribers are urged to be careful in sending coupons and remittances, to follow carefully

to Remember

be emphasized to those king advantage of the t is that the coupons item must be numbered for example, 1, 2, 3, and 6. The number of coupons necessary and the cash remittance, of course, depen on the item sought by the reader. T e is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary.

The complete list of parts obtainable, together with the number of coupons required, will appear here in next week's issue.

RADIO PREDICTS QUAKE

(Continued from page 1)

At the luncheon Dr. Day addressed were Ralph Arnold, chairman of the society, Dr. Perry O. Wood, research associate of the Carnegie Laboratory, who has charge of the earthquake experimental station at Mt. Wilson, Calif., A. M. Strong, a noted geologist, Dr. Ford Carpenter, writer and authority of meteorological subjects, and Dr. W. S. Kew of the United States Geological Survey.

Jap Disaster Proves Radio

Turning, however, from the suggestion for warning of quakes to the actual part played by Radio in the recent Japanese catastrophe, it can be said that commercial Radio was tried under very difficult conditions, and was not found wanting. Where all other means of communication failed, a little Jap Radio operator stuck to his post, repaired damages to his station, and gave the world information of the great earthquake.

Out of the appalling disaster has emerged proof of the unfailing dependability of Radio and a hero whose name will go down in history. When Tokio and Yokohama were first rocked by earthquakes and swept by flames, the cables and naval Radio stations were put out of commission.

Iwaki Unit Left Intact

At Tomioka, 155 miles north of Tokio, and at Haranomachi, 178 miles north of Tokio, the great 660-foot towers were, by some strange freak of the quakes, left standing. These two plants are together known as the Iwaki unit, the transmitting equipment being at Haranomachi, while the receiver and the key controlling the transmitter are at Tomioka.

Taki Yonemura, operator in charge of the Iwaki plant, is the man whose name will go down in history as one of the outstanding heroes of the Japanese catastrophe. Yonemura is the only man at the Jap station that understands English. Even he has only a limited knowledge of the tongue. While the earth rocked and swayed, he for three days and nights sat at his key and flashed to the outside world the tidings of destruction and the urgent appeals for food and medical aid.

Sends Messages as Earth Rocks

His messages, picked up by the big receiving station at Bolinas near San Francisco, operated by the Radio Corporation of America, were for seventy-two hours the only source of information for the press associations and newspapers of this country. In the intervals between sending, he laboriously translated into English some 8,000 words of Japanese, and just as laboriously spelled it out, letter for letter, in the International Morse Code. His handicap can better be appreciated when it is stated that this is not the code ordinarily used by Japanese operators.

His tenses were badly twisted and frequently, unable to express himself in English, he reverted to Japanese for whole sentences at a time. Time after time his story of the disaster was interrupted by heavy earthquake shocks which shattered parts of the apparatus and tore the wires from their connections. In one instance it was four hours before the damage could be repaired, but every time Yokemura replaced a part or traced the break and stuck to the job.

Cables Out of Commission

Without Radio and Yokemura, it would have been from twenty-four to forty-eight hours before news of Japan's plight could be sent to the outside world and relief supplies started on their way. The Pacific Commercial cable from Japan to Boning Island, reported submerged, and thence to Guam, was put out of service by the earthquake. Messages are now routed east via Manila, Shanghai and Nagasaki, or west via London.

It remained for Radio to carry the official dispatches and news reports across the Pacific to North America, and Radio has handled a tremendous amount of traffic. Tomioka for some time had no means of communication inland. At the suggestion of the Japanese ambassador at Washington, however, a courier service was established to Tokio and now a regular schedule is in operation. A statement that communication was open to Tokio, by the state department, led some to believe that line wire communication between the station and Tokio was established. However, communication used in the old sense, means that the roads were open. According to the last reports no wires have been re-established.

Broadcast to Sea of Dangers

Radio was by other ways the means of getting news of the disaster to the new world on September 4. The master of the S. S. President Jefferson Radioed to his Shanghai office from the port of Yokohama direct. The American consul put the message on the cable for Secretary Hughes in Washington.

Facts relating the unsafe condition of the harbor at Yokohama were immediately broadcast by the naval hydrographic office there, that all ships might be warned of the hidden dangers in the harbor, the absence of lights, etc. Here Radio again served in its first recognized capacity, that of protecting life at sea.

U. S. Naval Radio Makes Link

The U. S. naval forces in Japanese waters are rendering official emergency service via Radio. The American Asiatic fleet is now at Yokohama and the destroyer Borie is stationed at Nagasaki as a Radio relay ship. Messages from the American flagship are picked up by the Borie, relayed to the naval Radio station at Cavite and thense to the naval station at San Francisco. Government west bound messages are sent from Washington via Annapolis Radio station or commercial land lines to San Francisco, where they are relayed via Honolulu, Guam and Cavite to the Borie and thence to the American fleet off Yokohama. The U. S. S. Sacramento is stationed at Woosung, ready to relay Radio messages. The naval service can now deliver official dispatches to Yokohama within twenty-four hours.

Many Radio experts feel that the terrible disaster and the severing of communication out of Japan will aid materially in establishing better Radio service between Nippon and the world. The policy of the Japanese government has been to control Radio, although American commercial companies have been endeavoring to provide better stations and transmission for some time. It is now hoped that an opportunity will be given American companies to establish high-powered stations in Japan.

RADIO SPELLING BEE MAKES BOW IN WEST

"Exam" Queries Transferred from Blackboard to Air

SACRAMENTO, CAL. — Examination questions for California high school pupils have been transferred from the blackboard of the little red school house to the more up-to-date Radio broadcasting station.

The first Radic spelling bee in America, and probably the first in the world, was announced recently by Will C. Wood, state superintendent of public instruction.

Superintendent Wood will dictate the examination material to high school students in every section of California by means of Radio. The test will be limited to graduating classes and will take place at a date to be set in November.

Operator of WNAC Resigns to Sell Radio Apparatus

BOSTON, MASS.—Sam Curtis, who for the past year has been chief operator of the WNAC, The Shepard Stores station here, has resigned and will take immediate charge of the new Radio department established by the C. C. Harvey Company, dealers and manufacturers of pianos. When the Shepard Stores started their Radio department Mr. Curtis was placed in charge, and when John Shepard 3rd. established WNAC, Curtis was made chief operator. Curtis was for a number of years a naval Radio operator and later connected with the Radio Corporation of America.

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Looking Ahead

King Miloplex I—The Elaborate Excavations in Egypt become insignificant in comparison to the discovery of the Miloplex circuits. There are three of them, each one better than the last. We promised to divulge the first of this family of circuits this week but didn't have the space. But next issue it will be present—with bells on. Simple, efficient, and not expensive. Build a Miloplex.

How to Test Your Set—A Cracker-Jack Good Article by Thomas W. Benson next week. Mr. Benson will tell how to "shoot trouble" and give advice worth keeping for reference when your set goes dead.

The Story of Radio for Novices, Beginning Next Issue—A series by Marvin W. Thompson, known nationally as a Radio engineer and writer, and now associated with the Digest as a member of its staff. Tell your beginner friends to read Mr. Thompson's series starting with the first chapter.

Notes on the Reflex De Luxe—by H. J. Marx. This article, to appear in the September 29 issue, will tell the latest improvements on this popular set. It will include a simplified circuit for use with a loop aerial. Mr. Marx is planning a series of articles on building a Super-Heterodyne receiver. Watch for this!

Understood by Everybody. What? The Simplex Diagram, of Course. Next week it will illustrate the popular single tube super-regenerative set. You can't wire wrong with a Simplex Diagram.

A Book-Type Condenser You Can Make—Easy and few tools required. Read this how-to-make article along with other kinks next week.

R.D.-99, an Improved Ultra Audion Hook-Up—Has two stages of audio frequency amplification and a reputation for reliance. Wired for jacks, too! See it next issue.

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AMATEURS TO RACE SOL CROSS COUNTRY

TEN STATIONS COMPETING WITH SUN'S RAYS

From Coast to Coast Amateurs Enter Speed Contest to Aid Science Research

HARTFORD, CONN.—On the morning of Sunday, September 23, Radio amateurs of both coasts will attempt to beat Old Sol across the continent in spectacular daylight tests. Their transmitters will be pitted against sunlight in their efforts to relay messages across the country between sunrise and sunset, according to F. H. Schnell, traffic manager of the American Radio Relay League.

At least ten picked amateurs on both the Pacific and Atlantic coasts will start messages as the sun comes over the horizon, and they will be relayed by intervening stations. By evening it is expected that most of the messages will have reached their destination, and for the brass pounders the contest with Father Time will end in a Radio victory.

Tests Have Scientific Value

These tests have a real scientific value, since they will demonstrate to what extent the sun affects transmission. Every one familiar with Radio knows that reception over long distance is more difficult during the daytime than in darkness, this being caused, it is believed, by the ionization of the earth's atmosphere by the sun's rays.

The disastrous effect of sunlight upon Radio has been noticed, and it is confidently expected by league officers that definite comparisons may be drawn which will prove helpful in an investigation of this subject.

In this connection some interesting information may be gathered from the experience of Donald H. Mix, league Radio operator with the MacMillan Arctic exploration party, since he must transmit messages and news reports through both daylight and darkness from the Arctic seas to amateurs at home.

Starting Points Kept Secret

No one will know from what stations the messages will start, says Mr. Schnell, referring to the daylight tests. He says everybody will have the same chance of picking up a message and relaying it along the line.

He advises all amateurs to keep a record of everything they hear, and whether they use standard or daylight saving time. These records should be sent to American Radio Relay League headquarters at Hartford, Conn., by October 1.

The starting gong rings as the sun rises!

ALL-STAR YEARDAY FOR CANUCK PLANT

French-English Station to Mark Birth with Program of Choice Performers

MONTREAL, QUE.—Canada's popular station, CKAC, situated on the roof of La Presse, the French newspaper here, will celebrate its first anniversary September 29. For the occasion, Manager Jacques N. Cartier who announces in both French and English, is preparing a special program which will be given by the most popular artists who have performed during the last year. This program will be doubly interesting, since most all numbers will be either sung, or played, for the first time in America. It will be one of the best all star entertainments ever broadcast by any station and will be typically bi-lingual. The concert will begin at 8:00 p. m., eastern time. All messages received during the evening will be acknowledged.

During the first year, CKAC has had more than 4,000 artists performing singly and one hundred orchestras, besides a number of choirs and bands. During the summer months, over 3,000 American listeners in have visited the studio while touring the province of Quebec. Many have suggested that French courses be given from this station.

Stenographers Copy Talk by Air to Win Fair Prize

PHILADELPHIA. — Radiophans here who are stenographers were recently given an opportunity to win part of the $100 in prizes offered by the management of the sesquicentennial exposition, which is to be held here in 1926 to commemorate the Declaration of Independence. A speech broadcast by Dr. John W. Stockwell from Station WMAQ, Chicago, was transcribed by competing stenographers. Dr. Stockwell spoke at the rate of ninety-five words a minute; contestants were obliged to submit their transcriptions within forty-eight hours. Dr. Stockwell spoke later from Stations KYW and WDAP, Chicago.

SERIALIZE MYSTERY NOVEL FOR WJZ FANS

NEW YORK.—The present serialization of William Johnston's new mystery novel, "The Wedding Cipher," by Station WJZ of the Radio Corporation of America marks a new departure in the serialization of fiction.

A chapter of Mr. Johnston's story is being broadcast from the station here every Thursday evening at 8:45 p. m. eastern standard time.

'JERRY,' REAL DUMMY, TELLS 'EM FROM WOR

NEWARK, N. J.—"Jerry," the dummy who works for Marshall Montgomery, famous ventriloquist, broadcast a stunt and a new song for his master recently from Station WOR here. "Jerry" claims he is the first ventriloquist's dummy to broadcast from a Radio station. When interviewed on the subject, "Jerry" said that he enjoyed the experience very much.

THE OLD FAMILY TOOTHBRUSH

Remember the old barber shop quartet song, "The Old Family Toothbrush"? Well, save the toothbrush, says Miss Shirley Vernon, above, who has found that dipping it in alcohol and scrubbing the surfaces of old crystals, is a great help to failing cat whiskers © K. & H.

PRAISE GRAIN PRICE SERVICE FROM WBAP

Huge Sums Change Hands Daily on Radio Reports

FORT WORTH, TEXAS.—WBAP (Star-Telegram) cotton and grain reports have become an indispensable innovation throughout the entire Southwest. Daily thousands of dollars change hands, based upon the quotations that go out into the ether hourly to interested listeners in every section of the cotton and grain belt.

Texas and Oklahoma farmers have the latest prices almost at the same time they are posted on the big exchanges of New Orleans, New York or Chicago.

WBAP frequently receives letters commending them for the service given and thankfulness for the messages the Cowbells (symbol of WBAP) bring. In country towns a leading drug or merchandise store often installs a Radio receiver for the benefit of members of the community. Prices are posted to apprise the sons of the soil of the worth of their products.

Keystone Operators Organize

UNIONTOWN, PA.—In the home of Merton Crichton a meeting of Radio operators was held, during which steps were taken to form an organization of amateur operators holding government licenses. Important events in western Pennsylvania will be sent by the operator in whose district they take place.

4,000 Storekeepers Hear Unique Program of WSY

Birmingham Plant Entertains Huge Convention Audience

BIRMINGHAM, ALA.—One of the big entertainment features for the more than 3,000 Alabama retail merchants in all lines of trade, who held their annual convention in Birmingham, was a program by Station WSY here.

The entertainment was held at East Lake park, where a high power receiving set was installed especially for the occasion. Radio talks were also delivered by Col. R. A. Mitchell, vice president of the Alabama Power Company, and A. M. Kennedy, inventor of electrolytic arsenic. Special music was furnished by the WSY Serenaders.

This program was in some respects one of the most remarkable ever received and sent over WSY, due to the fact that it was one of the largest Radio audiences ever assembled in Birmingham, numbering close to 4,000 people. Another unique feature was that many of the Alabama merchants present were from small country towns, some of them also conducting stores far out in the country. There were several hundred in the audience who never had the opportunity of listening to a Radio before. A number of the small town merchants and the country merchants said they expected to order receiving outfits as soon as they reached home.

NEW STATION KYW STRONGER IS PLAN

RUSH CHANGES ON CHICAGO PLANT FOR OPERA

Shortened Wave Length and Other Obstacles to Be Overcome by Westinghouse Engineers

CHICAGO. — Improvements in KYW, Westinghouse Station here, are being rushed to completion, to make the station the most powerful in the United States.

New equipment is being installed under the direction of Chief Engineer Walter C. Evans, who has had charge of the mechanical section of the station virtually since it inaugurated broadcasting in the West two years ago. Particular effort is being made to have the station operating at its peak by the opening of the football season, so that the fans again may witness by Radio the conference games at Stagg Field.

To Broadcast Opera Again

Following the football season will come the opera season, when again KYW will broadcast to all parts of North America the music of the world's greatest voices from the Auditorium stage.

The difficulties encountered in changing to the 870-kilocycle (845-meter wave length) required by the government May 15, are being overcome. First there was the changing of the equipment to the new wave length, which was in itself an engineering feat. When this was done a new difficulty was encountered.

Surmount Difficulties

The Commonwealth Edison building, on which the station is located, and the surrounding buildings were found to be so tuned as to prevent the station getting out at its full power. The entire Radio engineering staff of the Westinghouse Electric & Manufacturing Company, under the direction of C. W. Horn and Mr. Evans, was put to work, and it is believed that the defect has been remedied. Within a few weeks KYW will be itself again, with greater power and greater sending range.

Plans for additional service, musical, news and features are now being perfected by Director Wilson J. Wetherbee of KYW so that the Radio patrons may look forward to a greatly improved station when the equipment is remodeled.

WHOLE CONTINENT HEARS CHILD CRY

Baby Wails in Midst of Quiet Intermission at Detroit Church Service

DETROIT.—A baby's cry that was heard all over the United States, parts of Canada and even down in old Mexico is an actual experience that took place recently from the Central M. E. church here. It occurred during a quiet intermission in the service that was being broadcast by WCX, the Detroit Free Press.

The child, in the arms of its mother in the north gallery of the church many feet from the microphone, becoming dissatisfied with its surroundings, suddenly started to wail. It was only for a second or two as the mother immediately hurried from the gallery. Nothing was thought of it at the time although the Radio engineer at the WCX studio in the Free Press building half a mile away said the wail came into the room so shrilly it almost startled him. The engineer said at first he thought the child might be in the studio.

Nothing more was thought of the instance until when a few days later letters began to come in making reference to the child's wail. Some writers declared the wail was almost uncanny in its reality.

Radio Enables Woman, Deaf 60 Years, to Hear Music

POMONA, CALIF.—After having been deaf since she was three years of age, Mrs. Manley Everham, 63 years old, of this city, recently heard vocal and instrumental music by means of Radio. She said that when she first placed the 'phones to her ears she could hear only queer noises, but after a few minutes she was able to distinguish voices and the sound of instrumental music. During the demonstration Mrs. Everham became greatly excited, frequently clapping her hands in applause.

Milwaukee "Bug" Club Resumes

MILWAUKEE, WIS.—The first meeting of the Milwaukee Radio Amateurs' Club, Inc., following the annual summer recess was to be on the evening of September 20, in the Trustees' Room of the Milwaukee Public Museum. On September 27 the society will hold its annual corporate meeting at which there will be an election of the members of the board of directors.

COMMERCIAL RADIO MUDDLED IN ITALY

ROME BARS RATE CUTTING BY COSTANO PLANT

Germany's Offer of Transmitter as Part of Reparations Also Complicates Situation

ROME, ITALY.—Governmental and civil Radio experts in Italy are considering the advisability of accepting a Radio station as a part of Germany's reparations to this country. The new broadcasting plant at Coltano (near Pisa), operating under the supervision of the Italian navy, transmits messages daily to South America at a cost far below that required by cable companies.

But the imminent completion of the sub-sea line from Fiumicino, seventeen miles from Rome, to Rio de Janeiro and Buenos Ayres by way of Malaga and the Azores, 7,300 miles, presents a form of opposition to the German Radio and the Coltano outfits which cannot be underestimated.

Two New Cables Viewed

The new cable, which is being installed at great cost, must be assured a profitable revenue. Were it to compete with the Coltano plant's present rates gain would be impossible; if the new cable company were to lower its proposed tariffs the Coltano station would be placed under a heavy financial strain.

Another element of doubt enters the situation in the form of the projected cable to North America by way of juncture with the old German line on the Azores, which line was part of Germany's war indemnity to Italy.

As the Italian government has evidently assured the cable company that the Coltano station will not decrease its tariffs, the fate of that Radio plant is deemed uncertain. This situation, coupled with the fact that the German Radio station offered to Italy is obsolete, or soon will be, due to Marconi's research, it is considered inadvisable by many to accept the German outfit.

KENTUCKY LISTENS TO CANADA "CO-OP" TALK

CFAC, Calgary, Sends American Expert's Views to Thousands

CALGARY, ALTA.—The speeches in Calgary of Aaron Shapiro of San Francisco, internationally known as a co-operative marketing expert, were broadcast recently over CFAC, the Calgary Herald station here. He spoke in this province of the formation of a voluntary wheat pool to handle Alberta's bumper wheat crop.

Eight thousand persons attended meetings held here and hundreds of thousands heard Shapiro speak, even down in Kentucky, where he organized the Burley tobacco pool. In Edmonton, CJCA broadcast his addresses.

Tell History of Navy

WASHINGTON.—In view of the close relationship between the Navy Department and the Radio Corporation of America, the Radio Corporation has arranged to turn over to the Navy Department at least once a month its new broadcasting station here, WRC. On these nights, exeprienced naval officers will tell the story of the navy and the U. S. Marine Band will play.

Radio broadcasting stations in England operate on different wave lengths, the lowest being 369 meters and the highest 415 meters.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

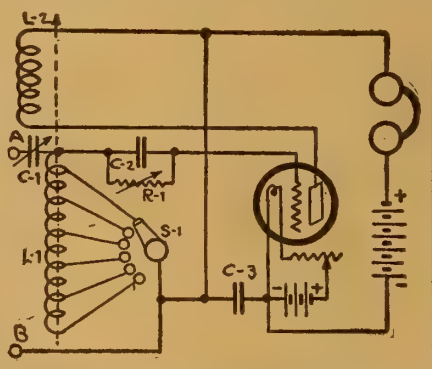
(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Has Hollow Cistern Voice

(Submitted by F. S. W., Newark, N. J.)

Question. I have used a Flewelling set for some time and have had really unusual results with it. It is of the three condenser type and I would like to change over to the simplified single condenser circuit. I would appreciate a diagram showing the connections for 'phone jacks for the amplifier and also an answer as to why the set works better on a ground alone and why it will reproduce a voice as though it were in a hollow room or like a voice in a hollow cistern?

Answer. We expect to publish shortly a few notes on the amplifier for the Flewelling set and believe that they will give you the answer that you wish concerning that part of the outfit.



I have stated before that I cannot recommend the use of filament control jacks either in the Flewelling circuit or any other type of circuit. Were we to have available jacks that had no inherent capacity, it would be very convenient at times to use them and we could no doubt do so successfully. The jack on the market at the present moment unfortunately has, comparatively speaking, a large amount of capacity and is not at all suitable.

The fact that your set works best on a ground alone might be due to several conditions, which we have not the space to go into. I have often seen such a condition, however, and invariably results were very comparable to those secured on a good antenna, so that I would not worry about this condition were I in your place.

Your last point in regard to the voices sounding as though it were in a hollow cistern brings up a point that I believe will be of great interest to the users of Radio sets in general and, of course, particularly to those owning the Flewelling set. It has been observed that if a regenerative circuit, particularly of the tickler coil type, is used with a stopping condenser either across the phones or the primary of the audio transformer, that several things happen, among these things being the tendency to more or less muffle the incoming signal phone, though it seems at times to increase the strength of the signal.

As a matter of fact, there is not much need for a stopping condenser in a regerative circuit of the tickler type. Regeration and oscillation may be secured to a sufficient extent by the use of the proper number of turns of wire on a tickler coil itself and by proper B battery voltage on the plate. It works out something like this: If you have a circuit of this type and find that it will not oscillate and therefore not regenerate properly with the condenser at its full maximum value, and if the circuit is not too far out of proportion, you will be able to make it oscillate and regenerate by increasing the plate battery voltage or by placing a stopping condenser say to .002 mfd. across the transformer or phones.

These are, however, methods which are not considered to be the best practice. Proper oscillation and regeneration should be secured by the correct balancing of the coils in the set rather than by any auxiliary methods, although, of course, the B battery should be justed to its correct point even with a properly designed set.

Your tendency to receive muffle signals will be increased as stopping condensers are used or the turns on the tickler coil are increased beyond their proper amount. The single condenser Flewelling layout was given with quite a large number of turns on the tickler coil because best average results were secured in this way, but it is easily conceivable that individual requirements might call for the cutting down of the number of turns, in which case there would be, of course, no objection.

Extremely Simple to Operate

Although the two highest refinements in modern radio—Regeneration and Tuned Radio Frequency Amplification—are combined in

The New GREBE Broadcast Receiver

this Instrument is extremely simple to operate. A tuning dial, graduated in wavelengths, enables you instantly to locate a desired station.

Licensed under Armstrong U.S. Pat. No. 1,113,149

Write for "Grebe Radio in the Well-Appointed Home."

A. H. GREBE & CO., Inc.
RICHMOND HILL, N.Y.

PREMIER
"HEGEHOG"
TRADE MARK
AUDIO
FREQUENCY TRANSFORMER

PAT. PEND.

HALF SIZE

MAXIMUM VOLUME
MINIMUM DISTORTION
100 PER CENT SHIELDED
MOUNTS ANYWHERE

PRICE $3.50

RATIOS—1 to 3, 1 to 4, or 1 to 5

The Most Efficient, Compact Transformer ever designed. Ask Your Dealer for the Premier "Hegehog."

Full Specifications on Request

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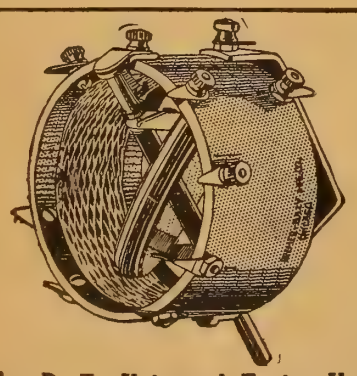


The B.-T. Universal Tuning Unit

There is nothing on the market you can compare with the Bremer-Tully Universal Tuner. It is an entirely new instrument, that gives unequalled selectivity and control on practically all modern circuits.

It replaces coils in Reinartz, Ultra Audion and other regenerative and non-regenerative circuits. In most circuits taps are not required. Also gives remarkable results in Radio Frequency and all Reflex Circuits.

Simple to connect, no soldering; connections made to binding posts, easily changed to any circuit.

Photo diagrams of above, also special Bremer-Tully circuits, in addition to key of windings, furnished. Write today.

BREMER-TULLY MFG. CO.
532 South Canal Street, CHICAGO, ILL.

What About It?

Isn't it about time to stop experimenting with multiple control circuits and build one that, combining ease of assembly and operation, loudness, clarity and selectivity of signals, as well as beautiful appearance, is excelled by none?

THE ELGIN SUPER-REINARTZ
RADIO RECEIVING SET

Embodies all the advantages of the well known Elgin Reinartz (the set which was largely responsible for the popularity of this wonderful circuit) and many others. It is much louder, more selective, requires no storage battery, and can be used with excellent results on a short or loop aerial.

It has brought in California stations two thousand miles from Elgin, clearly and without interference on a loud speaker with only one tube, and that while our powerful local station was broadcasting three miles away.

Could you ask for more?

Write for circular giving one, two and three bulb hook-ups of this remarkable circuit. IT IS FREE.

ELGIN RADIO SUPPLY CO.
207 East Chicago Street ELGIN, ILLINOIS

Long Distance Receiver That Tunes Out Local Stations

Michigan "Midget" $27.00

Wonderfully selective tuning. The tuning is done with two long levers. Distant stations have been brought in while local stations were broadcasting. Much quicker, easier and more accurate than knob-and-dial tuning. The front panel of the Michigan "Midget" Receiver slopes at an angle of 70 degrees, bringing controls into direct line of vision.

Cabinet—handsome mahogany finish—is only 14½ in. long; yet it holds three No. 6 dry cells and B battery.

The Receiver, without batteries, weighs only 6 lbs., making it easily portable.

Can be used with one or more sets of headphones; or by adding a Michigan two-stage amplifier, brings in distant signals through any good loud speaker.

Covers all wave lengths up to 600 meters. Works efficiently, with all standard 6-volt tubes, and especially adaptable for all dry-cell tubes.

The ideal home set because mother and the children can operate it quite as successfully as dad or big brother.

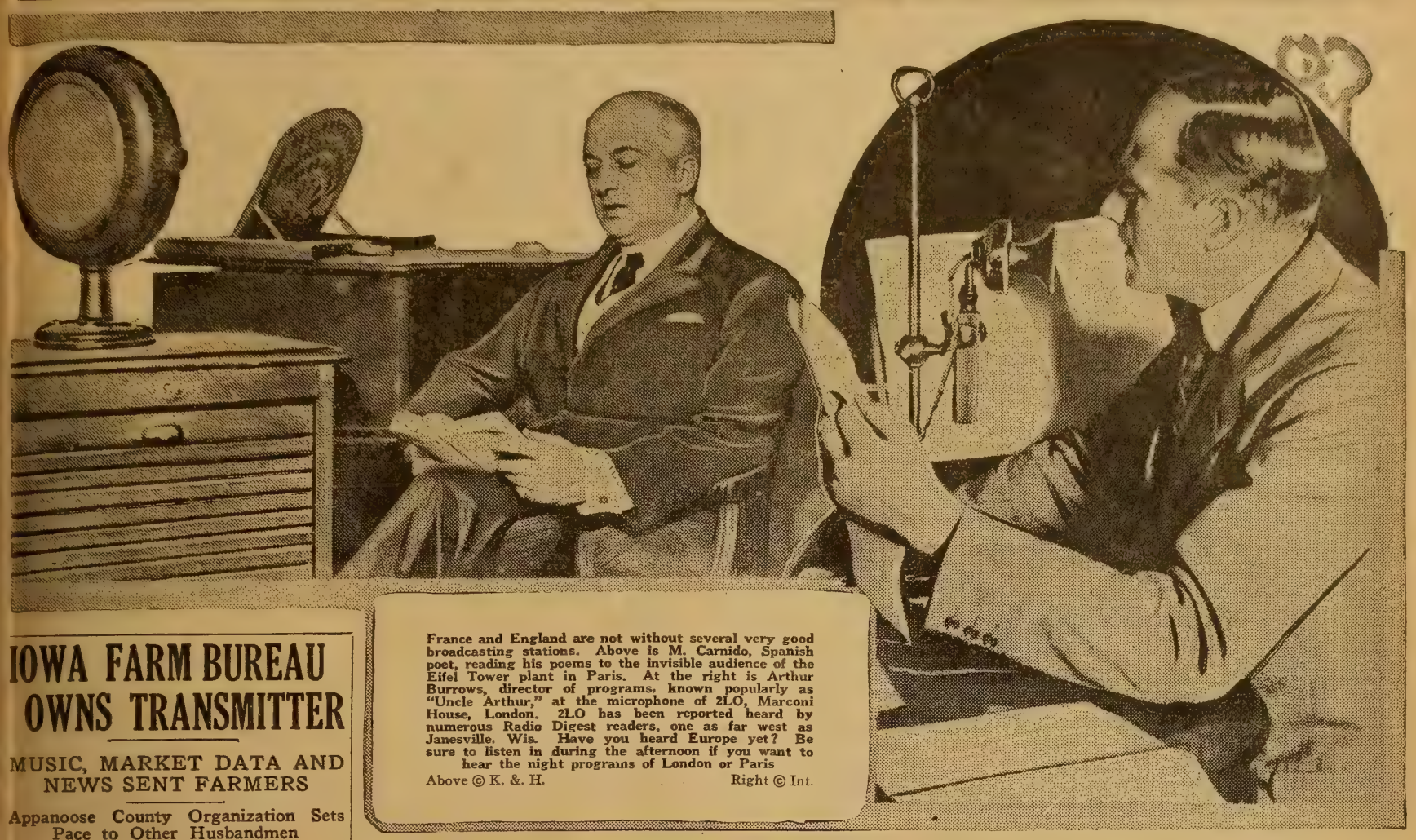
Price, without batteries or tube—$27.00.

Try your dealer first. If he does not handle it, remit direct and send dealer's name and address.

DEALERS: Don't miss this popular, quick-selling, nationally advertised radio masterpiece. Write for discounts, also information about the "Michigan" Two Stage Amplifier and our exclusive line of Condensers, Variocouplers, Variometers, Rheostats, etc. Every instrument guaranteed.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

ON THE AIR IN FRANCE AND ENGLAND



France and England are not without several very good broadcasting stations. Above is M. Carnido, Spanish poet, reading his poems to the invisible audience of the Eifel Tower plant in Paris. At the right is Arthur Burrows, director of programs, known popularly as "Uncle Arthur," at the microphone of 2LO, Marconi House, London. 2LO has been reported heard by numerous Radio Digest readers, one as far west as Janesville, Wis. Have you heard Europe yet? Be sure to listen in during the afternoon if you want to hear the night programs of London or Paris

Above © K. & H. Right © Int.

IOWA FARM BUREAU OWNS TRANSMITTER

MUSIC, MARKET DATA AND NEWS SENT FARMERS

Appanoose County Organization Sets Pace to Other Husbandmen of Hawkeye State

CENTERVILLE, IA.—Tillers of Appanoose county compose the first farm bureau organization in the United States which operates by means of Radio.

Recently they installed at their headquarters here a broadcasting outfit and receiving set of the latest type. They receive the markets, news and entertainment.

Station "XYZ," as it is known, has attracted wide attention in Iowa, due to the fact that it is under farmer control.

The broadcasting outfit, a 100-watt telephone, has an antenna current of four amperes. The maximum range is 1,200 miles; the normal range is 250 miles. A modified Hartley circuit is used.

There are eighty receiving sets on the farms of Appanoose county, besides that in the county agent's office. Each day at noon the latest news and market reports are sent to the farmers. The system takes the place of tedious hours at telephones, sending market news and like information to individuals.

The people of Iowa point to the Appanoose county station as an instance of the epoch marking Radio as a practicable means of communication.

Atlanta Marvels at WSB's Portable Pick-Up Outfit

ATLANTA, GA.—A portable pick-up, ready to hurry to any point of interest, is a highly popular feature of WSB's summer Radio service. The outfit is mounted on a motor truck and may be put into action in a few seconds. Cooperation by the local telephone company, coupled with a relay system of astonishing simplicity designed by A. W. Tison, chief operator at WSB, supplies many innovations. A recent twenty-four hour motorcycle race, the Elks' parade, eyewitness broadcast of Atlanta baseball games, indoor and outdoor athletic events, meetings, celebrations and many other events were broadcast by the portable pick-up.

Radio Bulbs Brighten Home as Iowa Storm Darkens It

WATERLOO, IA.—While John Hanson, Radio distributor of this city, was assisting his wife in the canning of tomatoes, a recent storm damaged the lighting system in his home. There were no kerosene lamps, not even a candle. Hanson studied the situation a minute, then brought out a Radio receiver, put in two one-ampere bulbs, and "There was light."

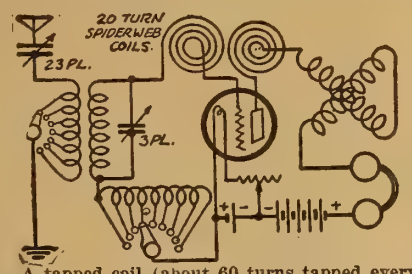
There are now about 50,000 privately owned Radio receiving sets in France—as compared to an estimated 2,000,000 in the United States.

RECEIVING RECORDS? SEND 'EM IN—

(The following items are based on letters from Radiophans, who have been doing good distance work. Readers submitting letters for publication must diagram their sets.—DX Record Editor.)

Many Controls; Easy to Tune

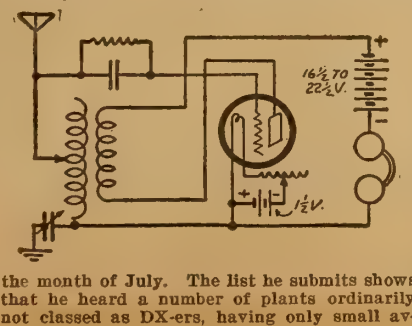
Although his set has a number of controls and might be called a double regenerator, Harrison Shays, 90 Cobourg Ave., Winnipeg, Canada, claims that it is extremely easy to tune and certainly brings in the stations across the boundary from coast to coast and from the far away gulf.



A tapped coil (about 60 turns tapped every 6 turns would suffice) is used to tune the grid circuit in resonance with the plate circuit. The latter is tuned by a variometer as shown in the diagram. In addition to the resonant regeneration, a feedback is supplied by two 20-turn spider web coils, mounted so as to be coupled closely or loosely, which are connected in the plate and grid circuits of the tube. A variocoupler with tapped primary provides the tuning unit. Several of the stations heard regularly by Mr. Shays are more than 1,500 miles distant.

Excellent Work in July

Good summer work on a very simple set is reported by K. H. Emerson, Randolph, Vt., who says that he has heard 43 stations during



the month of July. The list he submits shows that he heard a number of plants ordinarily not classed as DX-ers, having only small average transmitting ranges, a truly worthy

His set, diagram for which is given, is a single circuit regenerator, using a homemade coupler constructed from a rolled oats box and wire taken from an induction coil given Mr. Emerson by the local telephone company. The coupler cost him five cents, exclusive of the dial. The diagram shows a 1½-volt battery to supply the filament lighting current when using a WD-12 tube. This, however, is replaced by a 4½-volt battery when a UV-199 tube is used. Both types of tubes were found to give equal results with this circuit.

KYW Has "Farmers' Night"

CHICAGO.—Every Tuesday is now "farmers' night" at KYW, Westinghouse station here. Twenty-seven minutes between 9:01 and 9:28 o'clock, Eastern time, given over to the broadcasting of information for the benefit of farmers.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met.	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	4:45- 5:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	.....	.....
KDKA, E Pittsburgh, Pa.	326	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	6:30- 7:30
KFAF, Denver Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00	8:30- 9:00	9:00-10:00	9:00-10:00	.....
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	.....
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:30- 8:30
WCX, Detroit, Mich.	517	7:30- 9:00	7:30-11:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....	6:15- 7:15
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	4:00- 5:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	6:00- 1:00	6-00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 8:55	5:30- 6:00	5:30- 9:00	5:30- 6:00	5:30-11:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-10:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	.....	8:30- 9:30	8:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	5:00- 7:30	5:30- 8:00	5:00- 7:30	5:30- 8:00	5:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	4:30- 8:00	4:30- 6:45	4:30- 8:00	4:30- 5:30	5:30- 8:00	4:30- 6:45	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WIP, Philadelphia, Pa.	509	4:00- 5:30	4:00-10:00	4:00- 5:30	4:00- 8:00	4:00- 5:30	4:00-10:00	.....
WJAX, Cleveland O.	390	.....	6:30- 8:30	.....	6:00- 8:30	.....	.....	.....
WJAZ, Chicago, Ill.	448	.....	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	5:00- 8:00
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	4:00- 4:30
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P R.	360	.....	9:00-10:55	.....	.....	.....	9:00-10:55	.....
WLAG, Minneapolis, Minn.	417	5:30-10:00	5:30-10:00	5:30-12:00	5:30-10:00	5:30-12:00	6:30-10:30	7:45- 8:45
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WOAI, San Antonio, Texas.	385	.....	9:30-10:30	.....	7:30- 8:30	.....	9:30-10:30	5:00- 6:00
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	4:15- 5:30	6:00-10:00	4:15- 5:30	4:15- 5:30	6:00-10:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00 12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	7:30- 8:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

Station WJZ Explains Use of Direct Wires in Sending Various Programs

Microphones, Usually Concealed in Manhattan Places of Amusement, Are Connected by Temporary Equipment to Main Circuits Thence by Lead-Offs to Main Artery System

By J. L. Bernard

NEW YORK.—Few people who read the Radio programs have a clear conception of what is meant by the phrase "this concert will be broadcast by Station WJZ by direct wire from the———— Theater" or wherever the event is held. The layman's imagination does not seem to favor the idea of using wires in connection with Radio broadcasting.

The heart of the "direct wire" system used by WJZ is composed of three main arteries. In addition to these three arteries there are nine additional permanent wires. From these lines are run underground to Aeolian Hall Building thence to the control room of the station. Various other net works of wires are tapped off, and which lead to the station from the main circuits. This artery system enables WJZ to reach many points in Manhattan, and affords the Radio audience a multitude of concerts, talks, and plays which they could otherwise never receive.

Success of Play Determined First

When a Broadway production is to be broadcast, a member of the program staff is detailed to review the play about a week in advance of the proposed date—if the play has enough of its success in the songs and lines, it is considered a suitable Radio subject, while if its success is due to costumes and dancing, with no entertainment for a "blind" listener, it is of no value as a broadcast feature.

Assume that a show has been found suitable—what procedure is followed by the "outside crew" of the station? About two days before the broadcasting date a wireman installs the necessary backstage wire connections, which are of course temporary in the case of the theaters. On the afternoon of the day set for the performance the outside crew set up their equipment backstage. The microphone is concealed in the footlights in most cases, but may be suspended above the stage. Everything is in readiness by the time the first of the audience straggle in, and the announcer arrives in full evening regalia to introduce the theater audience to the Radio audience.

The announcer generally has a microphone just back of the scenes, so as to be in close touch with all that goes on, but occasionally is given a small dressing room, with interphone communication with the stage. As soon as the performance is over the microphones are removed.

How Goldman Concerts Are Sent

In the case of the Goldman Band Concerts on the Mall, which are being sent out from WJY-WJZ, the wire is run through the trees in the park, well out of reach of passers-by, to the main circuit thence to the station by way of a lead-off. The wire is tied high up on one of the posts of the band stand, a table is requisitioned, and the microphone stands in full view of the leader. The announcer uses a separate microphone, and stands as near the leader as possible so that one may time his actions to fit in with the leader.

In St. Thomas' Church the installation is permanent, the microphone being properly located to effect perfect transmission from all parts of the service. There is a permanent installation in the Mark Strand Theater, and the music which is broadcast from this theater every week has become one of the most popular of Radio concerts.

Everything is run according to a time schedule, with no allowance for hitches or mishaps (not one has ever occurred). The theater management has fitted up the screen room as a miniature broadcasting studio, and after the artists have completed their turns on the stage they may broadcast a purely Radio program.

Behind in the Background

Visitors at the Waldorf-Astoria, Plaza, Commodore, and the Astor Hotels this past season have known the purpose of the little black disc suspended in the midst of the tea-room orchestra. The little black disc is the microphone, the only part of the transmitting apparatus visible to the public.

Hidden in the near background there are always two operators and an announcer. Because they always keep in the background very few of the diners and dancers at the various hotel roofs have realized that the music to which they danced was being sent out to all parts of the country—there is so little ostentation about the process that it seems uncanny.

Cheers Porto Rico Lepers

SAN JUAN.—The leper colony on Cabras island, Porto Rico, recently watched with intense interest and excitement the installation of a receiving outfit. The exiles are now overjoyed to find themselves once again in contact with human affairs.

A variometer and a variable condenser make a set easily operated by beginners.

HAWAII RE-SENDS CONCERTS IN U. S.

Honolulu Plant Picks Up Programs Broadcast by KHJ, Los Angeles

HONOLULU, T. H.—New honors are now being reaped by Station KHJ, the Los Angeles Times, this time consisting of the rebroadcasting of the Times' programs by a Honolulu station here, KGU, the Honolulu Advertiser.

This marks the first instance of trans-oceanic rebroadcasting, doubly remarkable in view of the difficulties of long-distance reception during the summer months in the South Pacific. However, KHJ is being heard nightly in all parts of the Hawaiian group.

During the cool part of last season several stations in the states featured rebroadcasting programs from KHJ, particularly in the South and Southwest. KGU, the Honolulu Advertiser, is only a fifty-watt station, but it makes KHJ programs available to a large area in the Pacific.

State and City Officials Lead First Club, Chicago

CHICAGO.—The first Chicago Radio club to be incorporated and chartered has just been established in the 49th ward, from which it gets the name of "The 49th Ward Radio club, Inc." The president is Philip J. Alt, of the city department of buildings. George A. Williston, a state representative, is vice-president and John E. Maloney, runner up in the aldermanic contest last spring is secretary.

The charter roll of members totals 400. The meeting place, temporarily, will be at 1359 Devon avenue.

It is now possible to send a Radio letter to London and Germany at rates only slightly higher than postage.

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It is not that they occasionally perform well, but that they do so consistently, that has made "All-American" Transformers the choice of the big majority of radio fans and their adoption as standard equipment by the leading receiving set manufacturers of America.

Go to your dealer and ask to see "All-American" Transformers. If he can't supply, write us, giving his name. Book of successful hookup sent on receipt of 2c to cover postage.

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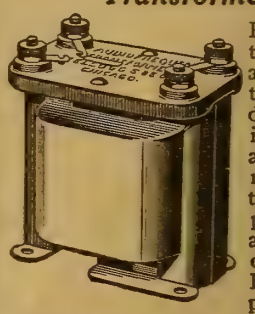

Kellogg transformers are designed to overcome defects of existing types and to furnish distortionless amplification of all audio frequencies. Built complete by the Kellogg Company, using highest grade wire, maroon enameled metal case, and molded Bakelite top. The primary and secondary binding posts are accessibly placed on top of the transformer.

These binding posts are plainly marked, so that there need be no error in assembling. Every Kellogg transformer is thoroughly tested before leaving the plant, and we guarantee the purchaser a product of exceptional efficiency.

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Welsh Peanut Tube	2.00 .08
Peanut Tube Socket	.50 .03
Switch Lever, Fada Type	.19 .06
Ammeter Testing B Battery	.49 .08
Hydrometers	.49 .08
Deuble Phonograph Attachment	.95 .08
Cockaday Coil	2.25 .14
2 Coil Honeycomb Mounts	2.95 .12
Wave Trap	4.95 .15
Electric Soldering Iron	3.95 .15
100 Feet Copper Antenna Wire	.39 .08
RHEOSTATS	
Dietzen, 6 ohm	.39 .06
Dietzen, 30 ohm	.45 .06
SOCKETS	
Bell V. T. & W. D. 11	.33 .10
V. T. Bakelite	.50 .10
DIALS	
2-inch	.25 .06
3-inch	.35 .08
4-inch	.49 .08

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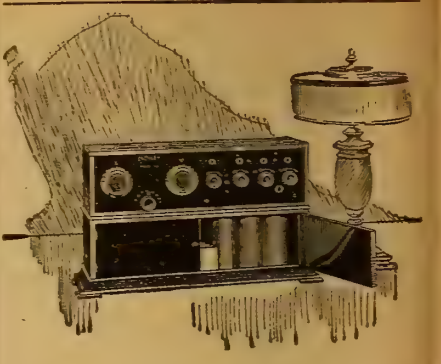

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GREBE RADIO

The Week's Advance Broadcast Programs

Tuesday, September 18

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selections from "Iolanthe." Star Concert Orchestra; "The Spirit Flower," Kate Jackson, contralto; "Nocturne in E Flat," Harry Adaskin, violinist; "Yearning for You," Star Concert Orchestra; "The Cry of Rachael," Kate Jackson; "Cavaleria Rusticana," Star Concert Orchestra; "Romance," Harry Adaskin; "Tales of Hoffman," Star Concert Orchestra; "Thank God for a Garden," Kate Jackson; Selections from "Maytime," Star Concert Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and piano rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period; 7:05, "The White Collar Job," Dr. Thomas S. Baker, lecturer; 7:20, Concert, "A Necklace of Love," "I Hid My Love," "Less Than the Dust," "'Til I Wake," "From the Land of the Sky Blue Water," Florence Bletcher, contralto; "Stars in a Velvety Sky," "Spring Song," "Rosary," "Sing Me to Sleep," Ronald Lavelle, cornetist; Marilla Kohary, accompanist.

KGW, Portland, Ore. (Pacific, 492), 3:30-4:00 P. M., Talk by Jeannette P. Cramer; 10:00-11:00, Dance Music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 492), 12:30-1:15 P. M., News Items; Music, 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, bedtime story, "Uncle John"; 8:00-10:00, Program, Ontario Business Men's Association; Simpson's Jazz Orchestra.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Program, male quartet; Arthur S. Schmitt, E. S. Wakeland, Walter H. Schmitt, Worth M. McCown.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Ellyn Swanson Engel, director; Herbie Mintz, pianist; Sallie Menkes, accompanist; Isham Jones and his orchestra.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 10:00 P. M., Frederick W. Agard, pianist; Bob Cougle, accompanist; Other artist furnished by Alexander Nakutin; Jack Chapman and his dance orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; dinner music, Arcadia Cafe Orchestra; 2:00-3:00, Concert, Arcadia Cafe Orchestra; Song recital; 4:30-5:55, Piano solos, Edna Finestone.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., Popular song recital, by Luckeythe Roberts, pianist-composer, assisted by Lena Sanford Roberts; Paul Bass and orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00, Address, DeWitt McMurray; 8:30-9:30, Harold Hart Todd, pianist; Henry Kramer, violinist; 11:00-12:00, Belcanto Male Quartet.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano recital, Loretta Kerk; 7:00, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Boy Scout Program; 8:30, Concert; 9:00, Song recital; 10:30, Dance music, Bellevue Stratford Dance Orchestra.

WGI, Medford Hillside, Mass. (Eastern, Daylight Saving, 360), 12:00 M., Selections on the Edison, Brunswick, Chickering-Ampico; Readings, H. D. M.; 3:00 P. M., Amrad Women's Club; "Hospitality Talk," Marjorie Drew; Selections, Chickering-Ampico and Brunswick; 5:00, "Twilight Tales," Eunice L. Randall; 7:00, Kiwani's Night, four speakers; Quartet contest of Kiwanis members.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; Digest of the day's news; scientific topics.

WGY, Schenectady, N. Y. (Eastern, 380), 1:00 P. M., Music and address, Mrs. E. C. Whitmyer; 7:45, Musical program; Orchestra selection, Publication Department Orchestra; Address, Martin P. Rice; Ethel Thomas, soprano; H. M. Mott-Smith, cellist; J. F. Quinlan, baritone; Edward A. Rice, violinist; Quartet selections; Walter Reagles, tenor; L. De Witt Efner, saxophonist; Duet, Ethel Thomas, soprano, J. F. Quinlan, baritone; A. O. Coggeshall, tenor.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie Jones, conductor; Selections played on Rialto Theater organ; 7:30-9:00, Concert, Ray Pfaff and his orchestra; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:02, Dinner music, Dick Regan's WIP Concert Orchestra; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talk; 8:15, Song recital; 8:30, Piano recital; 9:00, Musical program.

WJAX, Cleveland, Ohio. (Eastern, 390), 7:30 P. M., Concert program, Cleveland News-Leader; Dance music, Emerson Gill Orchestra; Vocal selections, Fred Irvine.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.-2. A. M., Selections, Oriole Orchestra, Dan Russo, director; "Bird of the Wilderness," "Somewhere a Voice Is Calling," "Indian Bird Song," "The Nightingale," May Goldberg, soprano; Violin solos, Roul Kantrou; "Kashmiri Song," "Serenade," R. C. Ball, baritone; "Etude in E Flat," "March Grotesque," Harriet Weeber, pianist.

WLW, Cincinnati, Ohio. (Eastern, 309), 10:00 P. M., Special Atonement program, Avondale Synagogue; Circle Orchestra, popular entertainment.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program, Gunn School of Music; 9:00-9:15, Hotel La Salle Roof Garden Orchestra; 9:15-10:00, Musical program, Mr. and Mrs. Paul Vernon.

WOC, Davenport, Iowa. (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., A. G. Hinrichs, lecturer; 5:45, Chimes concert; 7:00, Special, Art Landry and his "Call of the North"; WLAG Orchestra.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55, Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 9:45 A. M., "Ironing Day," program, Fred Shaw and Margery Richmond; 12:05 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Palestine Lodge Male Quartet.

Wednesday, September 19

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Overture, "Raymond," Star Concert Orchestra; "When Love Fills Your Heart with a Song," Jean McLean, soprano; "Londonderry Air," Mannie Roth, violinist; "Serenade D'Amour," Star Concert Orchestra; "Love and Joy," Jean McLean; "Danse Trepak," Star Concert Orchestra; "Caprice Viennois," Mannie Roth; "Yearning for You," Star Concert Orchestra; "Love Is Meant to Make Us Glad," Jean McLean; Grand March, "Aida," Star Concert Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; piano and piano rolls, C. C. Mellor Company; 5:15, P. M., Dinner concert, KDKA Little Symphony Orchestra; 6:30, Literary Program, Marjory Stewart; 6:45, Children's period; 7:05, "Saving the Engineer at Night," William E. Mott, lecturer; 7:20, Concert, Overture, "Jolly Robbers," "Musical Jig Saw," "The Lost Chord," "Golden Cockerel," Italian Street Songs, "Faust," "Evolution of Dixie," KDKA Little Symphony; "Ritorna Vincitor," "The Wanderer," "Bon Tom, Suzon." "The Moon Drops Low," Erna Niedermeiser, soprano; D. deVere Jamison, accompanist.

KGW, Portland, Ore. (Pacific, 492), 3:30-4:00 P. M., Children's program, Aunt Nell; 8:00-9:00, Concert Swetland's orchestra; 10:00-11:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 492), 12:30-1:15 P. M., Florence Taylor Black, violinist; 2:30-3:30, Florence Taylor Black, violinist; 6:45-7:30, Children's bedtime story, "Uncle John"; 8:00-10:00, Harry C. Knox, flutist.

KSD, St. Louis, Mo. (Central, 546), 7:00 P. M., Concert, Abergh's Concert Orchestra.

KYW, Chicago, Ill. (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program; Harry Geise, pianist; Mary Lee, soprano; Isham Jones orchestra; 8:05-8:25, Reviews, Llewellyn Jones.

PWX, Havana, Cuba. (Eastern, 400), 9:00-11:30 P. M., Municipal Band of Havana, classic and national music.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 10:00 P. M., Joseph Steindel, violinist and other artists; Jack Chapman and his dance orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; Short talk on care of children; 4:30-5:55, Song recital and short talks; 7:30-8:00, Dream Daddy, bedtime stories; 8:00, Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Piano recital, Alfred J. Stone; Solo, Lillabelle Barton, Wm. Gibson, accompanist; 7:00-8:00, Piano recital, Dorothy Brarman; Address, Katherine Parker Clivette; Song recital; Rosalind Fabian, Dorothy Brarman, accompanist.

WFAA, Dallas, Texas, (Central, 476), 12:30-1:00 P. M., Address, Dr. J. F. Kimball.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; 6:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra.

WGI, Medford Hillside, Mass. (Eastern, Daylight Saving, 360), 12:00 M., Selections on the Edison, Brunswick, Chickering-Ampico; Readings, H. D. M.; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 6:45, Girls' Hour, "Camp Fire Girls," by "Big Smoke"; 7:30, "Science Up to Date," by the "Scientific American"; Musical program, Charles L. H. Wagner, poet-composer.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:30, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, Eleanor Taft and Associates.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie Jones, conductor; Selections, Rialto Theater Organ; 7:30-9:00, Concert, Charles Meyers Orchestra; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Program of popular songs; 6:02, Dinner music, Jordan-Lewis Dance Orchestra under direction of Bob Lewis; 7:00-7:30, Bed time stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.,-2 A. M., Selections, Oriole Orchestra; "Until," "On the Road to Mandalay," "The Rosary," "Sweet Little Woman of Mine," Charles W. Green, tenor; Cello solos, Herbert, Weis; "Hear Me Ye Winds and Waves," "The Want of You," "At Dawning," "When You and I Were Young Maggie," H. Arnold Michel, baritone; Piano solos, Bessie Barnes; Dan Russo, violinist.

WLW, Cincinnati, Ohio. (Eastern, 309), 4:00 P. M., Crosley Forum; Piano solos, William Schmitt; 8:00, Special program, arranged by Mrs. O. B. Kaiser; Elmer Aichele Novelty Dance Orchestra; Songs by Joe Richards; Virginia Benham, accompanist; "Formation of Habit," M. D. Schrieber, lecturer.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program, Cosmopolitan School of Music and Dramatic Art; 7:00-7:30, Stories for children, Georgene Faulkner, story lady; 9:00-9:15, Hotel La Salle Roof Garden Orchestra; 9:15-10:00, Musical program, Ernest Dewey.

WOC, Davenport, Iowa. (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Music; Clyde G. Kern, lecturer; 6:30, Sandman's visit; 8:00, Pipe organ recital, Erwin Swindell; 10:00, Program, P. S. C. Choral Club.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:55 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio. (Eastern, 390), 8:00 P. M., Initial program.

WWJ, Detroit, Mich. (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Anthony Bonell, tenor; Mrs. Laurencelle, soprano; Prof. Bonavia, pianist.

Thursday, September 20

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Selections from "Faust," Star Concert Orchestra; "Far Away," Estelle Fox, soprano; "Evensong," Star Concert Orchestra; "Eili, Eili," Harry Adaskin, violinist; Suite No. II "Spanish Dances," Star Concert Orchestra; "Charmant Oiseau," Estelle Fox; "Badinage," Star Concert Orchestra; "Tango," Harry Adaskin; "Extase," Star Concert Orchestra; Soprano and solos, Estelle Fox; Intermezzo, "Naida," Star Concert Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and piano rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period; 7:20, Concert, Quartet numbers, "The Americans Come," "Katy Did," "Mighty Lak a Rose," "Molly's Eyes," "Lassie O Mine," "The Old Flag Never Touched the Ground," "One Solemn Hour," Charles L. Billeter, first tenor; Homer R. Gardner, second tenor; J. A. Rogers, baritone; Willard Hamilton, basso; Violin solos, Samuel Gluck.

KGW, Portland, Ore. (Pacific, 492), 3:30-4:00 P. M., Woman's program, Child Training; 10:00-11:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 492), 12:30-1:15 P. M., Program, Ray Fruth, saxophonist; Harold Southwick, pianist; Jack Lawton, saxophonist; 2:30-3:30, Matinee musicale; 6:45-7:30, Program, Gage Christopher; Rev. Thomas Lutman.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Lillian Allcen Landwer, soprano; Sallie Menkes, accompanist; Ireno Vopat, pianist; Herbie Mintz, pianist; 8:05-8:25, Good reading, Rev. C. J. Pernin.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 10:00 P. M., John Stamford, pianist; Jack Chapman and his dance orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; Piano solos, Edna Finestone; 4:30-5:55, Short talks and song recital; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. W. (Eastern, Daylight Saving, 405), 12:00-12:50, Song recital, Fred Taylor, Betty Waity, Vaughn de Leath, accompanist.

WFAA, Dallas, Texas, (Central, 376), 12:30-1:00 P. M., "Keeping Fit," Dr. J. B. Cranfill; 8:30-9:30, William A. Sutherland, Jr., pianist.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert of Ednyfed Lewis, tenor; John Vandersloot, bass; Loretta Kerk, pianist; 6:30, Dance music, Meyer Davis Bellevue Stratford Dance Orchestra; 8:00, Recital; 8:30, Dance music.

WGI, Medford Hillside, Mass. (Eastern, Daylight Saving, 360), 12:00 M., Selections on the Edison, Brunswick, Chickering-Ampico; Readings, H. D. M.; 5:00 P. M., "Twilight Tales," Eunice L. Randall; 7:00, "State Government," F. W. Cook; Radio farce, "Converting Bruce," by the Amrad Players.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news, Boy Scout Radiograms, "The American Boy."

WGY, Schenectady, N. Y. (Eastern, 380), 1:00 P. M., Music and address, courtesy Modern Priscilla; 7:45, Travelogue address on India, Dr. Sigel Roush; Instrumental selection, WGY Orchestra; Eward Rice, violinist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie Jones, conductor; Selections, Rialto Theater Organ; 7:30-9:00, Concert, Ella Sharrard Violin Quartette; Walter Bodeman, Christine Jansing, Dorothy Neat, Theodore Williams.

(Continued on page 8)

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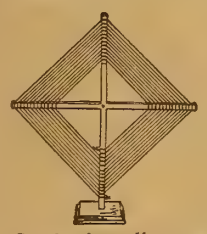

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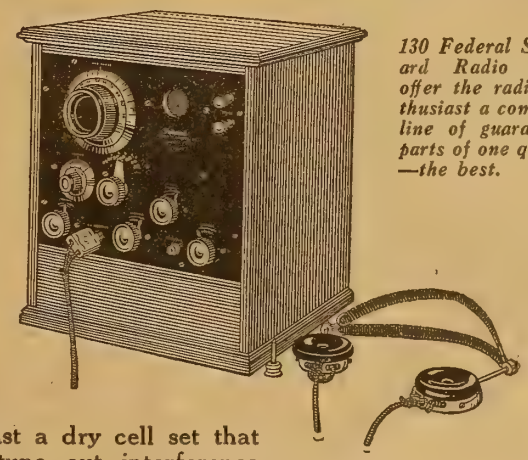

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ADVANCE PROGRAMS

(Continued from page 7)

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Song recital; 7:00, Bedtime stories and roll call, Uncle Wip; 8:00, Talk, "Where to Go and How to Get There," by Eugene E. Hogle, secretary of the Automobile Club of Philadelphia; 8:15, Dance music, Ace Brigode's Ten Virginians from Hotel Walton Roof; 9:00, Organ recital, Karl Bonawitz from Germantown Theater; 9:15, Recital; 10:10, Dance music, Charlie Kerr and his orchestra from Cafe L'Aiglon.

WJAX, Cleveland, Ohio. (Eastern, 390), 8:00 P. M., Dance program, Harold S. Smith Orchestra; Vocal solos, Mr. Howard Wallace; Saxophone solos, Mr. Julian Smith; Xylophone solos, Mr. Doyle.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "My Heart at Thy Sweet Voice," "Violets," "Minor and Major," "Noon and Night," Helen Davie, soprano; Helen Rauh, pianist; "Where'er You Walk," "The Night Wind," Tom Dunlop, tenor; Abbie Jane Tuttle, harpist; Phyllis Feingold, violinist.

WLW, Cincinnati, Ohio. (Eastern, 309), 4:00 P. M., Adelaide Apfel, pianist; Reading, "Moonlight," Fred Smith; 10:00, "Fantasia," Cletus E. Mecklenborg, violinist; Eugene Eckerle, pianist; "If Love Were All," Evelyn Valin, soprano; "Liszt Love Dream No. 3," Eugene Ackerle, pianist; Play, "Fourteen," Schuster Martin Dramatic School; "Until," John Twerck, tenor; "The Swan," Cletus E. Mecklenborg, violinist; Miscellaneous program, Cletus E. Mecklenborg, violinist; Eugene Ackerle, pianist; Evelyn Valin, soprano; Harris J. Wagner, zither; Eastern Hills Dance Orchestra.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Musical program; 7:00-8:00, Weekly Auto Trails, Rockwell Stephens; Weekly Boy Scout Talk; 9:00-9:15, Hotel La Salle Roof Garden Orchestra, 9:15-10:00, Musical program, Lyon and Healy.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Music; Lecture, Karl G. Stephan; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, P. S. C. Orchestra.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Vocal selections, pupils of Bassillios Kyros and Gray Fowler.

Friday, September 21

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Suite, "Peer Gynt," Star Concert Orchestra; "There's a Land," Harry Jackson, baritone; "Extase," Star Concert Orchestra; "Who Knows," Harry Jackson; "Narcissus," "Pulcinello," Star Concert Orchestra; "Love Is Mine," Harry Jackson; Selections from "Chu Chin," Star Concert Orchestra; Cello solos.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and piano rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:30, Address to the Farmers, Frank E. Mullen; 6:45, Children's period; 7:20, "Se Saran Rose," "Boats of Mine," "Love's Pilgrimage," A Scene from Faust, "The King of Thule," Eva Spencer, soprano; Piano solos, Matthew Frey; "Farewell to Cucullain," "Liebesfreud," "In a Gondola," "Schoen Rosmarin," Edith Jenkins, violinist.

KGW, Portland, Ore. (Pacific, 492), 3:30-4:00 P. M., Woman's program; 8:00-8:15, Program, vocal music; 8:15-9:00, Studio program, George Olsen and his orchestra; 10:30-12:00, Hoot Owls.

KHJ, Los Angeles, Calif. (Pacific, 492), 12:30-1:15 P. M., News Items; Music; 2:30-3:30, Matinee Musicale; 6:45-7:00, Children's bedtime story, "Uncle John"; 7:00-7:30, Organ Recital, Arthur Blakeley; 8:00-10:00, R. LeMonte Parker and his Great American Band.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Program; 11:00, Dance music, Silverman's dance orchestra.

KYW, Chicago, Ill. (Central, 345), 5:50 P. M., Children's bedtime story; 9:00-10:30, Isham Jones' Orchestra; Herbie Mintz and Harry Geise, pianists; Sallie Menkes, accompanist; Mary Lee, soprano.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 10:00 P. M., Regular Monthly Program, Sun Dodgers' Club; Jack Chapman and His Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Song recital; 4:30-5:55, Program of popular dance music; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00-9:00, Playlet by the Greenough Players; Songs by Harry Glyn; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WDT, New York, N. Y. (Eastern, Daylight Saving Time, 405), 12:00-12:50 P. M., Piano Selections, Leslie Smith; Song, Rae Garden Leeder; Selected songs, Helen Donny; Jewish Selections, by Jewish Artists; 11:00-11:55, Musical, Vaughn de Leath's WDT Feature Orchestra; Clifton Meyer, pianist; George Lynch, violinist; Henry Hardgraves, saxophonist; Arthur Marden, saxophonist; Gilbert Walker, banjo, and Samuel Walker, drums.

WFAA, Dallas, Tex. (Central, 376), 12:30-1:00 P. M., Address, Dr. Robert Stewart Hyer; 8:30-9:30, Mrs. Albert Smith, musical recital.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song and piano recital; 6:30, Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, Daylight Saving, 360), 12:00 M., Selections on the Edison, Brunswick, Chickering-Ampico; Readings, H. D. M.; 3:00 P. M., "Yes, We Have No Bananas," Talk Mrs. D. H. Goodwin; Selections on the Brunswick, Edison, Chickering-Ampico; 5:00, "Twilight Tales," Eunice L. Randall; 7:30, Housing Problems, E. T. Hartman; Concert, L'Origan Melody Girls.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, direction of J. P. Quinn.

WGY, Schenectady, N. Y. (Eastern, 380), 1:00 P. M., Music and address, Dr. William Burgess Cornell; 7:45, "A Night at the Club," Opening Chorus; Introduction and speech, John Puffitt; Musical selection, Jazz-Bo orchestra. "Good Night, Ladies," Entire Chorus; 10:30 Musical Program; Trio selection, Moonlight Serenaders, Casmir Cegleski, violinist; Orlando di Masi, violinist; Arthur di Masi, Spanish guitar; Helen Griffen, soprano; Ernesto Frasso, Guitar solo; Gladys Robinson, contralto.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections, Rialto Theater Organ; 7:30-9:00, Concert, Silver King Sextette; Ottis Steffey, director, pianist; Joe Willis, drummer; Milton Haffner, trombonist; Irving Haffner, saxophonist; George Share, banjoist; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Selections by Dick Regan's Instrumental Trio; Dick Regan, director and violinist; Joseph A. Doriath, Cellist; George A. Ehrenzeller, pianist; 6:45, "Radio Baseball Dope," Monte Cross, old-time ball player; 7:00, Bedtime stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "A Voice in the Wilderness," "Evening and Morning," Rose Bensen, soprano; "Trio for Violin, Piano and Cello," Beula Rosine, cellist; Harry Bensen, violinist; Amy Degerman, pianist; Selections, Oriole Orchestra; Piano solos, Kenneth Cutler; "Inclusions," "Evening," "Thou Art Me," Rose Bensen; Cello solos, Beula Rosine; Selections, Oriole Orchestra; "La Partida," "Ho, Mr. Piper," Rose Bensen; Piano solos, Amy Degeman; Orchestra selections.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 P. M., "Your Happiness," May Cornell Stoiber; Piano selections, Margaret Niesel.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Song Bells program; 7:00-7:30, Wide-Awake Club's Half Hours, Bertha L. Iles; 7:30-8:00, Weekly musical lecture, Mrs. Marx E. Obendorfer; 9:00-9:15, Hotel La Salle Roof Garden Orchestra; 9:15-10:00, Musical program, Gunn School of music.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Lecture, C. E. Wilent; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Musical program; Erwin Swindell, director; Apollo Mandolin Club; Bernice Gassling, soprano; Mahlon Bailey, baritone.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music from Hotel Adelphia Roof Garden; 8:30, Song and piano recital; 8:45, Dance music from Hotel Adelphia Roof Garden; 11:10, Dance music from Hotel Adelphia Roof Garden.

WWJ, Detroit, Mich. (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Anne Campbell, News Poet; Mrs. Eva DeVlieger, mezzo-soprano; Graeme Gillis, bass; Jack Maxwell, pianist.

Saturday, September 22

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Suite, "Woodland Pictures," Star Concert Orchestra; Contralto solo, Mary Bothwell; "In Old Vienna," Harry Adaskin, violinist; "Pleading," Star Concert Orchestra; Solo, Mary Bothwell, contralto; "Rendezvous," "Reve Angelique," "Entry of the Gladiators," Star Concert Orchestra.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and piano rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, "Carmen," "American Dance, No. 1," Idyll "The Mill in the Forest," "Parade of the Dolls," "Funeral March of the Marionet," "The Skaters' Waltz," Overture "Merry Wives of Windsor," "Carry Me Back to Old Virginny," Westinghouse Band; 6:45, Children's period; 7:05, "Humor from Judge," 7:20, "The Bartered Bride," "Tarantella Forasetta," "A Day in Venice," "Dawn," "Gondoliers," "Venetian Love Song," "Good Night," Dance "In the Shadows," "Celebrated Organ," "Bowl of Pansies," "Humoresque," "Memories of the Opera," Westinghouse Band.

KGW, Portland, Ore. (Pacific, 492), 3:30-4:00 P. M., Children's program, Aunt Nell; 10:00-11:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 492), 12:30-1:15 P. M., News Items; Music; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's bedtime story, "Uncle John"; 8:00-10:00, Program, Chamber of Commerce of Alhambra.

KSD (Central, 546), 8:00 P. M., Program, Missouri Theater.

KYW, Chicago, Ill. (Central, 345), 5:50 P. M., Children's bedtime story; 7:00-7:58, Musical program, W. W. Kimball Piano Company; Isham Jones and his orchestra; Harry Geise, pianist; Mary Lee, soprano; 8:05, Under the Evening Lamp, Youth's Companion.

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M. Cuban dance music, Antonio Romeu's Orchestra.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 10:00 P. M., Harmony Girls, Misses Carpenter and Ingram; Bob Brown, ukulele; Fred Rose, pianist; Betty Holmes, soprano; Melodians' Quartet; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; Song recital; 4:30-5:55, Dance music; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:55, "Tinkerman and the Winged Taxie," read by the author Edith J. Craine; Banjo selections, John Martell; Song recital, Mabel Meredith; Guitar solos, Ann Carson; Banjo and Guitar duet, Ann Carson and John Martell.

WFAA, Dallas, Tex. (Central, 376), 12:30-1:00 P. M., Address, Dr. J. H. McGinnis; 8:30-9:30, Gussie Montgomery's Harmony Six Orchestra; 11:00-12:00, Walter J. Fried, violinist.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Dance Orchestra; 3:00, Musical and literary program; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Children's Own Half Hour, Stories, by Cousin Eliza; 8:00, Dance music; 9:00, Program of popular music.

WGI, Medford Hillside, Mass. (Eastern, Daylight Saving, 360), 7:30 P. M., Talk on New England business problems; Program of late releases, Uncle Eddie and Uncle John.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 and 6:30-7:00 P. M., George Albert Bouchard, organist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections, Alamo Theater Organ; 7:30-9:00, Ten Best Foster Song Night, Courier-Journal Quartette; Mrs. Charles Shannon, soprano; Mrs. Carl W. Surman, contralto; Carl W. Surman, tenor; Albion S. Cornwall, baritone; Mrs. Albion S. Cornwall, accompanist; Reading, "An Interesting Historical Episode.

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Popular dance selections; 7:00, Bedtime stories and roll call, Uncle Wip; 8:00, Short talk; 8:15, Artist recital; 10:10, Dance music, Charlie Kerr and His Orchestra at Cafe L'Aiglon.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.-2:00 A. M., Selections, Oriole Orchestra; "Baby," "The Cactus," "Paddy," Helen Smith, soprano; Clarinette solos, E. E. Harder; Selections, Oriole Orchestra; "Little Woman Mine," "Araby," "Russian Lullaby," Aleen Strossberg, contralto; Orchestra; Guitar solos, Nic Lucas; "Where the Heart Is," "Trade Winds," Helen Smith; Clarinette solos (by popular request), E. E. Harder; Mark Love, bass; Norman Kling, baritone; Stella Barnhart, pianist; Orchestra selections.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 8:00-8:15 P. M., Hotel La Salle Roof Garden Orchestra; 8:15-9:00, Musical program, Eleanor Kaplan; 9:00-10:00, Weekly Chicago Theater program.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Lecture, C. C. Hall; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 9:00, Dance program, P. S. C. Orchestra.

(Continued on page 9)

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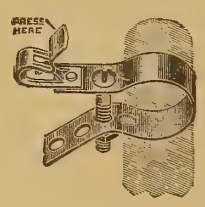

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Fahnestock Electric Co.
Long Island City, N. Y.

POSITIVE RESULTS

are being obtained by thousands of satisfied users of the

EASTERN COIL SETS

for the

COCKADAY CIRCUIT

The remarkable features which are making this circuit (4 circuit tuner) more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

COMPLETE ASSEMBLED SET OF B, C AND D COILS. PRICE **$2.75**

Hook-up, directions and material list FREE.

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EASTERN RADIO MFG. CO.
22 Warren Street, Dept. R. D., NEW YORK, N. Y.

Worksman Radio Service

"THE ACCENT IS ON SERVICE"

14-16 Vesey St. New York

Our appreciation of your orders is expressed in the quality of our merchandise and prompt service.

VARIOCOUPLERS

$3.50 Workrite 180°	$2.95
3.00 Rhason 180°	1.95
3.50 Fisher, Large, 180°	2.25
3.50 Fisher, Large, 90°	2.25
2.75 Fisher, Small, 180°	1.75
2.75 Fisher, Small, 90°	1.75

VARIOMETERS

$3.50 Workrite	$2.95
8.50 Remler, Molded	4.45
3.50 Fisher, Large	2.65

CONDENSERS

$2.00 R. C. 11 plate	$1.05
2.35 R. C 23 plate	1.35
2.75 R. C. 43 plate	1.65

VERNIER CONDENSERS

$4.00 Precision 23 pl.	$2.25
5.00 R. C. 43 pl.	2.95

SOCKETS

$1.00 Magnus, Aluminum	$0.45
.75 Bakelite	.45
.50 Composition, Mid.	.30

RHEOSTATS

Pacent, 6, 10, 20 or 30 ohm	$0.95
Seiss, 6 ohm	.60
Tillman, 6 ohm	.45
Tillman, 30 ohm	.60
Ajax Combination Socket & Rheostat	1.55

PHONES

$6.00 Brandes Superior	$5.25
12.00 N. & K., Imported	5.50
5.00 Nerco	2.50
Ambassador	3.89

Mail orders promptly attended to. All orders amounting to $5.00 or more will be shipped prepaid. Will ship C. O. D. unless remittance accompanies order.

The "B" Battery is the Life of Your Radio Set

THIS IS NUMBER ONE OF A SERIES

THE only function of your Radio set is to produce sound-waves—those mechanical disturbances in the air caused by some rapidly vibrating body. So far as the Radio set itself is concerned the actual source of the sound is the "B" Battery. It is not an exaggeration to say that the "B" battery is the "life of your Radio"; for the set itself is simply a device to reproduce sounds, and the sounds all have their origin in the "B" Battery.

The "B" Battery is simply a box full of electrical energy; harnessed for you by experts. Without the Radio wave the flow of energy from the "B" battery is smooth, steady and *silent*. It is the final aim and purpose of all the many parts which go to make up a Radio receiving set, to convert the otherwise steady flow of electrical energy from the "B" Battery, into a rippling, vibrating, throbbing, audible current.

As the sound-waves—whether caused by the human voice in talking or singing, or by musical instruments—are modulated up and down—now high—now low; so does the current from the strongly vital "B" Battery follow the modulations and the variations, so that the original message, in all its delicacy of tone and vibration, comes clear and distinct through your Radio set.

Not a mere adjunct to the pleasure-giving quality of your Radio set is the "B" Battery—instead, it is the vital, life-giving part—the very heart of your Radio set.

Do not slight this vital part—give your Radio set the advantage of the best—use Eveready "B" Batteries.

Note: This is No. 1 of a series of informative advertisements which will appear in this magazine. They are designed to help Radio users get the most out of their Batteries and Radio sets. If you have any battery problem, write to G. C. Furness, Manager Radio Division, National Carbon Co., Inc., Long Island City, N. Y.

The *New* Metal Case Eveready "B" Battery (No. 766)

"The Life of Your Radio"

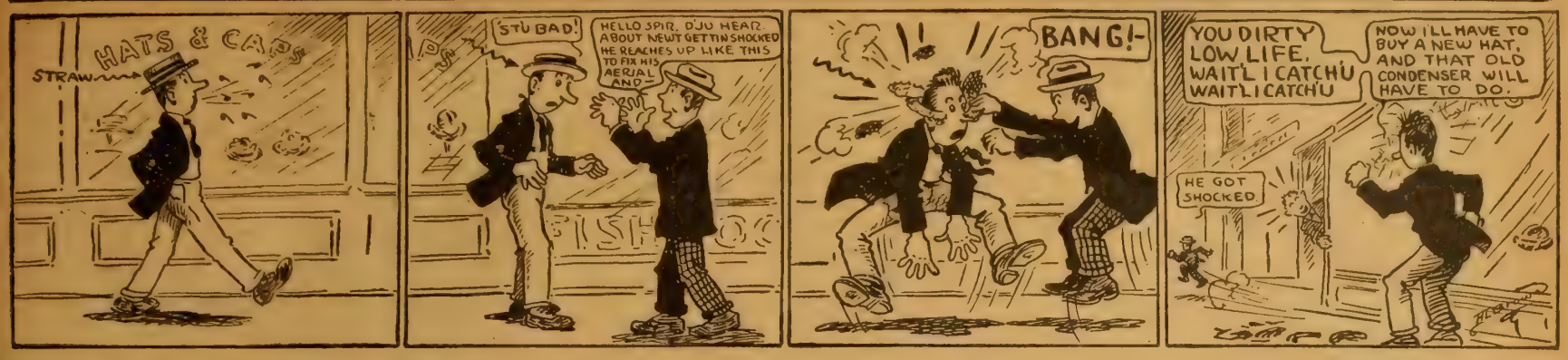
The same popular 22½ volt Eveready "B" Battery in a *new*, handsome, durable, waterproof, metal container. Eveready quality throughout. At all dealers, $3.00.

The "B" Battery is the vital part of any radio receiving set. Eveready Batteries — especially made for Radio—serve better, last longer and give better results.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
Long Island City, N. Y.

EVEREADY Radio Batteries
—they last longer



WWJ, FIRST PRESS PLANT, 3 YEARS OLD

HEARD IN ENGLAND, PERU AND HAWAII

Leader in Adopting Practical Designs Now Is Classed Among Finest Stations

DETROIT.—WWJ, the Detroit News has just celebrated its third birthday anniversary. It was the first newspaper in this country to enter the broadcasting field. The first broadcasting by The News was in the form of returns from the city, state and national primaries.

At first the effective range of WWJ was only about 100 miles. Due to improvements the range now is much wider. It has been heard in England. It also has been heard in Hawaii and Peru.

The story of progress in Radio telephony has been the story of WWJ. Each new practical development was incorporated by the station. The studio of WWJ is now rated as one of the finest.

In May, 1922, the Detroit News became a leader by forming an orchestra for Radio concerts. This has become famous.

ADVANCE PROGRAMS

(Continued from page 8)

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.
WTAM, Cleveland, Ohio. (Eastern, 390), 8:00 P. M., Concert.
WWJ, Detroit, Mich. (Eastern, 517), 12:05 P. M., Detroit News Orchestra; 7:30, Detroit News Orchestra.

Sunday, September 23

KHJ, Los Angeles, Calif. (Pacific, 492), 10:00 A. M., Church Services; 10:30-11:00, Arthur Blakeley, Organist; 7:00-7:30, Organ recital; 8:00-10:00, Musical program.
KYW, Chicago, Ill. (Central, 345), 10:00 A. M., Church Services, St. Chrysostom's Episcopal Church; Rev. Norman J. Hutton, rector; 5:00-8:00 P. M., Sisson Trio; A. L. Shyman, pianist; Theodore Ratzer, violinist; George Bass, cellist.
WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 9:15 P. M., Henry Selinger and the Drake Concert Ensemble; Milla Ybarra, Mexican soprano.
WFAA, Dallas, Texas. (Central, 376), 2:30-3:30 P. M., Radio Chapel Bible Class, First Presbyterian Church Dr. William M. Anderson, pastor; 9:30-10:00, Sacred music, Ervay Street Baptist Church; 10:00-11:00, Harris Brothers Orchestra.
WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 10:15 A. M., Church Services, Arch street Presbyterian Church.
WGI, Medford, Hillside, Mass. (Eastern, Daylight Saving, 360), 4:00 P. M., "Twilight" Program, "Adventure Hour," Youth's Companion; Concert, Edison Laboratory Phonograph; Stories by Arturo; 8:30, Evening program.
WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 3:00 P. M., Vesper service, Dr. Charles D. Broughton, Episcopal.
WGY, Schenectady, N. Y. (Eastern, 380), 10:30 A. M., Church Service of First Baptist Church, Troy, New York. Rev. F. King Singiser, pastor; 3:30 P. M., Lecture on Christian Science, Rev. Andrew J. Graham, C. S. B., First Church of Christ, of Boston, Mass.; 7:30, Church Service, First Baptist Church, Troy, New York, Rev. F. King Singiser, pastor.
WHAS, Louisville, Ky. (Central, 400), 9:57 A. M., Organ music; 10:00, Church services, Fourth Avenue Baptist Church; Rev. Dr. John F. Fraser, pastor; 4:00-5:00 P. M., Concert, St. Peters Evangelical Church Choir; Robert Conner, director.
WHK, Cleveland, Ohio. (Eastern, 360), 8:00 P. M., Concert program, WHK Orchestra.
WJAZ, Chicago, Ill. (Central, Daylight Saving, 447.7), 10:00 P. M.-2 A. M., Oriole Orchestra; "Polonaise in A Major," "Nocturne in E Flat Major," Margaret Garrity, pianist; "Rhondino," "Melody," Edward Hagner, violinist; Oriole Orchestra; "Philosophy," "You," R. G. Ball, baritone; "Prelude in C Sharp Minor," Margaret Garrity, pianist; Orchestra; "The Dew Is Sparkling," Edward Hagner, violinist; "To Show That I Was True," "O Little Mother of Mine," R. G. Ball; Isabella Walker Kuehne, soprano; Selections, Orchestra.
WWJ, Detroit, Mich. (Eastern, 517), 7:30 P. M., Church services, St. Paul's Episcopal Cathedral; 2:00, Detroit News Orchestra.

Monday, September 24

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; Short talks and piano solo; 4:00-5:55, Short talks and popular songs; 7:30-8:00 P. M., Bedtime stories, Dream Daddy.
WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Artist recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 7:00-7:30, Bedtime stores, Cousin Sue.
WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, Wheat Ice Cream Co., Orchestra, E. C. Sutton, director.
WGY, Schenectady, N. Y. (Eastern, 380), 1:00 P. M., Music and address, Mrs. Wm. J. Nunn; 7:45, Concert program, Helen A. Parker, pianist; Reading, Mrs. Robert Wilson; Margie Howard Morse, Contralto; Address, Samuel W. Mauger.
WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections, Rialto Theater organ.
WHAZ, Troy, N. Y. (Eastern, 380), 9:00-10:30 P. M., Program, Mrs. Harry Glass, soprano; Margaret Dexter Babbs, contralto; John C. Dandurand, tenor; C. Albert Cook, bass; Harry J. McCreedy, accompanist.
WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:45, "Radio Baseball Dope," Monte Cross, old-time baseball player; 7:00-7:30, Bedtime stories, Uncle Wip.
WLW, Cincinnati, Ohio. (Eastern, 309), 4:00 P. M., Special Music, Jennie Kehrt; 8:00, Concert, Esberger's Band of Cincinnati; Walter Esberger, director; Helen Hofer, soprano; Roger Hill Dance Orchestra; Roger Hill, pianist; Clyde Tuxworth, saxophonist; Webb Planitz, clarinetist; Ralph Ross, trombonist; Claude Lawson, banjoist; Bernie Hagener, drummer.
WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00-11:30 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:30, Dinner music from Hotel Adelphia Roof Garden; 8:30, Song recital; 9:30 P. M., Grand organ recital, Mary E. Vogt.

ALL NATION ENJOYS STATE FAIR OPENING

Concerts, Speeches at Detroit Broadcast to Millions

DEROIT.—The formal opening of the Michigan State Fair was heard by many thousands in various parts of the United States and Canada this year when Station WWJ connected its broadcasting outfit down town with apparatus at the fair grounds. At the same time it also located big horns at various points about the grounds where it was made possible to hear speakers on the grandstand and also the band concerts given every afternoon and evening on Belle Isle, several miles away.

Previous years prominent speakers, including even the governor, failed to hold the attention of the crowds on the grounds because they were so vast the speakers could be heard only a few feet away. This year, due to the efforts of WWJ, the Detroit News made it possible for everyone who cared, to hear every speaker on the grandstand and also to enjoy the finest of musical programs by gathering about the big horns.

Radio programs through loud speakers are furnished to inmates of the Ohio State penitentiary every evening between 6 and 7 o'clock.

Boston Listeners Form Club

BOSTON, MASS.—A new organization of broadcast listeners has been formed in Boston to be known as the Commonwealth Radio association. It is primarily a B. C. L. organization but includes all other amateurs. The members are chiefly old-time amateurs who want to be affiliated with the A. B. C. L.; all are members of the American Radio Relay league. The club has formed a traffic committee which will receive complaints from broadcast listeners and which will have at least one member listening during broadcast hours so as to log every amateur station.

U. V. 199 TUBES $5.30

WD-11, WD-12 and UV-201A. These tubes require only 1/16 and 1/4 of an ampere and are the most popular of all tubes today.

VARIABLE CONDENSERS (Moulded Ends)

$ 2.00— 3-Plate	$ 1.10
4.00—23-Plate	1.60
5.00—43-Plate	1.95
6.50—23-Plate Vernier	3.15
7.50—43-Plate Vernier	3.55
.65—ELECTRAD GRID LEAKS (with holders) ½, 1, 1½, 2, 3, 5 or 9 Megohms	.38

CROSLEY RADIO

$55.00—Model X (4 Tube Radio Freq.)	44.95
20.00—Crosley V (One Tube)	17.55
18.00—Crosley Two Stage	15.85
12.00—Gen. Nat. Baldwin Phones, Type C	8.35

Everything guaranteed as firsts. Don't delay getting Price List No. 9. Wonderful bargains. We pay postage.

RADIO SUPPLY STORES
254 West Stiegel Street Manheim, Pa.

Cotogrip

PACIFIC COAST BRANCH:
329 Union League Bldg.
LOS ANGELES

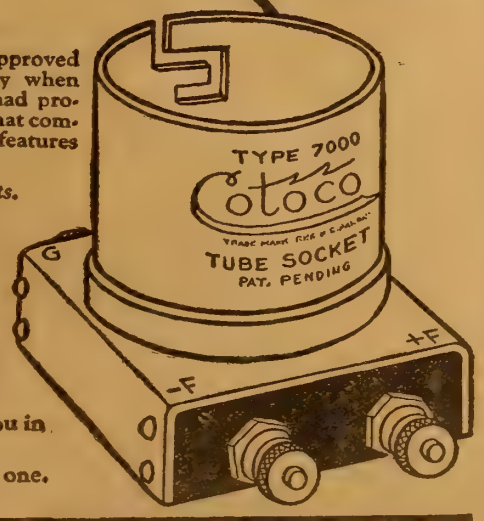
"Built First to Last"

This little beauty was approved by our engineers only when convinced that they had produced the one socket that combines all the essential features of a good socket.

1. *Positive Cotogrip Contacts.*
2. *Hard Rubber Insulation.*
3. *Rugged Construction.*
4. *Compact Design.*
5. *Concealed Mounting.*

It is impossible to show the unique mechanical action of Cotogrip contacts in a photograph. It is different from any other socket you have ever seen. This socket will interest you in every way.

You ought to have one.
Ask Your Dealer



COTO-COIL CO. PROVIDENCE

WHEN you're wondering which radio set to buy, remember that De Forest invented the vacuum tube, without which present-day radio would still be a dream. Naturally it is De Forest Radiophones which give the greatest satisfaction. Go to your De Forest agent today and let him tell you why.

DE FOREST RADIO TEL. & TEL. CO.
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If Located West of Pennsylvania, Address

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Western Sales Division
Dept. R. D. 5680 12th St., DETROIT, MICH.

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Radio Digest Illustrated

REG. U. S. PAT. OFF. AND DOM. OF CANADA

Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher
Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
H. J. Marx, Technical Editor M. W. Thompson, Associate Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

Member of the Audit Bureau of Circulations

58

PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies, 10 cents.

Vol. VI Chicago, Saturday, September 22, 1923 No. 11

Will It Be Power by Radio?

Tests Show That There Are Possibilities in Energy Transmission

IF POWER can be transmitted by Radio waves then motors will drive machinery in factories, lights will burn in homes, elevators in buildings will be operated, street cars will be driven and machinery made to work by means of power transmitted great distances and delivered on the carrier wave without great loss.

This prophecy may be made because of recent successful experiments conducted by two experts in the United States bureau of standards. These men successfully directed Radio waves from a transmitter to a receiver in a beam like a searchlight. The waves were short so that much interference was eliminated.

The possibilities first suggested by this accomplishment are secret; direct communication, instead of turning a message loose through all space, may be centered on objects at a distance.

Radio may prove to be the greatest labor saving device yet discovered.

Invalids Need Receivers

Let Some Shut-in Use Your Old Crystal Set

SHUT-INS are dependent on friends and relatives for their news and for world contact. Since the advent of the Radio conditions have changed; those confined in their homes have a chance to relieve the monotony and enjoy living by hearing about the great outside. The invalid looks forward to the Radio concert every evening.

In many instances some of those in hospitals or at home who are quite familiar with Radio receiving equipment would install and operate outfits if they had them. A great many Radio sets are not at present being used. Many who purchased crystal outfits have gradually put them aside in favor of the tube sets. These crystal outfits are performing the rather useless function of collecting dust in attic or closet. The number of broadcasting stations in the country has increased so rapidly that very few shut-ins with crystal receivers are now out of range of all stations. Why not turn that crystal set over to one of these persons? It is doing you no good and it may brighten the life of one not so fortunate.

About That Lightning Hazard

Why Bluster with Something That Is of No Consequence?

YOU would think, by the way most writers handle the subject of lightning hazards that they know just how to control a streak of lightning in spite of the storm king. Recently there appeared a whole page of text matter in a Sunday Radio section of a newspaper telling how and illustrating exactly where a forked bolt of "blue blazes" hits the Radio set, regardless of the ton of iron which usually constitutes the furnace, telephone poles, railroad tracks and tall chimneys. How a person really falls into these moods is more than the ordinary observer can understand.

There is a certain Radio set we know about which has two aerials on the roof of a tall apartment building. A storm recently came across the city; the air was full with what we mortals call an electric storm. The owner of the Radio set, while sitting in the railroad station waiting for a train, saw a heavy bolt of lightning, round in form, enter Lake Michigan a half mile out. Another struck an electric-wire pole just back of the apartment and another hit the tracks of the railroad where it flared up as a brilliant ball of fire. The insignificant little aerials, two of them, could not attract a single stray of the forked bolt. A dead piece of timber, a telegraph pole or post has always been the mark for lightning, not a copper wire. Think out the reason why, you Radiophans!

We wonder when Radio writers will stop throwing a "scare" into the fans when so few records show that an aerial is the real means of picking up a streak of lightning?

RADIO INDI-GEST

Radio in Cactus Center

(Part I. Written and Originally broadcast via WOR
By Arthur Chappman.)

It's hard to keep our punchers at their tasks, out on the range,
Sence a tenderfoot's upset 'em, with a dingbat new and strange;
A Radio, he calls it—stuck the first on Simpson's ranch,
And now he's got us locoed, plum from Lone Wolf to Comanch,
And the cattle are deserted, 'cause the men all stick around
For to hear what's in the air waves. Seems they hate to miss a sound,
And they jest won't hit their blankets, though they bat a sleepy eye,
Till they've had a bedtime story and a good-night lullaby.

We couldn't savvy, pronto, quite the nature of the game,
And we joked the gentle stranger, but he went on jest the same
Puttin' up his queer antenny, as he called some wire things,
And a bridle, with some ear-muffs, that he'd patched up with some strings.
Then at last speaks old Bear Hawkins: "Are you aimin' to declare
That this thing will ketch, in passin', all the noises of the air—
That she'll rope and tie a sound wave, jest the same as any steer?"
Says the stranger: "Don this harness and then tell us what you hear."

(Part II next week will conclude Mr. Chappman's poem.)

A-B-C Lessons for Indigest Beginners

Chapter XIV—Run It with Gasoline, It's Cheaper

BY GOSH

N IS for Needs;
Our set has such a crew,
And as we think of all we need
The mortgages come due.

Barely Saved from Incineration

Or Why the Cop Committed Suicide

THE patrolman was slowly sauntering along his beat. The church clock a block away struck one. All was quiet. In this suburb there was as little chance of something happening as there was of getting a promotion. But it is the unexpected that always happens. Looking across the street his attention was attracted to a house all dark except a flickering glow of light at an attic window. At times it was almost gone and then again it would flare up. A curl of smoke could be seen when it was the brightest. To the officer's mind the solution was clear.

Crossed wires, family asleep, a chance for a rescue, his picture in the papers and a possible promotion. It all ran through his mind in a flash. The pulling of the fire alarm box on the corner was his first move. Then on a run he crossed the street and back to the house where the light still flickered in the attic. He could hear the bell ringing as he kicked the door with his heavy shoe. A light appeared at the head of the stairs and a figure was descending. In the distance the clang of the approaching fire department could be heard. The front door opened.

"Madam, your house is on fire—crossed wires in the attic. Leave the door open for the fire department." There was a mad scramble up the stairs. The second floor was reached, the attic door opened, and up again. Breathless, at the head of the stairs they stopped. A figure near the window was seated in an old rocking chair smoking a pipe. On a box in front of him was a Radio set and on either side of which stood a candle, well burned down and sputtering.

"What do you mean by this, Pa?" the woman gasped. "I thought you were in bed long ago." There was the raising of a hand indicating silence. No other movement of the figure with the head phones. Then they heard him whisper, "S-h-h-h, I think I've got KFI."

H. K. C.

Beneath this green sod
Lies good J. DeCam—
He spread on his bread
Solder paste for jam.

Paging Polly W. That's 'Nuff

To Polly W.: That new-fashioned guy who "buttonholds" you and tells you about all the long distance stations he heard the night before—does he chew snuff?

Well, then YOU have nothing to worry about!!

BRIGHTON EARLY.

INDI-GEST KINKS?
SEND A DOLLAR—

THERE are many little Indi-Gest kinks worked out in the home that would hamper your fellow Radio-knut and cause him much worry. Indi-Gest is very much interested in securing such material and is willing to accept a dollar for each kink printed. Send a stamped envelope so rejected copy may be returned. Under no circumstances will the dollar be sent back.

INDI-GEST KINKS DEPARTMENT

No, Mike and Izzy Are Very Modest

Dear Indi: I am herewith enclosing one (1) poem. (I don't care what you say, *I* think it's a poem, so there!) Give this poem to the Office Squirrel, or send it to Mike and Izzy, if you don't think it will make them sick, but don't under any circumstances, publish it in your valueless column.

I was listening to Station BLAH the other night on my own modification of the Stebbins Sooper Degenerative Circuit (See enclosed hook-up) and kept hearing a raspy noise in the headphones. (I mean earmuffs.) I think this was caused by either Mike or Izzy scratching his fleas in front of the microphone. Am I right? Ann Tenna, signing off at 13:61, Eastern Standard Time. Good Night.

ANN TENNA.

(Indi's Note: Modified Stebbins hook-up and so-called poem coming later. Stand by.)

Fun on the Air

Condensed

By DIELECTRIC

Impresarios complain of artists being too temperamental, causing them annoyance at crucial moments. Judging from the experience Radio operators had at station WDAR, in Philadelphia, on a recent occasion I imagine the same fault will be attributed to microphones and their unionized adjuncts. Operators and announcers had planned to broadcast a program featuring themselves at that time, but the plant refused to function. They enjoyed an evening off with speeches and Radio dancing, which was no doubt a treat.

We listeners in have been privileged to listen to many men and women of prominence in various walks of life. Actors and actresses have addressed us whose names loom large in theatrical circles, yet it is seldom that such "perform" for us; an unfortunate circumstance. When WDAP announced the inimitable Chick Sale the other night in his perfected characterization of a minister (of a type) Radio audiences were aware of an unusual feature. Pity there are not more Sale broadcasts. An entertainment of this kind is well worth putting on the air.

Who will win the prize offered by WGY for the best Radio drama to be submitted during the next three months? Since I am not competing you all have a chance. It is a timely scheme of the General Electric people to urge greater thought along this line. As it is generally understood that dramas for Radio transmission require handling a little different from those intended for the stage, to be entirely successful, a new field is open to playwrights. The drama finally chosen will be broadcast this winter when conditions are most favorable.

Perhaps the majority of Radio listeners are ever ready to share their receiving sets with those less fortunately placed in the matter of hearing broadcasting. After reading of the experience of one fan in San Francisco, whose generosity had led to his being robbed of a hundred dollars, I question whether some of us will hand a headset to a stranger, however entrancing. The young woman who listened to KPO while getting the gate receipts was very clever. She possibly has introduced a new phase of criminal procedure. We'll see!

The details of prize fights, baseball and football have preceded the announcement of golf strokes but now we have these also. Station WSB gave to enthusiasts in Atlanta a Radio picture of Bobby Jones as he covered the golf course in winning fashion on the links on Long Island, N. Y. A leased telegraph wire enabled the station to provide this much appreciated service. Contests of whatever nature in which a large majority of the public is interested may easily be broadcast all over the country.

Despite the oft repeated assertion that the City of Brotherly Love is several steps behind other municipal marchers it is to be noted that as to Radio installation it is slightly in the lead. Hotels and apartments equipped with Radio receiving sets have multiplied in number quite rapidly. In the proposed structures to be erected in Philadelphia the most advanced plans for Radio reception by guests is contemplated. Not one of the least noved features is a Radio paging system.

While it is true that France, for instance, began testing the medium of Radio for warning shipping during heavy fogs, no country at present ranks with ours in the extent or efficiency of Radio fog signaling. At present the all-weather range of these signals is thirty miles on a thousand meter wave. One of the greatest achievements was to make the device automatic after being started by a keeper. The value of such fog signals to shipping cannot be overestimated, especially since the range can be increased beyond the thirty-mile limit.

First Steps for Beginners in Radio

Chapter XVII—Using Alternating Current on Tubes

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XVIII—Testing Radio Instruments.

Chapter XIX—Locating Trouble in the Set.

Chapter XX—Useful Information and Formulas.

THIS may seem a rather advanced subject to be considered in a beginners' series but experience has shown that minds not too close to a given subject often conceive the greater improvements. Witness the rise of Radio broadcasting when many amateurs made the greatest discoveries. Let us therefore discuss the difficulties yet to be overcome in the using of alternating current from the house lighting mains in a Radio set.

The possibility of simply connecting into a convenient socket as a source of energy for the filament and plate circuits of the Radio set is not beyond reason; in fact it has been accomplished in an experimental way but by methods too complicated for the ordinary man. Its realization would solve many of the harassing problems, particularly the upkeep, of the larger receiving sets.

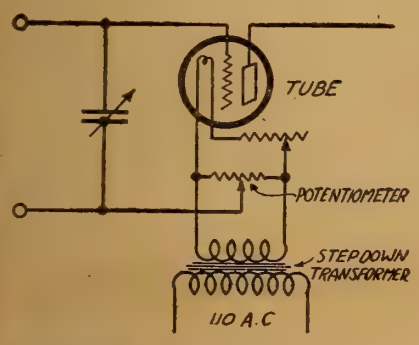

Figure 60—How A. C. is used in lighting filament

Noise Caused by Break in Current

We have found from previous chapters, if not by actual experience, that any disturbance in the steady flow of the filament or plate battery current would give an annoying sound in the phones. Were we then to attempt to use an alternating current, with its constant change in voltage and direction of flow, there would be encountered a loud hum in the phones or, properly speaking, a roar.

The reason for this action when A. C. is used on the filament will be apparent from a consideration of Figure 60. Here is shown an arrangement that is often used for the purpose and has operated successfully for many experimenters. It consists of a step down transformer, the primary being connected to the A. C. mains, the secondary having the rated voltage output needed for the tube filament. A rheostat in series serves to control the filament brilliancy. Now were we to connect one side of the secondary circuit to the filament terminal the polarity of this terminal would be rapidly changing from negative to positive and back again many times a second; with each change a variation in the grid potential would result. The plate circuit would then be affected and a roar would result. To offset this effect use is made of a potentiometer connected across the secondary of the transformer. The purpose of this potentiometer is not to vary the potential of the grid as usual but to locate the electrical center of the filament circuit. Even though the potentials at the ends of the potentiometer are continually changing it is apparent that at some point on the resistance there would be no change in potential as to the center of the filament.

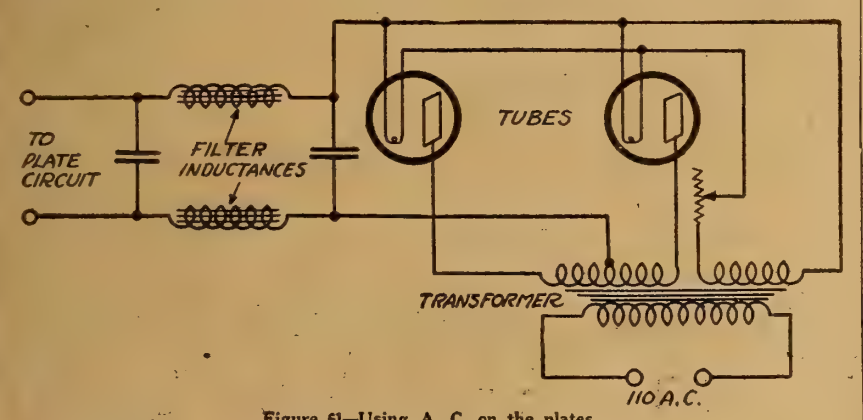

Figure 61—Using A. C. on the plates

Source of the Hum

This circuit will work but it is impossible to eliminate the hum because, though we locate a point on the potentiometer where there is no potential difference with the center of the filament, there is a difference between that point and the sides of the filament, hence the hum. For those troubled by storage batteries this arrangement may prove very satisfactory on local stations where the signals are strong.

The transformer should have a rating high enough to supply all the tubes in use. Allow 6 watts for each UV-200, UV-201 and C-300 or C-301. The allowance for other tubes can be readily calculated by multiplying the volts required by the rated filament current to give the watts. The potentiometer of standard construction may have 200 or 400 ohms' resistance as desired.

Application of the A. C. Current

We may now consider the application of A. C. to the plate circuit of the set. Here we have a more difficult problem, for it is absolutely necessary to have a steady direct current. The first problem is to rectify the alternating current; make it direct. For reception the electrolytic rectifier is not a satisfactory device, principally because it lets a little of the unwanted half of the cycle to leak through.

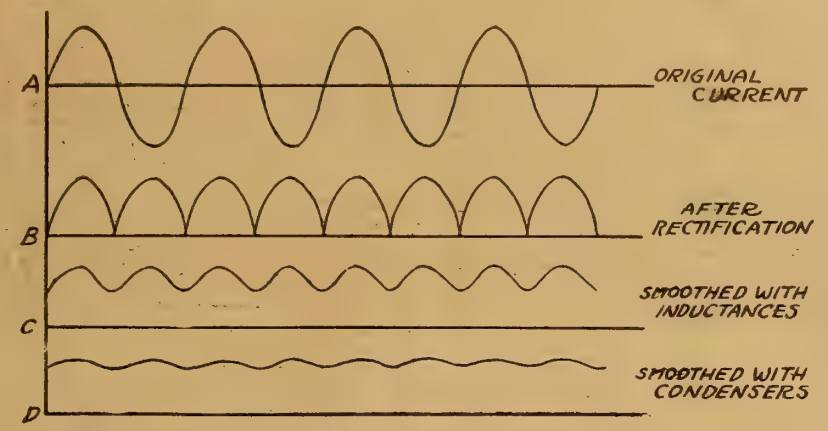

Figure 62—Showing various stages in converting A. C. to D. C. for use in plate circuits

Use then is made of electronic rectifiers which are nothing but two element tubes. We learned early in the series how a vacuum tube functions as a rectifier; we can put this principle to use in rectifying current for the plate circuit.

The circuit for accomplishing this is shown in Figure 61. A special transformer having a tap in the center of the secondary winding is employed. The outer terminals of the secondary terminals connect to the plates of the two element vacuum tubes, the filaments of which may be lighted from a winding on the same core as the tapped secondary. The tap on the secondary forms the negative terminal, the positive being the filaments of the tubes. The action of the arrangement is simplicity itself. Consider the current as flowing in one direction in the primary circuit. At that moment one end of the secondary will have a positive potential, and the other negative, in relation to the center tap. The tube, having its plate connected to the positive terminal at that instant, will permit current to flow to the filament, thence to the plate circuit of the set and back to the center tap. The other tube will not permit current to flow. However, when the current reverses, the other tube permits a flow of the current while the first one checks it. In this manner the alternating current is converted to a direct current; but it is pulsating.

Direct Current Obtained

This action is shown in Figure 62. At A is shown the original alternating current; at B the lower halves of the cycles are turned up, so to speak, giving a unidirectional current flow; but it rises and falls in voltage with each half cycle. Before it is suitable for use on the plate of a tube it must be smoothed; the ripples must be removed.

Here again we have recourse to a well known effect to obtain a given result. We also learned that an inductance acts to resist a change in the strength of cur-

(Continued on page 12)

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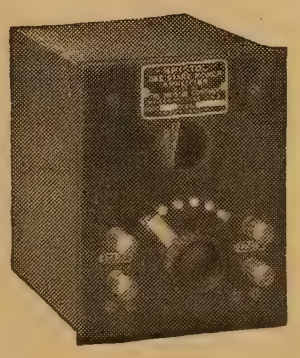

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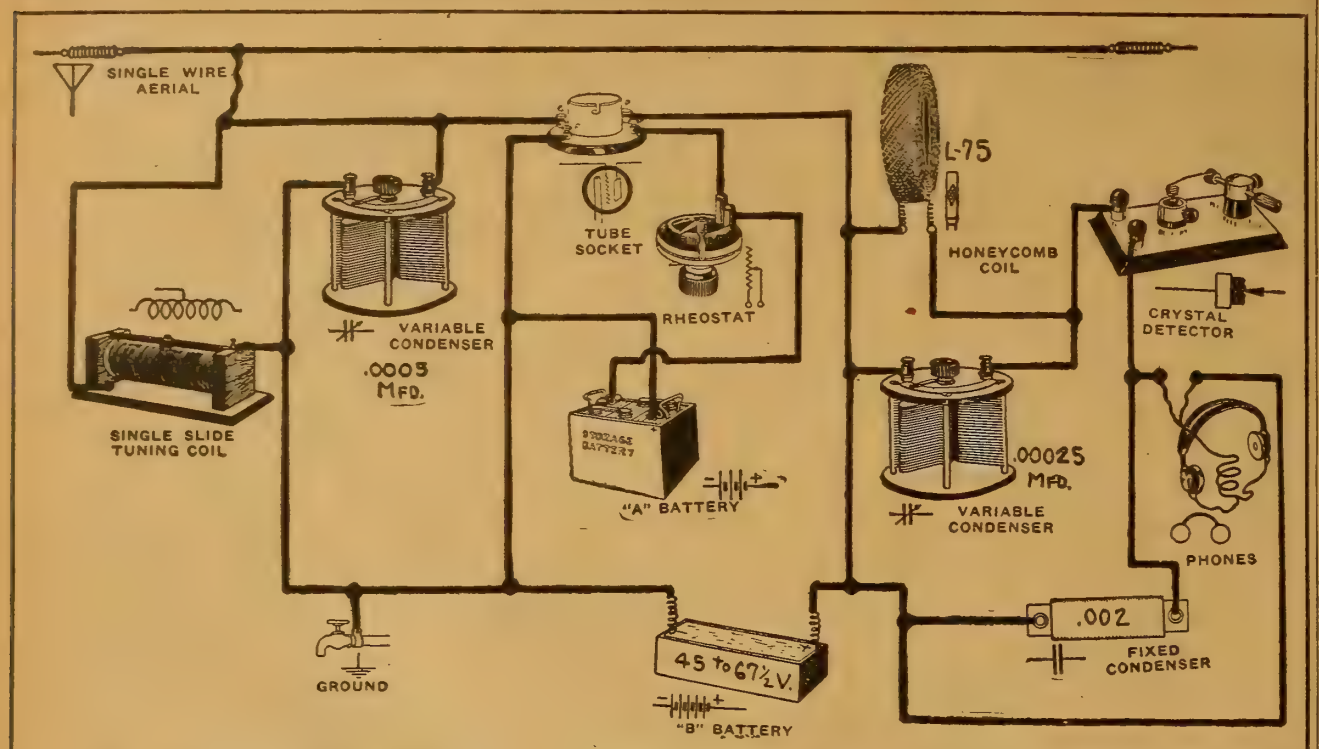
ENGLISH CRYSTAL AND R. F. AMPLIFIER CIRCUIT



AN ENGLISH circuit combining Radio frequency amplification with a crystal detector in the form of an inexpensive and simple set, is shown in the Simplex Diagram.

A single slide tuning coil, with a .0005 mfd. variable condenser across it, comprises the initial tuning unit. The detector circuit is tuned by means of another .0005 mfd. variable condenser across a 75 turn honeycomb coil. For lower wave lengths a 50 turn coil can be substituted.

The tube, an amplifier, can be of the dry cell type with rheostat and socket to conform with the requirements of the tube.

The phones are by-passed by a .002 mfd. fixed phone condenser. The plate voltage for the tube should be 45 or 67½ volts.

For the fan who wants to expand his crystal set this circuit is especially recommended because of its simplicity and low expense coupled with a very favorable receiving range.

FIRST STEPS IN RADIO

(Continued from page 11)

rent flowing through it. Were inductances inserted as shown in the illustration, when the voltage tended to rise, the inductance would cause it to lag; when the voltage falls, the inductance again would act to keep it flowing. The result then would be to "smooth" the wave form, giving something like the wave shown at C. Still this is not smooth enough for our purpose; so use is made of condensers. As shown, (Fig. 61) a condenser is connected on either side of the two inductances. These condensers act as a reservoir for the electricity. When the voltage builds up the condensers ahead of the inductance it is charged and as the voltage falls off, it discharges back through the inductances into the circuit. The other condenser acts as a reservoir from which energy is drawn for the plate circuit. It is kept constantly charged by the current from the transformer, the plate circuit drawing current as required for the operation of the tubes.

Voltage of the Transformer

The overall voltage of the transformer should be twice that required for the tubes, for the voltage of half of the winding is used only at one time. Its rating may be very low; 10 watts is sufficient in an efficient transformer. The inductances used in the filter should be very high, 2 to 5 henries, while the condenser should be of 4 mfd.

The explanation here covers the principles at present used in applying alternating currents to vacuum tubes. But they are not finding wide application as yet. The art is still young. For cheapness as to first cost and portability the batteries are far ahead but with the more common use of Radio sets in places of amusement, stores and restaurants, the A. C. set is as sure to come as the generator distanced the primary battery as a source of power. The solution of the problem is a challenge to the entire experimental field, for to it has gone many of the successes in the past.

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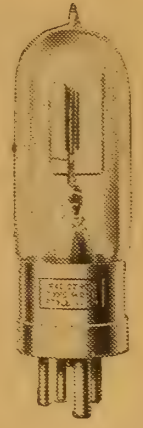

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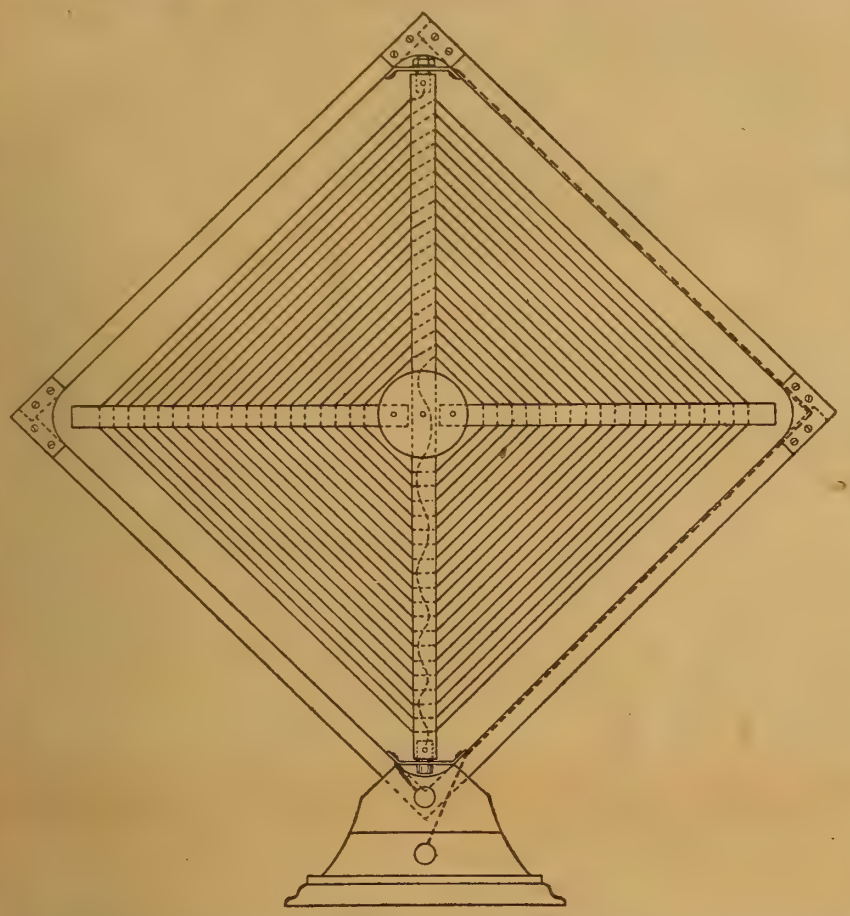
How to Make Loop Aerial De Luxe

Constructional Detail Suitable for Parlor Use

By H. J. Marx

THE average fan has had little opportunity for real loop aerial reception. First, on account of the very few loop aerials that are on the market and at a price within their means; second, because of the lack of complete details on the construction of a really efficient loop aerial. The broad band of wave length



range at present utilized in Radiophone broadcasting makes it difficult to get a loop that really serves the purpose. Another factor lies in the appearance of the loop. There is a decided tendency to try and eliminate the outdoor antenna, but it is based on the possibility of substituting a good loop aerial.

A good loop aerial does not mean one so bulky that it not only takes up too much room but is usually entirely inappropriate for an attractive room at home.

The Requirements in Loop Aerials

The essential points of a good loop aerial are:

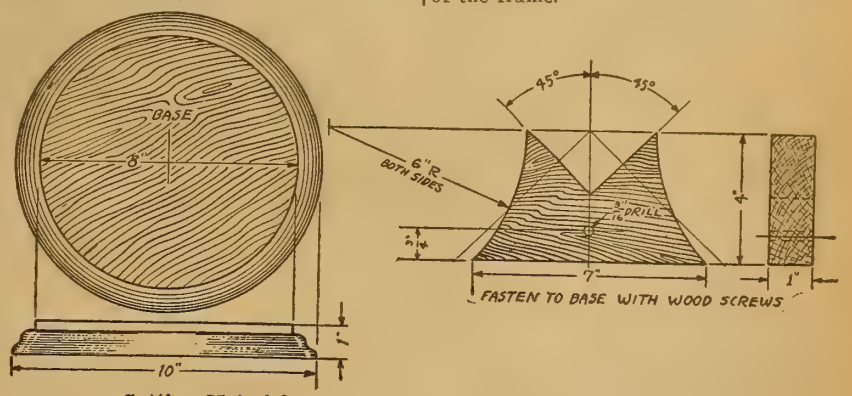
(1) Efficiency over present operating wave lengths.
(2) Reasonable price.
(3) Compactness, and easily handled.
(4) Attractive and workmanlike in appe. ance.

rge loops have their advantages, but some form of compromise is necessary. The loop under discussion was found to give very good reception results, is as small as possible and covers the necessary wave length range. Its design is based on experiments made with a number of different types and sizes. It can easily be made up by any of the fans who have that knack of handling tools and take pleasure in making their own apparatus.

If dimensions and detail instructions are carefully followed, it will fit together without difficulty.

Material Required

The material required is: 65 ft. of No. 20 double silk covered wire; 2 binding posts, 1½ inch machine screws to fit; 1 pc. birch 10½x10½x1 inch for the base; 1 pc. birch 7½x4½x1 inch for the seat; 1 pc. birch 3½x3½x1 inch for the center crosspiece; 1 pc. birch 20x4x1 inch for the four side frames; 2 pcs. fiber tubing 24 inches long, ⅜ inch outside diameter, ¼ inch inside diameter for vertical and horizontal arms; 1 pc. brass rod 3 inches long, ¼ inch diameter for the upper and lower pivots; 1 pivot nut-thread to suit pivot stud; 2 pcs. brass 3¼x¾x⅛ inch for pivot bearings; 2 pcs. brass 5x2x⅛ inch for the base plates; 6 pcs. brass 2x2x⅛ inch for the corner plates; 3 2-inch flat head wood screws, iron; 12 ½-inch flat head wood screws, brass; 36 ½-inch round head wood screws, brass.



Cutting Material

The base is turned in a wood lathe to the overall dimensions given. The design on the ends is left to the taste of the wood turner. All wooden parts should be well sandpapered and smoothed down before assembly.

The base seat is cut to size and finished. This can then be mounted on the base. The three (2-inch) flat head wood screws come through from the bottom of the base and hold the seat firmly in position. It is advisable to first drill and countersink the holes in the base and then use a small drill for the seat in order to properly direct the screws and avoid splitting of the wood.

The four side frames should next be made and finished. The shoulder at one end holds the end of the adjacent side in position. Two of the 1½-inch flat head wood screws should be used at each corner, drilling and countersinking the wood first. The six brass corner plates can then be finished and fastened on both sides of three of the corners with the ½ inch round head wood screws.

The frame is then mounted in the seat, and held in place with four of the 1½-inch wood screws through from the inside of the frame.

The two brass base plates are cut and fastened in position on each side with eight of the ½-inch round head wood screws.

Assembly of Loop Cross Frame

The center crosspiece is another wood turning job. The two ⅜-inch holes are drilled by hand, but care must be taken to see that they run true and at right angles to each other. If not drilled true, it de-

(Continued on page 14)

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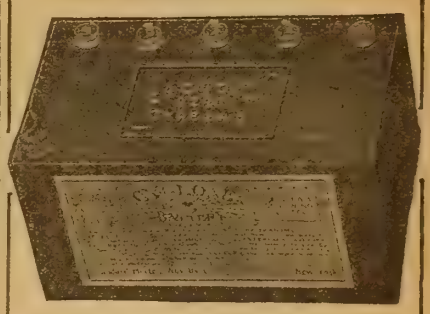

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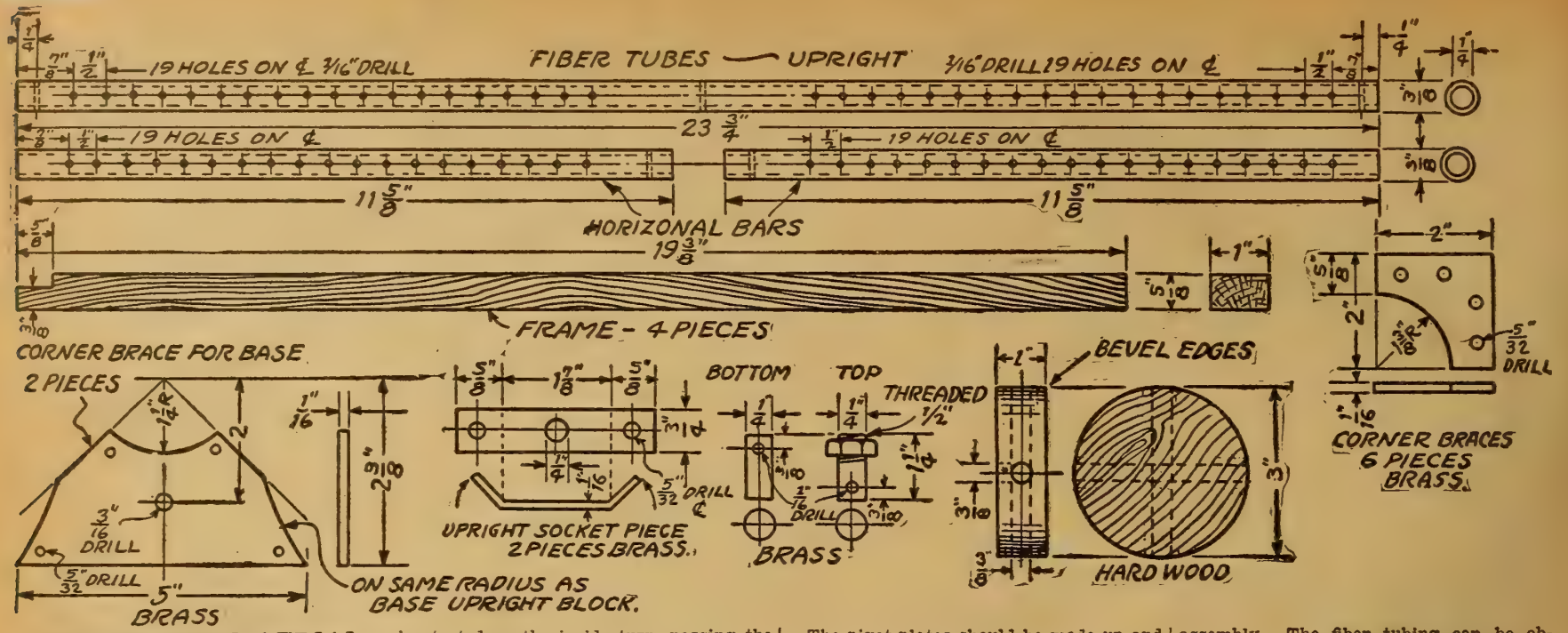


DE LUXE LOOP AERIAL

(Continued from page 13)

tracts considerably from the appearance of the loop.

The fiber tubing is first cut to the proper lengths. Then the holes are carefully laid out and drilled as shown in detail drawings. The long vertical tube is passed through the center crosspiece. A hole, 1/8-inch, is drilled at the center of the crosspiece passing through the tube. An ordinary brad or nail slightly larger than 1/8-inch in thickness is then forced through and cut off level on each side. The two horizontal tubes are then inserted and locked in position in the same manner.

Wiring the Loop

The loop is now ready for wiring, which must be pulled through the holes. This is started on the inside turn, passing the end through the upper inside turn and leaving about 6 inches of wire project from the lower end of the tube. This will have to be held in place so the wires can be wound taut. Winding from there on consists of pasing the full length of the wire through the holes for each successive turn as indicated in the assembled view. This is a tedious job but not necessarily a long one. See that the wires are kept taut throughout, as the appearance of the wires has a lot to do with the appearance of the whole unit.

After the wiring has been completed the brass pivot studs are slipped in place, and locked with a 1/8-inch brad or nail in the same manner as the cross arms in the center crosspiece. The ends of the loop wires should make contact with the two studs.

The pivot plates should be made up and screwed into place with the 1/2-inch round head wood screws. The top one however must be removed again for assembly. It is passed over the upper stud and the pivot nut screwed down. The loop is then placed inside of the frame, with the lower stud in its pivot plate and the screws of the upper pivot plate are again fastened in place. By turning the pivot nut the loop can be suspended equidistant between the two plates.

Binding Post Connections

The binding posts are then put in place, the upper post being connected to the lower pivot plate. A wire is run on the inside of the frame from the upper pivot plate to the lower binding post. It is suggested that a pigtail connection be made between the studs and plates so as to insure more perfect electrical connection, as the lower pivot contact may produce a very poor connection.

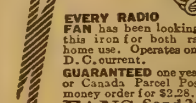
Finish of the Frame

To improve the appearance of the loop, all brass plates and wood screws should be nickel-plated. The frame and base should be stained and varnished before assembly. The fiber tubing can be obtained in black, red or light yellow (straw color).

One advantage of this construction is the fact that the base need not be rotated. The loop will rotate in any direction inside of the frame.

The average life of a standard B battery is about nine months.

ELECTRIC SOLDERING IRON



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It was not until the first night's camp that I announced the surprise to the rest of the boys only to have my hopes for an evening's entertainment dashed when I discovered I had failed to include the coil of insulating wire that I used for an aerial. We were entirely out of the line of communication with not even a barbed wire fence to which to hook our set.

The five of us set our heads to working, the result being that we took two of our fifty foot steel tape lines, clamped them together, hooked one end on top of a pine and the other to the set. One of our metal stakes made an excellent ground and we received KHJ, KFI and KPO in great shape.

Upon returning I took the case from an old cloth tape line and cut the line off. Then I wound up 100 feet of 1/4-inch copper on the spool. This was not enough better to discard the ordinary steel tape. So I now make it a point to carry a 100 foot steel line for my portable set. I cannot imagine anything better for a portable aerial as it takes up very little room and is very efficient.—G. L. King, Winslow, Ariz.

Protect Your Filaments

The addition of an ordinary 25-watt incandescent lamp in series with the plate and telephone receivers of your receiving set will not hinder the normal operation of the set in any way and will protect the filament from burning out in case the B battery is accidentally connected to the wrong terminals.

The Condenser Sensation of Modern Radio

FRESHMAN NOISELESS TESTED MICA CONDENSER
MFG. BY CHAS. FRESHMAN CO. Inc. NEW YORK CITY
PATENTS PENDING

Through the accuracy and dependability of Freshman Condensers, hook-ups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

These little Storers of energy and rectifiers of Radio Current are the very heart of a well-built radio set.

The proper fixed condenser will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	$ .35	.002	$ .40
.00015	.35	.0025	.50
.0002	.35	.003	.60
.00025	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	2.00
.0015	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

At your dealers, otherwise send purchase price and you will be supplied postpaid.

Chas. Freshman Co. Inc. Radio Condenser Products

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All-American	Portabloop
Federal Tel. & Tel.	True Tone
Leich	Amperite
Howard	Filkostats

Besides above lines we have connections with other leading manufacturers in U. S. and Europe. Let us know your wants, we will supply.

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OVERSEAS TRADING CO.
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116 South Michigan Ave., CHICAGO

ANY ARTICLE listed in the sets below may be purchased separately at our cut prices.

BUILD YOUR OWN SET

ALL INSTRUCTIONS INCLUDED ALL PANELS DRILLED— READY TO MOUNT

FLEWELLING
CIRCUIT COMPLETE!!

CONSISTING OF	Reg. Price	Our Price
6x14 Formica Panel	$1.26	$1.10
23 Plate Variable Condenser	3.30	1.45
Three .006 Mica Condensers	3.00	2.25
CRL Variable Grid Leak	1.85	1.35
Grid Leak	.40	.25
2 Coil Adjustable Honeycomb Coil Mounting with Knobs	4.00	2.65
50 Turn Honeycomb Coil	.75	.40
75 Turn Honeycomb Coil	.75	.40
2 Coil Mounts with Straps	1.20	.80
1 Bakelite Socket	1.00	.45
Vernier Rheostat	1.50	1.35
1 Bakelite 3" Dial	1.00	.25
8 Binding Posts	.80	.40
1 Baseboard for Mounting	.30	.20
1 Blueprint with Complete Instructions for Assembly and Wiring	1.00	.50
Regular Price	$22.16	

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HIGH AND LOW RATIO TRANSFORMERS
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AUTOMATIC ELECTRIC
$10.00 VALUE
HEAD SETS
$3.65

40,000 head sets—the entire stock of the Automatic Electric Co., of Chicago—for us a single purchase. Here is but one of the many opportunities our enormous buying power offers you—in this special case a splendid Automatic Electric $10 head set for only $3.65.

The Automatic Electric head set embodies a style and design proved by use and experiment to be the best. Coil wound with about 6500 turns of No. 40 enamel coated copper wire. Direct current resistance approximately 1600 ohms. Impedance at average music and voice frequency (800 cycles) is 21,000 ohms.

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CIRCUIT COMPLETE!!

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1 Howard rheostat
3 John Firth bakelite sockets
8 Binding posts
3 23 plate variable condensers
1 Wave control neutroformer
2 Radio frequency amplifying neutroformers
2 Grid neutralizing condensers
1 .00025 micon grid condenser
1 Marco variable grid leak
1 Base board for mounting
25 feet tinned copper bus bar wire and complete instructions for assembling and wiring,

$28.60

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ONE YEAR GUARANTEE
$2.45

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509 South State St., Dept. D 8-15, CHICAGO, ILL.

Human "Earful" Measured by Aid of Radio Tubes

Device Shows 300,000 Tones Audible to Normal Ear

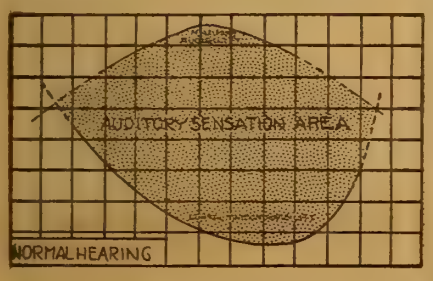
By C. W. Tucker

LEND us your ears; in a few minutes we can tell you by means of the audiometer whether you receive full measure when you get an "earful." You know there are earfuls and earfuls, just as there are types of ears. Most everyone has observed the many different kinds of ears. Some are small, some large; some are pinned back close to the head; others stand out like wings; some can be wiggled and others can't. But, of course, that is only the outer ear.

The inner ear, the part that actually does the hearing, is inside the head; its peculiarities cannot be observed by the innocent bystander. But from what the scientists of the Bell System laboratories of the Western Electric company tell us, there are as many variations in the inner ear and its hearing quality as there are in the outer ear. Therefore, there has never been evolved a standard unit of measure for an earful.

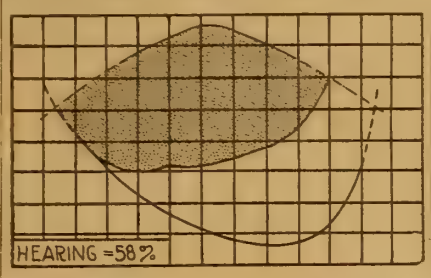
By measuring the hearing of a number of normal ears there has now been established a standard for the normal hearing. This is done by finding out the total number of pure tones audible to the person with normal hearing. A pure tone is one in which there is no mixture of other tones; it is specified by pitch and loudness. The pitch is determined by the rate of vibration and the loudness by the intensity of the vibration.

These findings are plotted on a chart, as shown below. The lower line is established by finding the lowest intensity at which the tones can be heard. The tones are spaced an octave apart on the musical



scale. You will see by this figure that the intensity or loudness of the higher and lower tones must be considerably greater to be audible than the tones near the middle of the scale. This makes the line of minimum audibility a curved line, as shown, instead of a straight one. The upper line, marked "maximum audibility," shows the maximum intensity at which these tones can be heard without hurting the ears. Likewise this is a curved line, because the higher and lower tones hurt the ears with less intensity or loudness than do those near the middle of the scale. The area between these two lines shows the area of normal hearing.

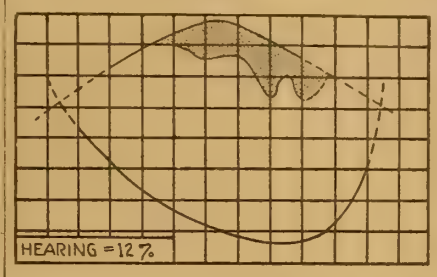
The question naturally arises in the reader's mind as to how many pure tones are audible to the normal ear. It has been determined that at high C, or C3, there are 270 graduations of volume which can be sensed one from the other. At the line of intensity or loudness, where the area is widest on the normal chart, 1,500 tones can be perceived as having different pitches. If the ear were equally sensitive to all pitches and intensities within its range, the total number of pure tones perceptible to the normal ear would be the product of these two numbers, or 405,000 tones. But as the ear is not as sensitive to the higher and lower tones there are



300,000 sounds which are audible to the normal ear.

Having determined the number of pure tones audible to the normal ear by the same method, the degree of deafness of a person with abnormal hearing can just as easily be ascertained. The upper charts show the percentage of the normal hearing that two persons, A and B, possess. Mr. A when he gets an earful gets only 12 per cent. of the news that the person with the normal hearing gets under the same conditions. B hears 58 per cent. of all that the person with normal audibility hears.

One of the distinct advantages of this



method of measuring the hearing is that it is possible to find just what tones cannot be heard. This gives the doctors a very good clue as to what is causing the deafness. It may then be possible to remove the cause and in some cases restore normal hearing to the afflicted.

The audiometer is very useful in legal cases. Considerable confusion exists in courts where the degree of deafness is involved, as there are a number of laws which prevent persons with poor hearing from engaging in certain kinds of work. For example, one cannot operate an automobile if he has a certain degree of deafness. At the present time there is a wide variation between the standards of various doctors in different parts of the country. The audiometer measures deafness with such accuracy that there is little opportunity for dispute.

The audiometer is composed of vacuum tubes, coils and adjustable resistances. By a proper arrangement of circuits the vacuum tube is capable of generating an oscillating electrical current of any desired frequency. This electrical vibration is transferred into sound vibration by means of a telephone receiver. Between the receiver and the oscillator a wire network, called an attenuator, is interposed which makes it possible to regulate the volume of sound. The theory of the receiver used to calibrate the audiometer has been worked out so that it is possible to calculate its acoustic output from the electrical energy it is absorbing. In this way it is possible to calculate the pressure produced in the outer ear canal while a tone is perceived.

PROTECT

The Heart of Your Radio Set

Vacuum Tubes are costly and extremely delicate. B battery or any other excessive current applied for only a fraction of a second to the filament leads will burn out your tubes. You have probably already had this experience and it is apt to happen again at any time. A burnt out tube means money lost—the set out of commission — inconvenience to you.

WHY TAKE THESE CHANCES WHEN

RADECO SAFETY FUSES

will absolutely protect your tubes. Applied in an instant to the filament terminals. Will fit any standard tube or go in any standard socket. Fully guaranteed. 50 cents each. Sent Postpaid. Delay may be costly. Write now. Specify type of tube used.

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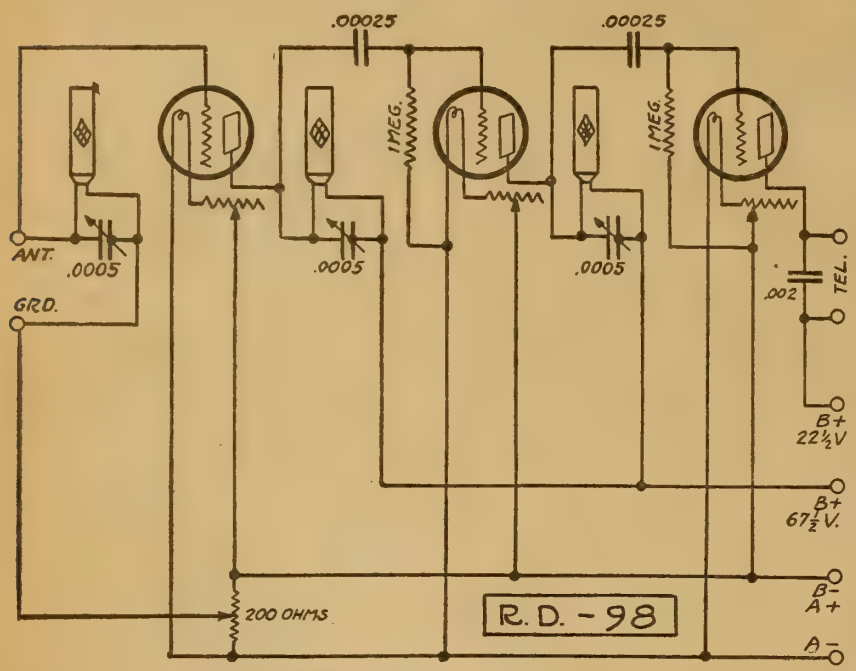
J. C. JOHNSON, GENERAL MANAGER

THREE TUBE RADIO FREQUENCY CIRCUIT



THERE have been many inquiries for a good tuned impedance coupled Radio Frequency receiver. The selectivity of this type of circuit is unusually good and the circuit is recommended for fans who plan long distance receiving for the fall. A two stage audio frequency amplifier can be added in cases where loud speaker volume is desired.

Three sets of three different coils can be kept on hand for all the music broadcasting wave lengths. These three are 35, 50 and 75 turns. When tuned with the .0005 condensers the required wave length range is well covered. Naturally the coils as used will be the same in the three stages; that is, either all 50 turn coils or all of 35 or 75 turns. This means nine coils to be kept on hand.

The fan must remember however that each stage must be tuned to the proper wave length in order to get satisfactory reception.

If dry cell tubes are used, the potentiometer should be of the high resistance type. The resistance of the rheostat is determined by the type of tubes used. The first two tubes are Radio frequency amplifiers, the last tube is a detector. Three fixed condensers are required, two of .00025 mfd. capacity and one .002 mfd. phone condenser. Two 1 megohm grid leaks are used.

The detector tube requires 22½ volts on the plate but the two amplifier tubes should have 67½ volts. The honeycomb coils should not be placed in inductive relation to one another. Three single coil mounts should be used. A good single wire aerial about 80 to 100 feet long and as high as possible is recommended for distance receiving.

Reviews of Books

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Radio for the Amateur. By A. H. Packer and R. R. Haugh. The underlying principles of Radio thoroughly explained in simple language and understandable illustrations. This book will teach you how to construct and operate a receiving set successfully. Price, $1.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning, 230 pages, with 130 illustrations. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

Do not use a hydrometer in a lead cell and then try it with a nickel iron cell. It will ruin the latter.

The Reader's View

Phone Transmission

I would like to see a law passed allowing phone transmitting without the knowledge of code. Say on a 175 meter power limit—about 20 watts.

There are lots of people interested in Radiophone communication who are too old to learn the code. Men who could probably develop circuits and apparatus more efficiently than those used today. Men such as electrical engineers, mechanical engineers, etc.

In the neighborhood where I live there are several amateurs, and I know I would like very much to be able to talk to them, and I think I am not alone in this.—W. Arnold Force, East Orange, N. J.

Future of Broadcasting

As a Radiophan interested in development I take the liberty of requesting your fine publication to consider seriously the problem of the future of broadcasting.

It is evident that the programs of the broadcasting stations are becoming inferior due to numerous reasons. If Radio as a means of entertainment is to be saved from a serious setback some radical step must be taken to assure the present owners and future purchasers of Radio sets that they will be able to receive programs worthy of their time and money invested. To the ordinary fan broadcast phonograph music, automatic piano music, inferior artists and other stuff are poor returns on the money invested.

I could name stations which daily are broadcasting the same pieces; this is a farce. If this continues and the prospective purchasers of sets "get wise" the manufacturers of Radio equipment will lose most and the people will lose a valuable means of entertainment.

After owning a set for a few months and after the wonder of being able to "tune in" has lost some of its interest, after one has listened to the best that the stations offer, one starts to wonder "is it worth while?" Yet one lives on hope; we all hope the situation will improve.

In the hope that the situation may be improved, I request that you endeavor to obtain the approval of your readers to the following plan:

The government should license every Radio receiving set on a graduated scale to be determined according to its range or value, with a minimum charge yearly of one dollar. The money raised by th taxation should be used to equip and maintain broadcasting stations in different parts of the country.

This proposal like every other would have its faults in that it may enable "graft" but with many thousands of highly interested fans daily listening in there would be but little chance for "rotten service."

It is estimated that there are 2,000,000 receiving sets in operation in this coun which when taxed would amply provid daily broadcast entertainment from at least twelve powerful government stations each with entertainers of the very best.

Such a system would help to promote Radio equipment sales, lift the burden of the cost of broadcasting from the shoulders of the manufacturers and provide entertainment for the fans.—W. R. Spangle, Elkhart, Ind.

MISSING WHAT YOU GET

YOUR set is probably bringing in DX stations you never hear because your rheostat cannot control your filament action. The Fil-Ko-Stat gives infinite adjustment and enables you to magnify the weak stations and bring them in strong and clear.

Full resistance 30 Ohms, adjusted to ALL TUBES.

"Avoid the use of inferior powdered carbon rheostats."

$2 At All Dealers in High Grade RADIO SUPPLIES

FIL-KO-STAT

Made and Guaranteed by
Dx Instrument Co., Harrisburg, Pa.
Sole International Distributors.
Radio Stores Corp., 218 W. 34, N. Y. City

WE REPAIR YOUR VACUUM TUBES

WD-11-12, UV-199, UV-201-A, C-301-A	$3.50 each
UV-200, C-300, AP Detectors	2.75 each
UV-201, C-301, AP Amplifiers	3.00 each
DV-6, DV-6-A	3.50 each
UV-202	4.00 each

And Guarantee Them Equal to New

ATTENTION
OUR NEW 6V. ¼ AMP. DETECTOR AND AMPLIFIER $4.10
THIS TUBE IS A REVELATION

QUICK SERVICE—Include with your order remittance to cover repair plus parcel postage for one pound per tube. If preferred, tubes will be returned C. O. D. repair charges.

SPECIAL
LOUD SPEAKER, nickel-plated—21" high. Undistorted reproduction.
Regular Price ..... $ 15.00
Our Price 9.50
Shipped prepaid.

ABALENE RADIO, 14 Vesey St., New York, N. Y.

Ready When Friends Call

Is your radio receiving ready when friends call, or do you have to make apologies — and as minute after minute slips by —do you feel yourself getting more and more embarrassed because your set—the one you made, won't work?

The way to be ready when friends call, to have that assurance that no matter when—your set will work, is to put into it only good parts. That's why Walnart parts are selling in greater and greater volume. They cost no more than the other kind, and you can always rely on them.

Walnart Variable Condensers—plates fitted into grooves, no nuts and washers to work loose and short circuit, in the following sizes: 3, 5, 13, 23 and 43 plate. Prices from $1.50 to $3.50, plain and vernier. $4.25 for 13 plate, $5.00 for 23 plate, $6.00 for 43 plate.

Walnart Inductance Switch. 10 different switch points, all in one. Only one hole to drill in panel; quickly and easily installed $1.00

Walnart Tube Sockets

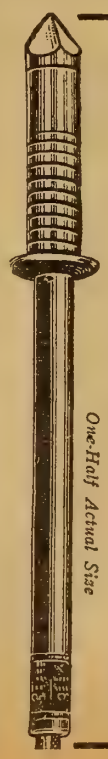
Walnart Variable Grid Resistance

All tested and proved the best.

Walnart Friction Vernier Adjuster. Fits any panel, only one hole to drill—enables you to tune close and sharp and bring in stations you would otherwise pass by..$0.25

All above will be sent postpaid on receipt of price; but ask your dealer first.

WALNART ELECTRIC MFG. CO.
Dept. 401 1249 West Van Buren Street CHICAGO, ILL.



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A Solution to the Small Soldering Problem of the Discriminating Assembler. Unbreakable Construction — Economical Operation on any Electrical Circuit—Interchangeable Tip.

One-Half Actual Size

$5.50

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SUPER-VALUES

LOUD SPEAKERS

List Price		Our Price
$ 60.00	MAGNAVOX TYPE R3	$ 51.00
35.00	MAGNAVOX TYPE R2	29.50
25.00	ATLAS AMPLITONE	19.50
161.00	WESTERN ELECTRIC 10 A	125.75
55.00	WESTERN ELECTRIC 10 D	44.00
30.00	MUSIC MASTER	24.50

PHONES

Brandes	$5.25
N & K German	5.50
Dictograph	5.50

FADA NEUTRODYNE PARTS
List Price $25.00 — Our Price $18.75

CONDENSERS

3 Plate Vernier	$0.90
23 Plate Vernier	2.50
43 Plate Vernier	2.75
23 Plate Plain	1.50
43 Plate Plain	1.90

TUBES

U V 200	Radiotron	$3.95
U V 201A	Radiotron	5.75
U V 199	Radiotron	5.75
W D 11	Radiotron	5.75
W D 12	Radiotron	5.75

AUDIO TRANSFORMERS

List Price			Our Price
$4.50	All American	3 to 1 Ratio	$3.95
4.75	All American	5 to 1 Ratio	4.10
4.75	All American	10 to 1 Ratio	4.10
4.25	Jefferson	4 to 1 Ratio	3.75
7.00	Jefferson	10 to 1 Ratio	5.55
$4.50	Thordarson	6 to 1 Ratio	$3.95
4.00	Thordarson	3½ to 1 Ratio	3.60
4.50	Kellogg (501)	4½ to 1 Ratio	3.95
4.50	Kellogg (502)	3½ to 1 Ratio	3.95
5.00	Gen'l Radio	3 to 1 Ratio	4.25
7.00	Amertran		5.55

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3 WEST 29th STREET, NEW YORK CITY

Receiving Set Built in a Match Box

Inexpensive Receiving Set with Special Coil

This receiver costs about twenty cents to build. It will operate very well as far as eight miles from a broadcasting station, due to the winding of the inductance. The best wire for this purpose is Number 36 dcc, but the wire on the secondary of a Ford coil may be used. Procure a heavy piece of cardboard, 1½ by ¾ inches, and make two pinholes ¼ inch apart at the ends. Weave one end of the wire through the holes at the end of the cardboard and wind from one side of the cardboard to the other. The sketch shows how to wind the wire by layers.

Five layers will be sufficient for an antenna with a fundamental wave length of about 150 meters. If you have a large antenna, take off one or two layers of winding. The detector may be obtained cheaply at a dealer's supply house. The base of the type shown will measure 1½ by 1¼ inches. This will just fit into the top of the match box cover; with a nut and bolt run through the base of the detector it may be fastened in place.

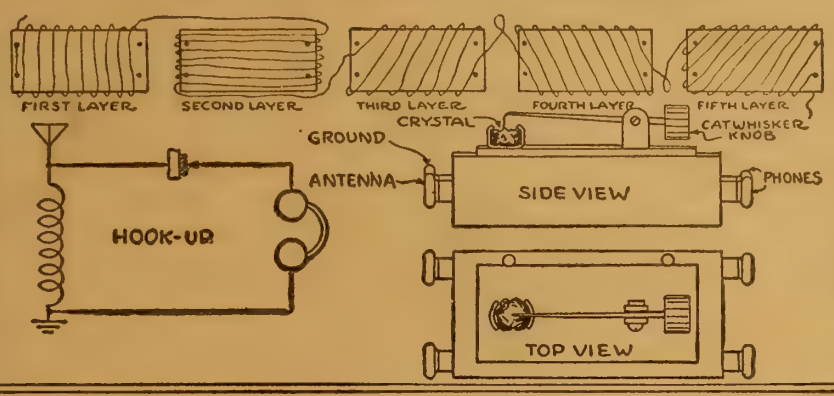
The completed coil is slightly moistened with glue and attached to the bottom, inside of the safety match box. Two binding posts are fastened through each end of the box, making four binding posts in all, two at each end. Wires are run from the inductance coil to the detector through holes on the edge of the box cover. No by-pass condenser was used; the usual length of telephone cord compensated.—F. E. Monsch, St. Louis, Mo.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

HEAR STATIONS EIGHT MILES



Connecting Transformers

The secondary winding of the amplifying transformers used in receiving circuits employing audio-frequency amplification should be connected to the negative side of the filament battery to prevent the grids of the amplifying tubes from becoming positively charged. If the secondary of the transformer were connected to the positive terminal of the A battery the grid would assume positive charge; consequently there would be a flow of electrons from the filament to the grid. This action would in effect constitute a shunt path for the electronic flow, which would greatly interfere with amplification within the tube.

Placing the filament control rheostat in the negative filament lead and connecting the transformer secondary to the negative side of the A battery, the grid of the amplifier tube will be one volt negative with respect to the negative end of the filament. This is because of the fact that the A battery supplies 6 volts, allowing a potential drop of 5 volts across the tube and 1 volt drop in the filament rheostat itself.—Peter J. M. Clute, Schenectady, N. Y.

Type of Grid Condenser

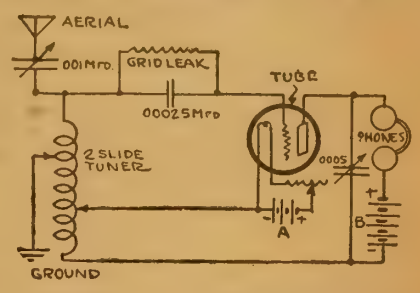
The correct capacity of the grid condenser for purposes of reception may be determined by experimenting with various values from .0002 to .0005 microfarads. Grid condensers in transmitting sets are usually of about the same capacity but are insulated to withstand much higher voltages.

Steep Tube Curves

The steeper the characteristic curve of a receiving tube the greater will be the regenerative tendency. The best amplifier tubes have very steep portions on the curves.

Two-Slide Tuner Used In a Single Tube Set

The circuit shown illustrates a new use for an old two-slide tuner. This circuit has been found to be very efficient for a small set. The signals received have a high degree of strength because of the regenerative effect. Both ends of the coil must be used. Either the 1½ volt or the 6 volt tubes may be used.—Leo Schecter, St. Louis, Mo.



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KLOSNER 6 & 30 Ohm Rheostat	1.25	43 plate Vernier	3.75
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W. D. 11 & U. V. 199 Socket	.50	CRYSTAL Detectors ..... 45c, 60c, 90c and	1.50
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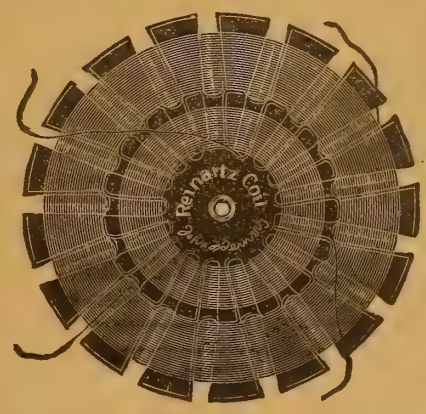

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Primary Coil ..... 57 turns 8 taps
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Diameter 5½ inches. Bakelite cores

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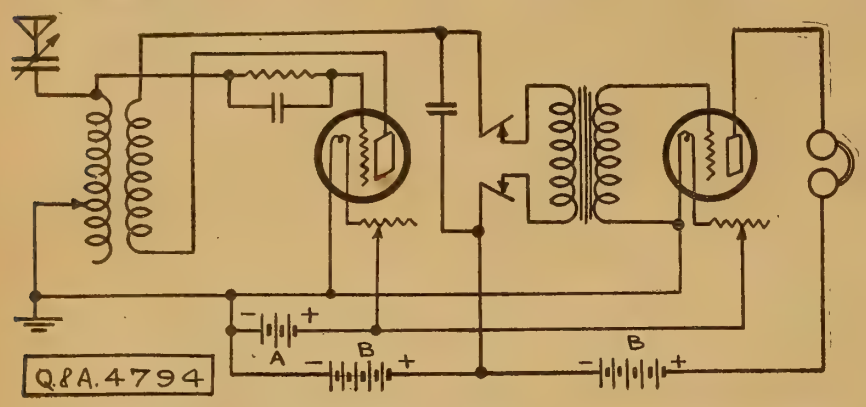
Questions and Answers

Single Circuit Hook-Up

(4791) CBK, Rock Island, Ill.

Will you lease give the hook-up diagram for a single circuit set having one stage of audio frequency amplification and that will operate satisfactorily with WD-17 tubes?



A.—The diagram requested is shown on this page. This circuit will work quite well.

Two Aerials

(4567) LLJ, Le Mars, Ia.

I would like to ask a question—One of my neighbors wants to attach his aerial to my aerial pole. If this is done the two aerials would be about 25 feet apart at the nearest point and would lead away from each other in the shape of a V, being about 70 feet apart at the widest point. I would like to ask if these two aerials fastened on the same pole would interfere with each other. If so, what effect would it have on the efficiency of our sets? We use the audio frequency system. Would a transformer of a ratio of 6 to 1 work all right in the first stage of an audio frequency set? If so, would it require any more B battery than a 3½ to 1 transformer?

A.—The connection of two antenna systems in the manner suggested will be practicable if you are not using regenerative circuits, in which case they should be separated as far as possible and at right angles to each other. Otherwise you will experience decided interference. The system described could be used only with non-regenerative or Radio frequency circuits.

Six to one transformers will require no more B battery than a lower ratio, ratio having no relation primarily to B battery voltage.

Loop Aerial, Honeycomb Coils, Etc.

(4642) E. C. Wichita Falls, Texas.

With reference to the Flewelling circuit on page 6, Flewelling answer department, I ask the following questions:

Is this variation of the original Flewelling circuit as good as the original?

Could a loop antenna be used with success?

What size honeycomb coil should be used to cover the new wave lengths?

What size condenser (variable) should be used?

What size fixed condenser should be used?

I intend using a C-299 tube; how much plate voltage should be used?

Can a Flewelling set of this type be successfully loaded for high wave lengths? How?

A.—There is no fundamental difference from the original; the results will be equal.

A loop aerial can be used with this circuit but a short wire connected as antenna and ground will be found far more effective.

The present wave lengths will be covered with 75 and 100 turn honeycomb coils.

A 23-plate vernier condenser is desirable. The fixed condenser employed is of .006 mfd.

Fifty volts plate potential will be correct with a C-299 tube. Do not attempt to use less than 45 volts, otherwise the circuit will not function as a super. A 6-volt tube is recommended as much better than a C-299 tube.

Arlington Time Signals

(4611) DW, Wheeling, W. Va.

Will you please tell me how to receive the correct time by the Arlington Time signals?

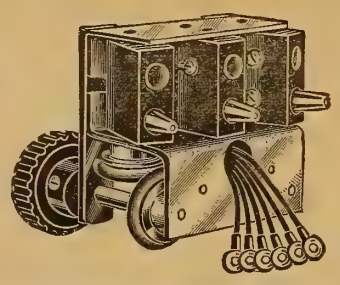
I know many Radiophans would like to have the same question answered.

A.—The second dots begin at 2 seconds before the hour and continue until the 58th second. The 59th second is omitted; the 60th is made 2 seconds long; the beginning of the dash is the exact hour.

YOU DON'T NEED Tubes to get out of town. If you want new stations on your crystal set WRITE ME TODAY. Mine works 400 to 1,000 miles without tubes or batteries! Thousands have bought my plans and now get results like mine. Changes often cost less than a dollar. *Send self-addressed envelope for further information.*

Leon Lambert, 501 South Volutsia, Wichita, Kan.

Another Columbia Scoop



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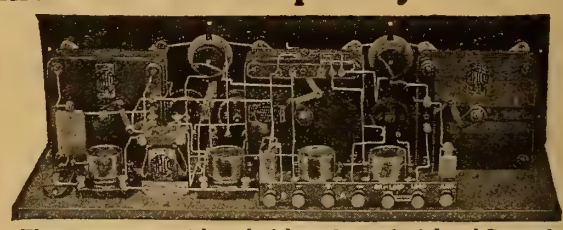

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Radiophone Broadcasting Stations

Corrected Every Week—Part II

(NOTE.—The second part of the schedule list appears below. The first appeared last week and the third part will appear next week.)

KUO, San Francisco, Calif. 360 meters. 1,500 mi. San Francisco Examiner. Slogan, "The Voice of the West." Daily ex Sun, 9-10 am, chat to housewives; 11-12, reports; 2:30-3:30 pm, lecture, news; 9 am, 12 m, 6:45 pm, weather reports. Sun, 9-10 am, 5-6 pm, news. Pacific.

KUS, Los Angeles, Calif. 360 meters. 300 mi. City Dye Works. & Laundry Co. Daily ex Sun, 7-7:30 am, setting up exercises; 12-12:30 pm, concert, time. Mon, Thurs, 2-2:30 pm, features. Tues, Fri, 4-4:30 pm, code practice. Wed, Fri, 6-6:45 pm, concert. Pacific.

KUY, El Monte, Calif. 360 meters. 500 mi. Coast Radio Co. Wed, 4-4:30 pm. Sat, 3-4 pm. Pacific.

KWG, Stockton, Calif. 360 meters. 1,500 mi. Portable Wireless Telephone Co. Daily ex Sun, 4-5 pm, news, concert, markets. Tues and Fri, 8-9 pm, concert. Sun, 2-3 pm, concert. Pacific.

KWH, Los Angeles, Calif. 360 meters. 250 mi. Examiner. Daily ex Sun, 1:30-1:40 pm, 5:30-6, 6-6:15, 8:20-9, reports, entertainment. Sun, 8:30-9 pm, church service. Pacific.

KXD, Modesto, Calif. 252 meters. 100 mi. Modesto Herald Pub. Co. Daily ex Sun, Mon, 6:30-7 pm. Mon, 7-9 pm. Sun 1-2 pm. Pacific.

KYQ, Honolulu, Hawaii. 360 meters. Electric Shop. No definite schedule.

KYW, Chicago, Ill. 345 meters. 2,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 9:30 am, 10, 10:30, 11, markets; 11:05, weather; 11:30, news; 11:35, table talk; 12, 12:30, 1, 1:20, 2:15, 2:30, markets; 3, 3:30, 4, news; 4:15, markets; 4:30, 5, news; 6:30, markets; 6:50 bedtime story; 8, concert, 9, special. Sun, 11 am, Church service. Central, Daylight Saving.

KZM, Oakland, Calif. 360 meters. 200 mi. Western Radio Institute (Hotel Oakland). Daily ex Sun, 6:45-7 pm, news. Pacific.

KZN, Salt Lake City, Utah. 360 meters. 1,000 mi. Desert News. Slogan, "The Center of Scenic America." Daily ex Sun, 8-9:30 pm, music, news, bedtime stories, etc. Mountain.

KZV, Wenatchee, Wash. 360 meters. 200 mi. Wenatchee Battery & Motor Co. Daily ex Sun, 3:30-4:15 pm, weather. Mon, Wed, Fri, 1st to 15th each month, 8:45-9:30 pm; 15th to last each month, 8-8:45 pm, weather. Sun, 1st to 15th each month, 7:30-9 pm; 15th to last each month, 11 am-12:30 pm, church services. Eastern.

NAA, Radio, Va. 435 meters. 2,000 mi. U. S. Navy Dept. Daily ex Sun, 9:45-10:40 am, 12:25-12:40 pm, 1:45-2:20, markets, weather; 2:45-3 (Tues. only). Dept. Interior: 3:25-4:40, 5:05-5:20, markets, weather 10:05-10:20, weather. Mon, 6:45-8:20 pm, Dept. programs. Tues, 7:05-8:20 pm, Dept. programs. Wed, 7:25-7:40 pm, Dept. programs; 8:05-9:40, Marine Band. Thurs, 6:45-8:40 pm, Dept. programs. Fri, 8:05-8:40 pm, band concert. Eastern.

OA, Ottawa, Ont., Can. Dept. of Marine & Fisheries.

PWX, Havana, Cuba. 400 meters. 1,500 mi. International Tel. & Teleg. Corp. Wed, Sat, 9-11:30 pm, music. Eastern.

WAAB, New Orleans, La. 268 meters. Valdemar Jensen.

WAAC, New Orleans, La. 360 meters. Tulane Univ. Mechanics Inst. No regular schedule.

WAAD, Cincinnati, O. 360 meters. 200 mi. Ohio Mechanics Inst. No regular schedule. Central, Daylight Saving.

WAAF, Chicago, Ill. 286 meters. 300 mi. Chicago. Daily Drovers Journal. Daily ex Sun, 8:40 am, 10:30, 10:45, 12:30 pm, 12:45, 3, 4:30, live stock and weather reports. Central.

WAAH, St. Paul, Minn. 360 meters. 500 mi. Commonwealth Elec. Co. Slogan, "From the Land of Ten Thousand Lakes." Temporarily discontinued.

WAAK, Milwaukee, Wis. 280 meters. 300 mi. Gimbel Bros. Daily ex Sun, 10 am, 11:10, 12:10 pm, 1:25, 3. Daily ex Wed and Sat, 7:15, 7:30 pm. Central.

WAAM, Newark, N. J. 263 meters. 300 mi. I. R. Nelson Co. Daily ex Sun, 9:15-9:45 am, Daily ex Sat, 11-11:55 am; Mon, Tues, Wed, Thurs, 8-10:30 pm, music. Eastern.

WAAN, Columbia, Mo. 254 meters. Univ. of Mo.

WAAP, Wichita, Kan. 360 meters. 500 mi. United Electric Co. Daily ex Sun, 12-12:30 pm, educational program; 10:30 pm, weather. Tues, Fri, 8 pm, entertainment. Central.

WAAW, Omaha, Neb. 360 meters. 500 mi. Omaha Grain Exchange. Daily ex Sun, 8:45 am, 9:45, 10:45, 11:45, 12:15 pm, 12:45-1:15, 8, market reports; 8:15-9 pm, music. Central.

WAAZ, Emporia, Kans. 360 meters. 250 mi. Hollister-Miller Motor Co. Tues, Thurs, 7-8 pm, entertainment. Temporary schedule. Central.

WABB, Harrisburg, Pa. 266 meters. Dr. John B. Lawrence.

WABC, Anderson, Ind. 229 meters. Fulwider-Grimes Battery Co.

WABD, Dayton, O. 283 meters. Parker High School.

WABE, Washington, D. C. 283 meters. Y. M. C. A.

WABF, Mt. Vernon, Ill. 234 meters. Mt. Vernon Register-News Co.

WABG, Jacksonville, Fla. 248 meters. 50 mi. Arnold Edwards Piano Co. Daily ex Thurs, 5-6 pm, music, sports. Eastern.

WABH, Sandusky, O. 240 meters. Lake Shore Tire Co.

WABI, Bangor, Me. 240 meters. Bangor Ry. & Elec. Co.

WABJ, South Bend, Ind. 240 meters. The Radio Laboratories.

WABK, Worcester, Mass. 252 meters. First Baptist Church.

WABL, Storrs, Conn. 283 meters. Connecticut Agri. College.

WABM, Saginaw, Mich. 254 meters. F. E. Doherty.

WABN, La Crosse, Wis. 234 meters. Waldo C. Grover.

WABO, Rochester, N. Y. 252 meters. Lake Ave. Baptist Church.

WAI, Dayton, O. McCook Field, U. S. Army.

WAJT, Marshall, Mo. 360 meters. Kelly-Vawter Jewelry Co.

WAJU, Yankton, S. D. 360 meters. Yankton College.

WBAA, W. Lafayette, Ind. 360 meters. 100 mi. Purdue University. Irregular schedule.

WBAD, Minneapolis, Minn. 360 meters. Sterling Elec. Co.

WBAF, Moorestown, N. J. 389 meters. Fred M. Middleton.

WBAH, Minneapolis, Minn. 360 meters. 200 mi. The Dayton Co. Daily ex Sun, 1-1:30 pm, 3-3:30, 5-5:30, 9:30-10. Sat. 11-11:30 am. Wed, 8-10 pm. Central.

WBAN, Paterson, N. J. 244 meters. 200 mi. Wireless Phone Corp. Slogan, "The Silk City of America." Daily ex Sun, 9-11:30 am, 12:30-5:30 pm. Sat morn. only. Sun, 10-12 am, 2-5 pm, 7:30-10:30. Eastern.

WBAO, Decatur, Ill. 360 meters. 100 mi. James Millikin Univ. University activities. No definite schedule. Central.

WBAP, Fort Worth, Tex. 476 meters. 1,500 mi. Fort Worth Star-Telegram. Club, "Radio Truth League." Daily ex Sun, 9-9:15 am, 10-10:15, 11-11:30, 12-12:15 pm, 1-1:15, 2-2:15, 3-3:30, 4-4:15, markets; 5, 6:30, 7:30, baseball results; 9:30, sports, news, road reports. Sat, 7-7:30 pm, bible lesson. Sun, 11 am-12:15 pm, church; 5, 6:30, 7:30, baseball. Central.

WBAU, Hamilton, O. 258 meters. Republican Pub. Co. Temporarily discontinued.

WBAV, Columbus, O. 390 meters. 500 mi. The Ernor Hopkins Co. Slogan, "We Broadcast a Variety." Daily ex Sun, 12:30-1 pm. Mon, 7-9 pm. Central.

WBAW, Marietta, O. 246 meters. Marietta College. Temporarily discontinued.

WBAX, Wilkes-Barre, Pa. 360 meters. 200 mi. John H. Stenger, Jr. Three nights of week, not regular.

WBAY, New York, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Experimental purposes only.

WBBA, Newark, O. 240 meters. Newark Radio Lab.

WBBC, Sterling, Ill. 229 meters. Sterling Radio Equipment Co.

WBBD, Reading, Pa. 224 meters. Barbey Battery Service.

WBL, Anthony, Kans. 261 meters. 200 mi. T & H Radio Co. Mon, Wed, Sat, 8-9 pm, concert, lecture. Sun, 10 am, church service. Central.

WBS, Newark, N. J. 360 meters. 200 mi. D. W. May, Inc. Daily ex Sun 11-12 am, music; 1-2:15 pm, reports; 2:15-2:30 pm, music, reports. Tues, Thurs, Sat, 7:30-9:30 pm, program. Sun, 9-10:30 am, sacred music; 1-3 pm, program. Eastern.

WBT, Charlotte, N. C. 360 meters. 1,200 mi. Southern Radio Corp. Slogan, "Queen City of the South." Daily ex Sun, 11 am, 8 pm, weather, markets. Tues, 8:30 pm, music. Fri, 11 pm, entertainment. Sun, 8 pm, church services. Eastern.

WBU, Chicago, Ill. 286 meters. 100 mi. City of Chicago. Daily ex Sun, 10:15-10:30 am, 11:45-12 m, 4:15-4:30 pm, police reports. Mon, Wed, Fri, 3:30 pm, 7:30, speeches. Central Daylight Saving.

WBZ, Springfield, Mass. 337 meters. 1,000 mi. Westinghouse Elec. & Mfg. Co. Daily ex Sun, 7 pm, baseball, lecture; 7:30, children's hour; 7:45, markets, weather, lecture; 8-9, concert. Mon, Wed, Fri, 6-7 pm, concert. Sun, 8:30 pm, church service. Eastern. Daylight Saving.

WCAC, Fort Smith, Ark. 360 meters. John Fink Jewelry Co. Tests only.

WCAD, Canton, N. Y. 280 meters. 300 mi. St. Lawrence Univ. No regular schedule. Eastern.

WCAE, Pittsburgh, Pa. 462 meters. Kaufman & Baer Co.

WCAF, Rodgers, Mich. 360 meters. Michigan Limestone & Chem. Co.

WCAG, New Orleans, La. 268 meters. 200 mi. Clyde R. Randall. Mon, Thurs, 8-9 pm, concert. Central.

WCAH, Columbus, O. 286 meters. 500 mi. Entrekin Elec. Co. Slogan, "The Heart of Ohio." Daily ex Sun, 11:30-12:30 am, music, news. Tues, 7-9 pm, concert. Sun, 10-12:30, church service. Central Daylight Savings.

WCAJ, Univ. Place, Nebr. 360 meters. 150 mi. Nebr. Wesleyan Univ. Daily, 10:30 am, weather. Tues, 7 pm, Children's Hour. Thurs, 8 pm, music, lectures. Central.

WCAK, Houston, Tex. 360 meters. 100 mi. Alfred P. Daniel. Slogan, "Where Eighteen Railroads Meet the Sea." Daily ex Sun, 7-7:30 pm, music. Wed, 8-9 pm, concert. Sun, 3-4 pm, features. Central.

WCAL, Northfield, Minn. 360 meters. 500 mi. Dept. of Physics, St. Olaf College. No definite schedule.

WCAM, Villanova, Pa. 360 meters. Villanova College.

WCAO, Baltimore, Md. 360 meters. 100 mi. Sanders & Stayman Co. Daily ex Sun, 12-1 pm. Mon, Wed, 8-9 pm. Eastern.

WCAP, Washington, D. C. 469 meters. Chesapeake & Potomac Tel. Co.

WCAR, San Antonio, Tex. 360 meters. 1,500 mi. Alamo Radio Elec. Co. Mon, Thurs, Sat, 8:30-9:30 pm, concert. Central.

WCAS, Minneapolis, Minn. 246 meters. 500 mi. Wm. H. Dunwoody Industrial Inst. Slogan "From the Flour City of the World." Mon, 9:30-11 pm, music, lectures. Mon, Wed, Fri, 6:30-7 pm, code instruction. Central.

WCAT, Rapid City, S. D. 240 meters. 300 mi. S. D. State School of Mines. Daily ex Sun, 9:30 am, 12:30 pm, 3 pm, weather, reports. Wed, 7:15 pm, concert. Mountain.

WCAU, Philadelphia, Pa. 286 meters. 500 mi. Durham & Co. Daily 11:45 am. Tues, Fri, 7:30-8 pm, concert. Sun, 10:55 am, church services. Eastern Daylight Saving.

WCAV, Little Rock, Ark. 360 meters. J. C. Dice Elec. Co.

WCAX, Burlington, Vt. 360 meters. Univ. of Vt.

WCAY, Milwaukee, Wis. 261 meters. 500 mi. Kesselman-O'Driscoll Music House. Daily ex Sun, 11 am, reports. Mon, Tues, Thur, Fri, 7:30-8:30 pm, music. Tues, 10:30-11:30 pm, dance music. Sun, 7:30-9 pm, church services. Central.

WCBA, Allentown, Pa. 280 meters. Chas. W. Haimbach. Wed, Sat, 2-12 pm. Sun, 2-4 pm, 8-10. Eastern.

WCBB, Greenville, O. 240 meters. K. & K. Radio Supply Co.

WCBD, Zion, Ill. 345 meters. 1,500 mi. Wilbur Glenn Voliva. Slogan, "Where God Rules, Man Prospers." Mon, Fri, 8-10 pm, concert. Wed, Fri, 2:30-3:45 pm, service. Sun, 9-9:45 am, Bible School; 2:30-5:30 pm, church services. Central daylight saving.

WCE, Minneapolis, Minn. 360 meters. Findley Elec. Co.

WCK, St. Louis, Mo. 360 meters. 500 mi. Stix, Baer & Fuller. Daily, 12-12:30 pm, 3-4:15, 5-5:30. Mon, Wed, Fri, 6:45-8 pm, concert, lecture. Central.

WCM, Austin, Tex. 360 meters. Univ. of Tex.

WCX, Detroit, Mich. 517 meters. 1,000 mi. The Detroit Free Press. Slogan, "The Call of the Motor City." Club, "Red Apple Club." Daily ex Sun, 2 pm, news; 2:15, stock reports; 2:50, weather, markets; 4:15, 4:30, 4:50, 6:15, markets, music. Daily ex Sat, Sun, 8:30-10 pm, week starting Dec. 11 and alternate weeks thereafter, concert, Tues, 10-12 pm, Club, Sun, 10:30 am, 7:15 pm, church services. Eastern.

WDAD, Lindsborg, Kans. 360 meters. 200 mi. Wm. Louis Harrison. Tues, Thurs, Fri, 9:30 pm, entertainment, weather. Sun, 3:30 pm, vesper services. Central.

WDAE, Tampa, Fla. 360 meters. 500 mi. Tampa Daily Times. Wed, Fri, 8-10 pm, music, lecture. Eastern.

WDAF, Kansas City, Mo. 411 meters. 2,000 mi. Kansas City Star. Club, "Nighthawks." Daily ex Sun, 3:30-4:30 pm, music; 6-7, educational, bedtime story, etc.; 11:45 pm-1 am, Nighthawk Frolic. Mon, Wed, Fri, 8-10 pm, concert. Sun, 4-5 pm, music. Daily ex Sun, 3:30 pm, 4-4:30, 5, 6, baseball. Sun, 3:30 pm, 4, 5, baseball. Central.

WDAG, Amarillo, Tex. 263 meters. J. Laurance Martin. Tues, Thurs, 8-9:30 pm, music. Central.

WDAH, El Paso, Tex. 268 meters. Trinity Methodist Church South. Wed, Thurs, Sun, 7:30-8:30 pm. Mountain.

WDAI, Syracuse, N. Y. 246 meters. 200 mi. Hughes Radio Corp. Daily ex Sun, 12 m, reports. Eastern.

WDAJ, College Park, Ga. 258 meters. 2,000 mi. A & W. P. R. R. Co. Daily, 7:30-8:30 pm, 10:30-11:30 pm, concert. Wed, 10:30-11:30 pm, only. Central.

WDAK, Hartford, Conn. 261 meters. 150 mi. The Courant. Sat, 8 pm, concert. Eastern.

WDAL, Jacksonville, Fla. 360 meters. 250 mi. Florida Times Union. Daily, 11 am, weather; 4-5, 6-7 pm, music; 8-9, entertainment; 9:30, reports. Eastern.

WDAO, Dallas, Tex., 360 meters. 300 mi. Automotive Elec. Co. Daily, 1-1:45 pm, 7:15-8. Central.

WDAP, Chicago, Ill. 360 meters. 2,000 mi. Drake Hotel. Daily ex Sun, every half hour from 9:30 am to 1:30 pm, quotations, reports; 6 pm, news. Tues, Thurs, 7-8, Wed, Fri, 7-8:30, Tues, Wed, Thurs, Sat, 10, concert. Sun, 9, 10, concert. Central Daylight Saving.

WDAR, Philadelphia, Pa. 395 meters. Lit Bros. Club, "Morning Glory." Daily ex Sun, 12-12:55 pm, music. 2-3 pm, 4:30-6, music, talks; 7:30-8 pm, Dream Daddy. Mon, 7:30-10:55, Wed, 8-11 pm, entertainment. Fri, 8-10:50, entertainment; 1 am, Club. Eastern Daylight Saving.

WDAS, Worcester, Mass. 360 meters. Samuel A. Waite

WDAU, New Bedford, Mass. 360 meters. 500 mi. A. H. Smith. Mon, Wed, Fri, 12:15-12:50 pm, industrial reports; 7:45-10 pm, music. Sun, 11 am-12:30 pm, 7-8 pm, church services. Eastern Daylight Saving.

WDAX, Centerville, Iowa. 268 meters. 500 mi. First Nat'l Bank. Daily ex Sun, 11:30 am, reports, news. Mon, Thur, 7:30-9 pm, concert. Central.

WDAY, Fargo, N. D. 244 meters. 300 mi. Radio Equip. Corp. Slogan, "The Biggest Little City in the World." Daily ex Sun, 9:30 am, weather, 6 pm, baseball. Tues, Thurs, Sat, 7:30-8:30 pm, concert. Sun, 10:30 am, church services. Central.

WDBC, Lancaster, Pa. 258 meters. Kirk Johnson & Co., Inc.

WDBF, Youngstown, O. 261 meters. Robert G. Phillips.

WDM, Washington, D. C. 360 meters. 50 mi. Church of the Covenant. Sun, 11 am, church service; 8 pm, church service. Eastern.

WDT, New York City, N. Y. 405 meters. Ship Owners Radio Service & Premier Grand Piano. Daily ex Sun, 12-1 pm, concert. Wed, 7-8, concert. Fri, 11-12, concert. Eastern Daylight Saving.

WDZ, Tuscola, Ill. 278 meters. 100 mi. James L. Bush. Daily ex Sun, every half hour, 8:30 am-12:15 pm, Chicago Board of Trade quotations. Central.

WEAA, Flint, Mich. 280 meters. 200 mi. Fallain & Lathrop. Slogan, "The Vehicle City." No definite schedule.

WEAB, Fort Dodge, Ia. 360 meters. 1,000 mi. Standard Radio Equip. Co. Daily ex Sun, markets every 30 min. from 8:40 am-12:20 pm; 5:15 pm, 10 am, 4 pm, road reports. Central.

WEAD, Atwood, Kan. 268 meters. Henry Radio & Elec. Supply Co. Temporarily discontinued.

WEAE, Blacksburg, Va. 360 meters. Polytechnic Inst.

WEAF, New York City, N. Y. 492 meters. 1,500 mi. A. T. & T. Co. Slogan, "The Voice to the Millions." Tues, Wed, Thurs, Fri, 11-12 am, 4:30-5:30 pm, 7:30-10. Sun, 3:30-4:30 pm, 7:30-10. Eastern Daylight Saving.

WEAG, Edgewood, R. I. 231 meters. Nicholas-Hineline-Bassett Lab.

WEAH, Wichita, Kan. 244 meters. 500 mi. Wichita Board of Trade. Daily ex Sun, 8:40 am, 9, 10, 11, 12 pm, 1, reports. Tues, Fri, 8:15 pm, concert. Sun, 7:30, concert. Central.

WEAI, Ithaca, N. Y. 286 meters. Cornell Univ.

WEAJ, Vermilion, S. D. 360 meters. Univ. of S. D. Temporarily discontinued.

WEAK, St. Joseph, Mo. 360 meters. 100 mi. Julius B. Abercrombie. Daily ex Sun, 5:15-6 pm. Central.

WEAM, North Plainfield, N. J. 250 meters. 75 mi. Borough of N. Plainfield. No definite schedule.

WEAN, Providence, R. I. 273 meters. 50 mi. The Shepard Stores. Daily ex Sun, Mon, 6-7, music, reports, weather, concerts. Tues, Thurs, 8:15-10, concert. Wed, Sat, 7-8 pm, concert. Sun, 10:45-11:30 am, 7:30-8:45 pm, church service. Eastern Daylight Saving.

WEAO, Columbus, O. 360 meters. 500 mi. Ohio State Univ. Daily ex Sun, 1:30 pm, 4, reports, music. Thurs, 7-9 pm, lecture, concert. Eastern.

WEAP, Mobile, Ala. 360 meters. 50 mi. Mobile Radio Co. Daily ex Sun, 12 m, reports; 4-5 pm, music. Daily ex Sun, Mon, 7:45-8:45 pm, music. Sun, 3-3:30 pm, church service. First Mon of each month, 11 pm-1 am, concert. Central.

WEAR, Baltimore, Md. 360 meters. 200 mi. News & American Pub. Co. Daily ex Sun, 6:30-7, weather, music, news. Tues, Thurs, 7:30-9:30 pm. Eastern.

WEAS, Washington, D. C. 360 meters. 200 mi. The Hecht Co. Daily ex Sun, 3-4 pm. Wed, Fri, 7-8 pm. Eastern.

WEAU, Sioux City, Ia. 360 meters. 300 mi. Davidson Bros. Co. Slogan, "The Heart of the Corn Belt." Daily ex Sun, 9 am, 10, 11, 1 pm, 5, markets, news. Mon, Wed, Fri, 8-9 pm, concert. Sun 7-9 pm. Central.

WEAY, Houston, Tex. 360 meters. 700 mi. Will Horwitz (Iris Theater.) Slogan, "Where All the Oceans Meet All the Railroads." Daily ex Sun, 11 am, dinner hints, news; 12 m, music; 12:57-1 pm, time; 2:30 pm, music; 6 pm, news. Fri, Sat, 8-10 pm, concert. Sun, 11 am, 8 pm, church services; 9 pm, concert. Central.

WEB, St. Louis, Mo. 360 meters. 800 mi. The Benwood Co., Inc. Tues, 9-10:30 pm. Wed, 8-9:30 pm. Sat, 7:30-9 pm, 11 pm-1 am. Central.

WEV, Houston, Tex. 360 meters. 500 mi. Hurlburt-Still Elec. Co. Daily ex Sun, 10 am, 5:30 pm, weather, roads. Tues, Thur, 8 pm, concert. Central.

WEW, St. Louis, Mo. 261 meters. 200 mi. St. Louis Univ. Daily ex Sun, 9 am, 10, 2, 5 pm, reports. Central.

WFAA, Dallas, Tex. 476 meters. 1,500 mi. Dallas News and Dallas Journal. Slogan, "Working For All Alike." Daily, 10:30 am, reports; 12:30-1 pm, address; 2:30, 3:30, 4:30, 5:30, reports, news, baseball; 6:15-7, bedtime story, baseball; 8:30-9:30, concert, weather (silent Wed). Tues, Sat, 11-12 pm, music. Sun, 2:30-3:30 pm, bible class; 6:45-7 pm, baseball; 9:30-11 pm, music. Central.

WFAB, Syracuse, N. Y. 234 meters. 100 mi. C. F. Woese. No definite schedule.

WFAF, Poughkeepsie, N. Y. 273 meters. H. C. Spratley Radio Co. Temporarily discontinued.

WFAH, Port Arthur, Tex. 360 meters. 100 mi. Elec. Supply Co. Tues, Thurs, 10-11 pm, concert. Central.

WFAJ, Asheville, N. C. 250 mi. Hi-Grade Wireless Instrument Co.

WFAM, St. Cloud, Minn. 360 meters. 100 mi. Granite City Elec. Co. Daily ex Sun, 3:30-4 pm, markets. Mon, Wed, 7:30-9 pm, entertainment. Central.

WFAN, Hutchinson, Minn. 360 meters. 300 mi. Hutchinson Elec. Service Co. Slogan, "The Gateway to the Ten Thousand Lakes of Minn." Daily, 11:57-12:20, time, weather. Tues, Wed, 8:30 pm, concert. Sun, 2:30 pm. Central.

WFAQ, Cameron, Mo. 360 meters. 300 mi. Missouri Wesleyan College.

WFAT, Sioux Falls, S. D. 360 meters. 500 mi. Daily Argus Leader. Daily ex Sun, 9:15 am, 11:15, 12:30 pm, 1:30, reports, music; 7:30, baseball, music. Central.

WFAV, Lincoln, Nebr. 360 meters. 300 mi. Univ. of Nebr. Slogan, "The Home of the Cornhuskers." Daily ex Sun, 10 am, 12:40 pm, weather. Thurs, 8 pm, concert. Central.

WFI, Philadelphia, Pa. 395 meters. 1,000 mi. Strawbridge & Clothier. Daily ex Sat, Sun, 10 am, reports; 1 pm, news; 2, music; 3-4:30, concert; 7-7:30 children's hour. Tues, Thurs, 8 pm, concert. Wed, 10:30 pm, dance music. Sun, 9:30 pm, organ recital, alternating 10:30 am, 7:30, church services. Eastern Daylight Saving.

WGAF, Tulsa, Okla. 360 meters. Goller Radio Service.

WGAL, Lancaster, Pa. 248 meters. 35 mi. Lancaster Elec. Supply & Construction Co. Slogan, "Garden Spot of U. S. A." Mon, Wed, Fri, 7:30-9 pm, concert, lecture. Sun, 3-3:30 pm, church service. Eastern.

WGAN, Pensacola, Fla. 360 meters. Cecil E. Lloyd.

WGAQ, Shreveport, La. 360 meters. 500 mi. Glenwood Radio Corp. Daily ex Sun, 12:30-1:30 pm, 6:30, 7:30, music. Sun, 11 am, 7:30 pm, church service. Central.

WGAR, Fort Smith, Ark. 360 meters. Southwest America.

WGAU, Wooster, O. 226 meters. Marcus G. Limb.

WGAW, Altoona, Pa. 261 meters. 300 mi. Ernest C. Albright. Slogan, "The home of the world's largest railroad shops." Tues, Wed, 9-11 pm, music. Sun, 9-10:30 pm, music. Eastern.

WGAY, Madison, Wis. 360 meters. 100 mi. North Western Radio Co. Daily ex Sun, 10 am, weather; 4:30, news. Mon, Thurs, 8:30 pm, concert. Sun, 3 pm, music. Central.

WGAZ, South Bend, Ind. 360 meters. 200 mi. South Bend Tribune. Daily ex Sun, 9-9:30 am, household hints, menus; 5-5:30 pm, music. Tues, Thurs, Sat, 7-8 pm, music. Central.

WGF, Des Moines, Iowa. 360 meters. Register and Tribune. Slogan, "The Convention City." Tues, Fri, 7:30 pm, entertainment. Sat, 10 pm, music. Sun, 5 pm, church service. Central.

WGI, Medford Hillside, Mass. 360 meters. 500 mi. Am. Radio & Research Corp. Slogan, "Amrad, the Voice of the Air." Mon, 12 m-1 pm, concert. Tues, Thurs, 7-8:30, concert. Wed, Fri, Sat, 7:30-9:00, concert. Daily, 5-6:45 pm, Children's Hour, reports, codes, Tues, Fri, 3 pm, Amrad Women's Club. Sun, 4-5 pm, 8:30, church services; 10, concert. Eastern Daylight Saving.

WGL, Philadelphia, Pa. 360 meters. 2,000 mi. Thos. F. J. Howlett. Irregular schedule.

WGM, Atlanta, Ga. 429 meters. 1,500 mi. The Atlanta Constitution. Daily ex Sun and Wed, 6-7 pm, orchestra concert; 9:30-10:30 pm, music. Sun, 3:30-4:30 pm, organ recital; 9:30-10:30 pm, music. Wed, 12-1 am, concert. Central.

WGR, Buffalo, N. Y. 360 meters. 1,000 mi. Federal Tel. & Telg. Co. Slogan, "Key City of Industry." Daily, 11:45 am, weather; 12 m, Organ music. Daily ex Sat, Sun, 12:35 pm, 2:30, 3:30, 5, reports. Daily ex Sun, 6:30, Organ; 7-8:45, news. Mon,, Wed, Fri, 9 pm, concert. Daily, 11:45, weather. Sun, 3 pm, vesper services. Eastern Daylight Saving.

WGV, New Orleans, La. 350 meters. 400 mi. Interstate Elec. Co. Slogan, "Where the Mighty Mississippi Makes a Crescent Near the Gulf." Mon, Wed, Sat, 8-9 pm, 12-1, music, talks. Sat, 7:30-8:30 pm. Central.

WGY, Schenectady, N. Y. 380 meters. 1,000 mi. General Elec. Co. Daily ex Sun, 11:30-12 m, 5, reports, time, sports. Mon, Tues, Thur, Fri, 1-1:30 pm, 7:45, concert. Fri, 10:30 pm, special. Sun, 9:30 am, 6:30 pm, church service. Eastern.

WHA, Madison, Wis. 360 meters. 1,000 mi. Univ. of Wis. Daily ex Sun, 11:59-12 m, time signals, weather. Mon, Wed, Fri, 7:30 pm, lectures, news, agriograms. Central.

WHAA, Iowa City, Ia. 263 meters. 200 mi. Univ. of Iowa. No regular schedule.

WHAB, Galveston, Tex. 360 meters. 500 mi. Clark W. Thompson Co. Slogan, "The Gateway to the Southwest and Treasure Island of America." Daily ex Sun, 9:45 am, 11, 3:30 pm, 5, reports, music, news. Tues, Fri, 8 pm, entertainment. Sat, 8:20, special. Sun, 11 am, 7:30 pm, church service. Central.

WHAC, Waterloo, Ia. 360 meters. 100 mi. Cole Bros. Elec. Co. Daily, 6 pm, news, sports. Mon, Wed, Fri, 9:30 pm, concert. Sun, 11 am, church services. Central.

WHAD, Milwaukee, Wis. 280 meters. 1,000 mi. Marquette Univ. Wed, 7:30-8:30 pm, music, entertainment. Central.

WHAG, Cincinnati, O. 222 meters. 100 mi. Univ. of Cincinnati. No definite schedule.

WHAH, Joplin, Mo. 360 meters. Hafer Supply Co.

WHAI, Davenport, Ia. 360 meters. 30 mi. Radio Equip. & Mfg. Co. Temporarily discontinued.

WHAK, Clarksburg, W. Va. 360 meters. Roberts Hdwe. Co. 50 mi. No definite schedule.

WHAL, Lansing, Mich. 248 meters. 200 mi. The Capital News. Daily ex Sun, 12:30 pm, 2:55, 4:30. Mon, Wed, Fri, 7:45 pm. Sat, 12 midnight. Sun, 2:30 pm. Central.

WHAM, Rochester, N. Y. 360 meters. Univ. of Rochester.

WHAP, Decatur, Ill. 360 meters. 100 mi. Otto & Kuhns. No definite schedule.

WHAQ, Washington, D. C. 242 meters. 75 mi. Semmes Motor Co. Mon, 7-8 pm, lecture on automobile upkeep, music. Eastern.

WHAR, Atlantic City, N. J. 231 meters. Paramount Radio & Elect. Co.

WHAS, Louisville, Ky. 400 meters. 1,500 mi. Courier Journal and Louisville Times Co. Daily ex Sun, 4-5 pm, 7:30-9. Sun, 9:57-10:45 am, 4-5 pm, church service. Mon night, silent. Central.

WHAV, Wilmington, Del. 360 meters. 200 mi. Wilmington Elec. Spec. Co. Slogan, "The First Broadcasting Station of the First City of the First State." No definite schedule.

WHAY, Huntington, Ind. 360 meters. 75 mi. Huntington Pub. Co. Daily ex Sun, 12 m-12:30, weather, 3 pm, music; 6 pm, markets, news, weather, sports. Mon, Wed, Fri, 8 pm, concert. Sun, 3 pm, sermon; 4 pm, concert. Central.

WHAZ, Troy, N. Y. 380 meters. 2,000 mi. Rensselaer Polytechnic Inst. Slogan, "Transcontinental and International Broadcasting Staion Located at the Oldest School of Engineering." Club, R. P. I. Mon, 9-10:30 pm, music. Transcontinental second Monday of each month, 12-1:30 am, music. Eastern.

WHB, Kansas City, Mo. 411 meters. 1,000 mi. Sweeney Auto & Electric School. Slogan, "Heart of America." Daily ex Sun, 8:25 am, 9:25, 10:25, 11:25, 12:25 pm, 3, reports. Tues, Thurs, Sun, 8-10 pm, concert. Central.

WHD, Morgantown, W. Va. W. Va. University. Temporarily discontinued.

WHK, Cleveland, O. 360 meters. 1,000 mi. Warren R. Cox. Daily ex Sun, 1-1:30 pm, 4-4:30 music; 6-6:30, news, music. Wed, Sun, 8-9:55 pm, sermon, concert. Eastern.

WHN, Brooklyn, N. Y. 360 meters. 250 mi. Associated Broadcasters, Inc. Slogan, Station of the Sunrise Trail." Daily ex Sun, 9:30-11 am, 12-1 pm, 2:15-3:15, 3:45-5:30. Mon, Wed, Sat, 7:30-12 pm. Tues, Thurs, Fri, 9:30-12:00 pm. Sun, 9:30-10:30 am, 3-6 pm, 9:30-12 pm. Eastern.

WIAB, Rockford, Ill. 252 meters. 50 mi. Joslyn Automobile Co. Tues, Fri, 7:30-8:30 pm, music. Mon, Thurs, 8-9 pm. Sun, 12-1 pm, church services. Central.

WIAC, Galveston, Tex. 360 meters. 200 mi. Galveston Tribune. Daily ex Sun, 12:35 pm, reports. Tues, Sat, evening concert. Central.

WIAD, Ocean City, N. J. 254 meters. 200 mi. Ocean City Yacht Club. Fri, Sat, Sun, 8-12 pm. Eastern.

WIAF, New Orleans, La. 234 meters. 300 mi. G. A. DeCortin. Tues, 8-9:30 pm. Sun, 10-11:30 am, church services. Central.

WIAH, Newton, Ia. 360 meters. 100 mi. Continental Radio & Mfg. Co. Daily 12:30-1 pm, music, news. Sun, 10:45-12 m, church services. Central.

WIAI, Springfield, Mo. 253 meters. 300 mi. Heer Stores Co. Daily ex Sun, 10:30-11 am, reports, news, weather. Tues, Thurs, 7:30-8:45 pm. Sat, 6:15-7:15 pm, music, entertainment. Central.

WIAJ, Neenah, Wisc. 224 meters. Fox River Valley Radio Supply Co.

WIAK, Omaha, Neb. 278 meters. 300 mi. Daily Journal-Stockman. Daily ex Sun, 7:45 am, 9:10, 10:20, 12 m, 1:30 pm, 3:50, markets, weather. Central.

WIAO, Milwaukee, Wis. 360 meters. 500 mi. School of Engineering of Milwaukee. Slogan, "In the Land of the Sky Blue Water." Mon, Tues, Thur, Fri, 10-10:30 am, 11:30-12 m, music, news; 5-6 pm, music, news; 7-7:30, music, speeches. Central.

WIAQ, Marion, Ind. 226 meters. Chronicle Pub. Co.

WIAR, Paducah, Ky. 360 meters. 150 mi. Paducah Evening Sun. Slogan, "Howdy Folks, This is WIAR, a real Live Wiar." Daily ex Sat, Sun, 7-8 pm, concert, lecture, etc. Central.

WIAS, Burlington, Ia. 360 meters. 400 mi. Hawk-Eye Home Elec. Co. Slogan, "Burlington, On The Mississippi." Tues, Thurs, 8-9 pm, concert. Central.

WIAT, Tarkio, Mo. 360 meters. Leon T. Noel.

WIAU, Le Mars, Ia. 360 meters. Am. Trust & Savings Bank.

WIL, Washington, D. C. 360 meters. 50 mi. Continental Elec. Supply Co. Daily 5:30-7 pm, music, entertainment. Eastern.

WIP, Philadelphia, Pa. 509 meters. 2,000 mi. Gimbel Bros. Slogan, "Watch Its Progress." Daily ex Sun. 1-2 pm, 3-4:30, 6-6:45, music; 7-7:30 pm, bedtime stories. Tues, Thurs, 8-10 pm, concert. Tues, Sat, 10:10-12 pm, concert. Sun, 11 am, church services, starting June 3, every alternate week; fill in weeks, 4:30 pm, concert. Eastern Daylight Saving.

WJAB, Lincoln, Nebr. 360 meters. 800 mi. Am. Elec. Co. Mon, Thurs, 9:30-10:15 pm, music, special. Sun, 8-9 pm, church services. Central.

WJAD, Waco, Tex. 360 meters. 500 mi. Jackson's Radio Engineering Lab. Daily ex Sun, 4-4:30 pm, news, music. Mon, Fri, 8-9, concert. Sun, 11-12 am, church service. Central.

WJAF, Muncie, Ind. 200 mi. Muncie Press and Smith Elec. Co. Daily ex Sun, 3:30-4 pm, news, music. Mon, Wed, Fri, 7-8 pm; Sat, 6-7 pm, music. Sun, 10-12 am, 2-3:30 pm, church services. Central.

WJAG, Norfolk, Nebr. 360 meters. 150 mi. Norfolk Daily News. Daily ex Sun, 12:15 pm, 5, 5:30, reports. Central.

WJAK, Stockdale, O. 360 meters. 250 mi. White Radio Lab. Slogan, "WJAK, of the Buckeye State." Mon, Thurs, 11 am, 4 pm, news, music. Thurs, 9-10:30 pm, dance music. Sat, 4 pm, bible lesson. Sun, 2-2:45 pm, church service. Central.

WJAM, Cedar Rapids, Ia. 268 meters. 100 mi. D. M. Perham. Slogan, "Cereal City of the World." Daily ex Sun, 9 am, 10:30, 12:15, markets, reports. Tues, Wed, Fri, 7:15 pm, music. Sun, 2:45 pm, music. Central.

WJAN, Peoria, Ill. 280 meters. 300 mi. Peoria Star. Slogan, "The Grandview City of Illinois." Daily ex Sun, 9:15 am, 10:30, 1:30 pm, markets, weather agriograms; 5:30, sports. Tues, 9:15-10:45 pm, concert. Central.

WJAQ, Topeka, Kan. 360 meters. 250 mi. Capper Publications. Schedule not regular. Central.

WJAR, Providence, R. I. 360 meters. 600 mi. The Outlet Co. Slogan, "The Gateway of Southern New England." Daily ex Sun, 10-11 am, 1-2:30 pm, 5-6. Mon, Tues, Thurs, 7-8 pm. Fri, 8-10 pm, concert. Eastern Daylight Saving.

WJAS, Pittsburgh, Pa. 360 meters. 150 mi. Pittsburgh Radio Supply House. Daily ex Sun, 11:30-12 m, 2:30-3 pm. Mon, Wed, Fri, 7:30-9 pm. Eastern.

WJAT, Marshall, Mo. 360 meters. 100 mi. Kelley-Vawter Jewelry Co. Daily ex Sun, 5:15-5:45 pm, concert. Central.

WJAX, Cleveland, O. 390 meters. 1,000 mi Union Trust Co. Slogan, "The Wave From Lake Erie." Daily ex Sat pm and Sun, 9-9:45 am, 10-10:45 2-2:45 pm, 3-3:45, music, financial reports, news. Tues, 7:30-9:30 pm; Thurs, 8-10:30 pm, entertainment. Eastern

WJAZ, Chicago, Ill. 448 meters. 1,500 mi. Zenith-Edgewater Beach (Chicago Radio Lab.) Daily ex. Sun and Mon, 10 pm-2 am, music, entertainment. Sun, 6-9 pm, concert. Central Daylight Saving.

(The third part of the station schedules will appear next week.)

Radio Illustrated

Broadcasting of drama has become quite popular. Here is Howard Lang in the part of "Emmett Sheridan," in "Thumbs Down," thrillo-drama recently broadcast via Station WOR, L. Bamberger & Co., Newark, N. J. This eastern station has found Radio matinees of Broadway hits not only entertaining to the afternoon listeners in, but profitable for the theater box offices

A seashore-Radio enthusiast is responsible for the sea shell loud speaker pictured at left. The curling spiral chambers of the shell make it ideal for a compact horn, and its tonal qualities are said to be very good. Arapahoe Indians (above), from the Wind River Reservation, Wyoming, enjoy their first Radio concert camping in their tepees in the heart of New York City while en route to England

Left © Atlantic Above © K. & H.

OCT 5 1923 © CIB587389

New Simplified Reflex; Series for Beginners

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VI. Copyright, 1923 R. D. P. Co. Inc. SATURDAY, SEPTEMBER 29, 1923 No. 12

NEW MILOPLEX CIRCUIT

PLANT PLAYS HYMN FOR DYING MOTHER

FANS BOW AT "NEARER MY GOD TO THEE"

Thousands Deeply Moved as California Station Fills Request of Failing Woman

By Jeffrey J. Dingman

SAN FRANCISCO.—A request from a dying woman that that immortal hymn "Nearer, My God, To Thee," be played for her over the Radiophone before she died was granted recently by Station KPO, Hale Brothers, here. Just at the close of the regular evening organ recital from KPO, a listener in telephoned the station, saying his mother, herself a Radiophan, was dying and that she wanted to hear "Nearer, My God, To Thee," by Radio before she died. The announcer at KPO, after telling his invisible audience of the cause, immediately had the selection played. Radiophans all over the United States and Canada heard the hymn and the announcement and bowed their heads in reverence at the solemnity of the occasion.

This occurrence is said to have established a precedent in broadcasting. It is believed that this is the first time such has been done.

Finita De Soria, above, is Spanish, if there are doubters who heard her sing a group of Spanish songs recently from WDT, New York. She will be remembered as prima donna of "The O'Brien Girl." Kay Laurell, left, star of "Whispering Wires" at the Princess Theater, Chicago, was heard recently in a sketch from that play from WMAQ, The Daily News

"Midgie" Miller, below, of "The Gingham Girl," Garrick Theater, Chicago, made a hit with middle western fans last week when she sang at Station KYW, Westinghouse Company, Chicago, Ill.

WIZARD SET WINS HONOR IN RESULTS

Costs Little to Build

Mystery Man Tells of Astounding Circuit—Remarkable Action Unexplained

CHICAGO—The Miloplex, so named by the inventor, a resident of this city who wishes to remain unknown, is with us as the latest and most promising member of the great family of Radio hook-ups. In a nutshell, the Miloplex requires but one tube and the least amount of apparatus possible, its tuning controls number but

(Continued on page 10)

EDISON, JR., BUSY ON ANTI-STATIC DEVICE

WILMINGTON, DEL. — Experiments toward eliminating static interference with Radio reception are being conducted by William L. Edison, son of the noted inventor, in his laboratory at Mendenhall, Pa. Young Edison said recently he believes he can perfect the device in a year. He does not think Radio will displace the phonograph. He said that while Radio makes possible broadcasts of song hits, those who hear them immediately go and buy the record.

ICELAND OPERATOR GETS WGY'S VOICE

Schenectady Station Is First American Plant Heard So Far North

SCHENECTADY, N. Y.—WGY is the first American broadcasting station to be heard in Iceland. In May, Snorri P. B. Arnar, chief Radio operator at Reykjavik, 2,600 miles from this city, picked up the General Electric Company station regularly, sometimes strong enough to operate a loud speaker, so his letter states.

COLD BLASTS BRING MORE COUPON FANS

NUMBER OF INQUIRIES CONTINUES TO GROW

Readers Can Turn in More Than One Series for Parts—Answers Question

SPECIAL REWARD OFFER

Coupon Number 18

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

Cold weather brings oysters and new Radiophans. And with new Radiophans come more demands for parts under the Radio Digest special reward offer to regular readers. It would surprise most people to see the increased interest in the special offer since Old Sol decided it was time for him to take his static interference down toward Mexico for a season.

The question is again asked by some readers whether or not they may save and send in two, duplicate series. Yes, is the answer. Just as long as each series is consecutive, so far as the numbers are concerned, there is absolutely no limit to the number of different series of coupons sent in by any one reader.

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Grid Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; 3" Radion Dial, black; 2¼" Radion Dial, black; 3"x1" Radion knob with shafts, ⅜" or ¼", black, 3" Radion Dial, ribbed surface.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack; 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 milhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm; 3¼" Radion Dial, black; 4" Radion Dial, black; 4" Radion Dial, black, ribbed surface.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat; 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. condenser; Walnart Variable Condenser (3-plate .0006 mfd.); Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 250 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Radion Panel ⅜"x7"x9", black or mahoganite; Radion Panel ⅜"x7"x12, black.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Radion Panel ⅜"x7"x12", mahoganite; Radion Panel ⅜"x7"x18", black; Radion Panel ⅜"x9"x14", black; Radion Panel ⅜"x10"x12", black.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .00025 mfd.); Turney Genuine Reinartz Coil; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial; Radion Panel ⅜"x7"x18" mahoganite; Radion Panel ⅜"x7"x21", black.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80), any one of the following articles will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser; Radion Panel ⅜"x7"x21", mahoganite; Radion Panel ⅜"x7"x24", black; Radion Panel ¼"x10"x12", black; Radion Panel ⅜"x9"x14", mahoganite; Radion Panel ⅜"x10"x12", mahoganite.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate; Radion Panel ⅜"x7"x24", mahoganite; Radion Panel ¼"x10"x12", mahoganite; Radion Panel ⅜"x12"x21", black; Radion Panel ⅜"x14"x18", black.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.00) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 228 W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Walnart Variable Condenser (23-Plate vernier); Dubilier Duratran (R. F. transformer); Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Thordarson A. F. Transformer, 6 to 1 Ratio. Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Head Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Radion Panel ⅜"x12"x21", mahoganite; Radion Panel ⅜"x14"x18", mahoganite.

Station WFI, Philadelphia, advocates every broadcast listener to fly the American flag from his aerial pole as a mark of patriotism.

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Looking Ahead

What Kind of a Rheostat to Use and When—Some real information about tubes, rheostats and batteries, by H. J. Marx next week. You may wonder when you should or shouldn't use a twenty-ohm rheostat. Read Mr. Marx' next article and get all the facts clear in your mind.

A Bearcat Circuit Is the Ultra Audion—But the new Radiophans don't always get their wiring just right. Next issue will show it in the form of a Simplex Diagram, and just to make sure the set builders won't go wrong there will be a rear view of an assembled set.

Hook-Up R.D.-100 Looked So Good that it was decided to give the photograph of the constructed set to show more clearly just how to put it together. Build this set from next week's details, hook it onto a loud speaker, and then let the set shout for itself!

Trouble Shooting Your Outfit—The subject Thomas W. Benson will discuss in Chapter XIX of his beginner's series next issue. He tells of testing instruments on page seventeen of this issue. Get the rest of the story next week, and keep both copies on file.

Everyone Learns Something New when they start reading all over again the underlying principles of Radio. Marvin W. Thompson starts such a series this week. Read about electrical and Radio terms in his second chapter.

Tricks of the Trade in the Kinks from Readers—Your fellow fan does something a little different than it has ever been done before. One such kink next week tells how five different capacity values are possible from one condenser simply by using a double switch control.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

ASK GREATER RANGE FOR CAVALRY'S SETS

OFFICERS' BOARD ADVOCATE IMPROVEMENTS

Motor Equipment for Larger Brigades Recommended to Replace Horse Pack, Report

FORT BLISS, TEX.—A report on the requirements of Radio equipment for the cavalry has just been completed by a board of cavalry and signal corps officers which met here recently. While the recommendations of the board have not as yet been made public, it is known that they contain considerable data as to improvements on existing army Radio sets, together with suggestions for the signal corps in designing new apparatus for the use of the cavalry in the field.

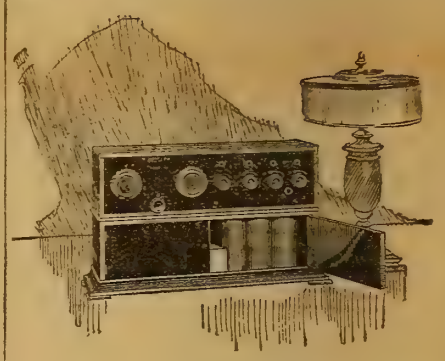
Both cavalry squadrons and regiments are now equipped with pack Radio telegraph sets known as SCR-127, a tube set capable of about sixty miles transmission. The apparatus, weighing 200 pounds, is divided when transported between three horses or mules, one pack holds the generator, another the batteries and aerial, and the third the set itself with spares and auxiliary equipment.

Will Recommend Motor Equipment

Brigade headquarters troops are outfitted with more powerful sets, designated as SCR-130, having a slightly longer range. This set is transported on a light spring wagon.

Recommendations of the board include methods of transportation, whether horse pack, by motor or by wagon, power plant, extent of wave band, range, weight and other specification for the new issue of Radio equipment for cavalry. It is believed that motor equipment for the larger units such as brigades will be recommended, and that the range of the sets will be extended over their present reach of sixty miles. Radio telephone equipment will not be assigned, since these sets are of greater weight than is practical for field transportation and Radio telegraph seems to serve the needs of the cavalry.

The signal corps is understood to be awaiting the report of the board before undertaking improvements on old sets or developing new equipment.



Abroad at Home

with a Crosley Model X-J

Price $65

Wonderful opera from New York, dance music from Chicago, stock quotations, current speeches, amusing stories from where you will—all these are brought to your home and fireside if you own a Crosley Model X-J.

This beautiful new Model, similar in construction to the famous Crosley Model X but with greater refinement of detail, is the last word in perfection among radio sets. Its low price—$65—the battery cabinet pictured above costs $16 extra—makes it doubly attractive and it more than lives up to the Crosley slogan—Better—Cost Less.

FOR SALE BY GOOD DEALERS EVERYWHERE

Write today for free Catalog which shows the complete Crosley Line

Crosley Manufacturing Co.

9495 Alfred Street Cincinnati, O.

GIVE SCHEDULE FOR FREQUENCY SIGNALS

OCTOBER, NOVEMBER AND DECEMBER LISTED

Department of Commerce Announces New Opportunities for Check-up and Adjustment of Wavemeters

By L. M. Lamm

WASHINGTON, D. C.—The Department of Commerce has announced the schedule of standard frequency Radio signals to be transmitted by the Bureau of Standards for the months of October, November and December. These signals are of interest to all transmitting station operators in checking wavemeters and adjusting transmitting and receiving apparatus. Their accuracy is better than three-tenths of one percent.

Commercial and ship operators should be especially interested in the transmission of October 20. The signals of November 20 cover approximately the same band as those of October 20. The signals of November 5 cover the frequency band used by Class B broadcasting stations. The frequencies transmitted on December 5 cover those used by all broadcasting stations as well as some used by amateurs.

Some Plants Off Assigned Waves

Measurements made at the bureau of the frequencies on which broadcasting stations are operated indicate that some stations are not remaining on their assigned frequencies, and hence are causing interference with programs from their own as well as other broadcasting stations.

The schedule followed in these transmissions will be slightly different from that followed in the past. All transmissions will be by unmodulated continuous wave telegraphy and no announcement will be made by voice. This considerably reduces the time of transmitting any one frequency. The signals will in other respects be similar to those transmitted in the past. A complete frequency transmission will include a "general call," a "standard frequency signal," and "announcements." The "general call" will be given at the beginning of the eight-minute period and will continue for about two minutes. This will include a statement of the frequency. The "standard frequency signal" will be a series of very long dashes with the call letters WWV intervening. This signal will continue for about four minutes. The "announcements" will be on the same frequency as the "standard frequency signal" just transmitted, and will contain a statement of the measured frequency. An announcement of the next frequency to be transmitted will then be given. There will then be a four-minute interval while the transmitting set is adjusted for the next frequency.

Can Calibrate Wavemeter

The complete schedule has been so planned that a wavemeter may be accurately calibrated over a range from 150 to 1,700 kilocycles, if all of the transmissions are received. With sensitive receiving apparatus it should be possible to receive these signals anywhere east of the Mississippi River.

The complete schedule of standard frequency signals to be transmitted follows:

Eastern Time	Oct. 20	Nov. 5	Nov. 20	Dec. 5
		KILOCYCLES		
	166.5	500	150	500
11:00-11:08 p. m.	(1800)*	(600)	(1999)	(600)
	220	580	190	700
11:12-11:20 p. m.	(1363)	(517)	(1578)	(438)
	275	640	240	900
11:24-11:32 p. m.	(1090)	(468)	(1249)	(333)
	315	700	290	1100
11:36-11:44 p. m.	(952)	(428)	(1034)	(273)
	375	760	360	1300
11:48-11:56 p. m.	(800)	(394)	(833)	(231)
	425	833	430	1500
12:00-12:08 a. m.	(705)	(360)	(697)	(200)
	500	920	500	1600
12:12-12:20 a. m.	(600)	(326)	(600)	(187)
	666	1000	570	1700
12:24-12:32 a. m.	(450)	(300)	(526)	(176)

*Wave length in meters is given in parentheses.

Oil Fleet Uses Radio Compass

PORTLAND, ORE.—Radio compasses are to be installed on all vessels of the Standard Oil Company's tanker fleet, according to word received here recently by the local agency of the Federal Telegraph Company. Orders for twelve compasses for the purpose have been given, it is said.

"PERSONAL" BY RADIO FINDS VET'S BUDDY

SALEM, MASS.—R. V. Griffin, sergeant in the World War, recently was amazed to hear his own name come from Station WGI. The Boston Red Cross was anxious to get in touch with him in behalf of a former comrade, Roy Van Steenburge of Portland, Ore. As a result of the broadcast Van Steenburge secured affidavits needed to obtain compensation for an injury received during the war.

OFFERS BLOOD ON BROADCAST APPEAL

LONDON.—A broadcast appeal for a subject for blood transfusion has resulted in a woman volunteer giving half a pint of her blood to another woman in a hospital here. The operation was successful. Appeals of this kind are no longer unique in England. One for volunteers for transfusion to a patient in King's College hospital was answered by over a score of people willing to give blood.

MILADY AND HER BOUDOIR SET

Miss Jean Tolley has ideas about how a lady's set should appear, especially if placed in one's boudoir. The receivers resemble a morning bandeau, wrapped with purple and orchid velvet flowers. The other disguise hides a loud speaker © K. & H.

LAKES SERVICE TAKEN UP BY INTER-CITY FIRM

Concern Plans to Open New Shore Stations

CLEVELAND.—The Radio service on the Great Lakes handled recently by the United States Navy Department stations has been taken over by the Intercity Radio Telegraph Company, of No. 949 Broadway, New York. The Cleveland station, WTK, is located in Hotel Cleveland. It uses a two-kilowatt quenched spark navy type set, built by Emil J. Simon, and operates continuously during the twenty-four hours on a 1,800-meter wave, under license of the Department of Commerce.

Other shore stations will shortly be opened by this company, to extend the service to the most important lake cities, and the stations will also be used for ordinary telegrams between cities.

The intercity stations at Chicago, Detroit and Cleveland have a wide range and hold several records for distance transmission. This development of a point-to-point Radio telegraph system in conjunction with the lake service is believed to be an important factor in U. S. internal communications.

New Radio Station for Mexico

WASHINGTON.—The General Electric Company has representatives at Caracas, Mexico, who are preparing a contract for the construction of a large Radio transmitting station there, it is understood.

FANS BUSY ON PLAYS FOR $500 CONTEST

WGY LISTS RULES FOR AIR DRAMA WRITERS

Announcement of Prize Awards Brings Hundreds of Letters from Listeners In

SCHENECTADY, N. Y.—The announcement by WGY, the General Electric Company station here, of a prize offer of $500 for the best Radio drama submitted during the three months' period ending November 30, has brought hundreds of letters of inquiry and there is every evidence that many contributions will be received.

Additional prizes in varying sums up to $100 will be awarded for other plays deemed suitable for Radio production. The offer of WGY is made for the purpose of stimulating interest in the writing and the development of a new form of drama, a play which reaches its fullest appreciation through the ear, the mind and the imagination.

Plays will be considered that fall under any of the following classes: drama, melodrama, comedy drama, comedy and farce comedy. Manuscripts must be original and accompanied by the written permission of the author (or, if copyrighted, by the person or persons controlling the copyright, giving the General Electric Company exclusive right to produce the play by Radio. Rights for use other than Radio may be reserved by the author. Two copies of each play must be forwarded and should be sent by registered mail. The author should retain a complete copy.

More Conditions of Contest

The author's name must not appear on any manuscript offered in competition. Instead, the manuscript should be signed with a nom de plume which must also be written on a sealed envelope containing the contestant's real name, address and permission granting exclusive right to produce the play by Radio. This envelope should be enclosed with the manuscript and will not be opened until the award has been made. A synopsis of the play must be attached to each manuscript.

A play requiring one and a half hours for performance is desirable. In any case the time should not exceed two hours. Small cast plays, employing five or six characters are best adapted to Radio, as they permit quick comprehension of the plot and give rise to no confusion in distinguishing characters. Plots must be clean with no attempt at questionable situations.

SEATTLE PLANTS ON BOOM WITH AUTUMN

Pioneer in Washington State Still Retains Lead with Four Stations

SEATTLE, WASH.—Radio is on the boom in Seattle again. This city was the pioneer in the State of Washington in broadcasting, beginning early in 1922, and still retains the lead. There are four large stations in operation in the city, all but one of which have been put into commission within the past two weeks.

KFJC, under the auspices of the Seattle Post-Intelligencer, opened a splendid Class A station with an auspicious program recently. The Post-Intelligencer operated the first broadcasting station in the state, KFC, but this was discontinued in January, after a long run of service. The service has been resumed, however, on a much larger scale than before. KFJC operates on a 233-meter wave length.

KDZE recently opened a 500-watt broadcasting station under the direction of the Rhodes Company, local department store, and the Kilbourne-Clarke Company, Radio manufacturers. They are operating a splendid Class B station with good results.

KFIY is the call of the Star Electric Company broadcasting station, another recent addition to the Seattle broadcasters.

THE ANTENNA BROTHERS — Spir L. and Lew P. — An Easy Way to Get There

ENTERTAINERS LAND JOBS BY BROADCAST

ENGAGEMENTS OFFERED ON RADIO ABILITY

Singers and Even Entire Orchestra Win Permanent Position Through Airphone Concerts

By A. K. Chenoweth

COLUMBUS, O.—Broadcasting stations doing regular duty in Columbus not only are filling the role of impressario, but also are proving to be high grade booking agencies for musical talent, according to reports from the owners and managers. They have dozens of cases on file of Radio performers who have secured temporary or permanent engagements through the medium of playing or singing on programs given to the keeping of the air.

One of the notable examples was when a short program was broadcast by the signal corps station at Ohio State university, Columbus, with the Columbus Dispatch acting as impressario. One of the women singers on the program promptly was engaged for a group of songs in a neighboring town.

Has Long List of Similar Cases

It is a long list of such cases which Mrs. C. A. Entrekin, studio manager for Station WCAH, the Entrekin Electric Company, can cite to the questioning artists. Offhand Mrs. Entrekin names two woman singers who were benefited by broadcast performances. One of these immediately was elevated to a better position in church singing and another secured an engagement carrying with it substantial pay.

Two orchestras were hired to play shortly after they played their music in front of the microphone at Station WCAH. In each of these cases they were engaged by telephone and the contracts later verified by writing. There are many examples of music teachers obtaining pupils, and one young male singer soon will be given the opportunity of having his voice recorded for the phonograph. At least one juvenile singer has secured a choir tryout as a result of his Radio performance.

Music Teachers Laud Radio

Teachers of music as a rule are very desirous of having their proteges sing or play before the microphone. "Clothes and general appearance have no effect whatsoever when the pupils appear on a Radio program," one of them states. "Quality alone counts, and that is what we are working for in the training of youthful voices or hands."

Immediately after a jazz orchestra played on a program for Station WBAV, one of the Erner & Hopkins Company here, the management of one of Columbus' largest restaurants called the station and asked for the manager of the musicians. Terms of a contract were arranged by phone and the company of players left the building in automobiles, being taken to the restaurant for immediate work.

Station Also Discovers Talent

The young lady who arranges most of the programs for WBAV cites one unusual case where the station acted as discoverers of talent. A performer billed to sing on a certain evening failed to show up, and in desperation the girl turned to a young man living in her neighborhood, known only as an amateur singer, and asked him to fill in. He did, with the result that one Columbus hotel immediately asked for his services. Ultimately he secured a position in a Columbus church quartet. Three offers for individual engagements were received at the station on the night of his first and only Radio performance.

More amazing still is the record number of engagements which an aggregation of young men from Ohio State university working together as entertainers, received after rendering a group of numbers for Station WPAL, the Superior Radio and Telephone Equipment Company here. During their studio performance a fan in St. Louis sent in a long distance telephone call at his own expense asking for encores of a certain selection. Two contracts were made by telephone on the same night, and it is reported that the talented young men are still filling engagements made as a direct result of one night's work.

TELLS HOW TO PUT MOVIE MAKE-UP ON

Lon Chaney, celebrated star of the silver sheet, recently told the fair and lesser sex listening to WOR, Newark, N. J., just how to proceed when "Making Up for Motion Pictures." Mr. Chaney is famous for his ability as a contortionist. It was because of this ability, partly, that he was chosen to play the lead in "The Hunchback of Notre Dame," a picture which was directed by loud speakers connected with Radio voice amplifiers

State Fair Program Enjoyed at Special Broadcast Station

LONDON, O.—Local Radio fans did not find it necessary to go to Columbus in order to enjoy the recent annual state fair there. The Erner & Hopkins Company of Columbus had installed a special broadcasting station on the grounds which sent out information regarding the programs for different days, winners of exhibitions, entertainment and information of the crowds. Broadcasting was started about noon every day and continued throughout the afternoon. Music from bands at the grounds was also sent out, including a concert given in the evening at the coliseum by the Red Hussar band.

Swedish Radio Rules Curious

WASHINGTON.—The status of broadcasting in Sweden is a curious one; the government has now decided that transmitting stations will be constructed by the state, but will be leased to operating companies. Receiving stations may be established by private persons upon obtaining a license from the government.

Studio Operator Barely Escapes Electrocution

Makes Contact with 2,000 Volts, Current Bores Hole in Arm

CALGARY, ALTA.—W. W. Grant, president of the firm operating Station CFCN here, narrowly escaped death by electrocution recently when making an adjustment. His arm inadvertently slipped and contact was established with a line carrying 2,000 volts. All that saved Mr. Grant from being badly burned was that contact was established with only one arm, the current going into the arm just above the elbow and emerging at all five finger tips on the arm burned. A hole an eighth of an inch in diameter and so deep that the bone could be plainly seen was burned in his arm, paralyzing it so that he did not regain full use of the injured member for several days.

Mr. Grant was unable to broadcast that night. The veteran operator said that in the course of his life work in Radio he has been burned and has sustained electrical shocks several times, but never such a severe one. The fact that the current traveled downward in the arm instead of up saved his life.

Station WGI Produces First Radario by Harvard Writer

MEDFORD, MASS. — George Brinton Beal, known as a newswriter and playwright, has written a one-act play, which was produced recently by the Amrad Players over Station WGI here. It is entitled "Bringing Mother Back." Another of his one-act plays will soon be produced by the Amrad Players.

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WBAP HAS PICK-UP USED BY HARDING

Fort Worth Plant to Keep Microphone into Which Late President Talked

FORT WORTH, TEX.—WBAP, Star-Telegram, has received the super-sensitive microphone used by the late President Harding in his speech at St. Louis, June 21. The transmitter will be employed in connection with the in-put amplifier system. This system enables programs to be broadcast from any part of the city with as much efficiency as if they were being sent out from the studio itself.

Upon the microphone is inscribed the words: "Used by President Harding in St. Louis, June 21, 1923." Radiophans will recall that this memorable speech was re-broadcast by WBAP, using a long distance line of the Southwestern Bell Telephone Company and the aid of a member of the American Radio Relay League at St. Louis.

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Just off the press! The greatest book on Radio ever written. Price only $1. Filled with sound, practical, tested information for every radio fan, from beginner to hard-boiled owl. Written, compiled, and edited by men of national reputation. Every page tells you something useful—and there are 514 pages. Mail $1 to-day and get this I. C. S. Radio Handbook before you spend another cent on parts.

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Dept. R. D. 5680 12th St., DETROIT, MICH.

BROADCAST MATINEE FOR IRELAND

While every other country has been listening to, and hearing, American broadcasting stations, poor little Ireland has been left forlorn. But Will Morrissey, son of the Emerald Isle, and theatrical producer, noticed the deficiency, and had his latest show, "The Newcomers," now at the Ambassador Theater, New York, give a special matinee recently before the microphone of the famous trans-Atlantic broadcaster, WOR. The performance was addressed to the people of Ireland, and it is reported that a number of receiving sets on the "Old Sod" were able to hear the show. Left, above, are Mason and Shaw, nationally known comedy team with "The Newcomers," and, right, two members of the beauty chorus

OPERATE CREWLESS BOAT BY AIR BRAINS

STARTS, TURNS AND STOPS AT BROADCAST SIGNALS

Craft, Moored Far into Lake Ontario, Is Called Wonder of the Age

By A. H. Munday

TORONTO, QUE.—Hailed as the first boat to be controlled by Radio in Canada, a boat equipped with special apparatus has during the past few weeks carried out extensive trips along the waterfront at the Canadian National Exhibition here. The boat, without a soul on board, and moored a long distance out in Lake Ontario, has been made to start, proceed, turn right or left and stop at will by a system of Radio signals broadcasted from Station CFCA, the Toronto Daily Star. The boat has been called by all who saw it the wonder of the age, and has, in Canada at least, marked a new step in Radio progress.

The inventor is Alfred Starr of Toronto. In a special interview for Radio Digest he said: "The boat is equipped with a standard receiver and amplifier which actuate a relay of special design.

Selector "Brains" of Mechanism

"The various functions of starting, steering and stopping are carried out by the master relay acting through a device called a selector, which is the 'brains' of the mechanism. The selector interrupts the code signals received, and distributes them to the proper channels, such as the starting mechanism or the steering gear. Thus a certain combination of signals will start the boat, another combination will steer the boat to port or starboard and still another combination will stop the boat.

"The electrical steering gear is of special design. It is arranged so that the rudder is held in port or starboard as long as desired by the operator on shore. On the completion of a steering operation the rudder is automatically centered by the steering gear. The boat is propelled by a small direct current motor the current for which is supplied by storage batteries."

University Adds Radio Course

SALT LAKE CITY, UTAH.—Practical instruction in Radio is to be added to the work of the reserve officers' training corps unit at the University of Utah this fall. The university has two sets of Radio apparatus, which will be put in order, and in addition there will be visits to the great receiving station at Fort Douglas nearby. All male students of the university are eligible for enrollment.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	6:00- 7:00	4:45- 5:45
CFCN, Calgary, Alta.	440	10:00-11:00	.....	.....	.....	11:30- 1:30	11:00- 1:00	.....
CKAC, Montreal, Que.	430	.....	6:00- 9:00	.....	6:00- 9:00	.....	.....	.....
KDKA, E Pittsburgh, Pa.	326	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	4:00- 9:00	6:30- 7:30
KDZE, Seattle, Wash.	455	5:00- 6:00	.....	6:00- 7:00	.....	5:00- 6:00	.....	.....
KFAF, Denver, Colo.	360	9:00-10:00	9:00-10:00	9:00-10:00	8:30- 9:00	9:00-10:00	9:00-10:00	.....
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:30- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00	.....	10:00-12:00	.....	10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00	.....	8:00-10:00	8:00-10:00	.....
KYW, Chicago, Ill.	345	.....	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	.....
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40	.....	.....
PWX, Havana, Cuba	400	.....	.....	8:00-10:30	.....	.....	8:00-10:30	.....
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	7:30- 8:00
WBAV, Columbus, O.	390	7:00- 9:00	.....	.....	.....	.....	.....	.....
WBZ, Springfield, Mass.	337	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	5:00- 8:00	6:30- 8:00	7:30- 8:30
WCAP, Washington, D. C.	469	.....	5:30- 6:30	.....	8:45-11:00	.....	5:30-11:00	5:20- 8:00
WCBD, Zion, Ill.	345	7:00- 9:00	.....	.....	.....	7:00- 9:00	.....	.....
WCX, Detroit, Mich.	517	7:30- 9:00	7:30-11:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....	6:15- 7:15
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	4:00- 5:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30	7:30-11:30
WDAP, Chicago, Ill.	360	.....	6:00- 1:00	6-00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	5:30- 8:55	5:30- 6:00	5:30- 9:00	5:30- 6:00	5:30-11:00	5:30- 6:00	.....
WDT, New York, N. Y.	405	.....	.....	5:00- 5:50	.....	9:00-10:00	.....	.....
WEAF, New York, N. Y.	492	.....	5:30- 6:00	5:30- 8:00	5:30- 8:00	5:30- 6:00	5:30- 8:00	.....
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00	.....	8:30- 9:30	8:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:00- 5:30	5:00- 7:00	5:00- 9:30	5:00- 7:00	5:00- 5:30	.....	5:30- 6:30
WGI, Medford, Mass.	360	.....	5:00- 7:30	5:30- 8:00	5:00- 7:30	5:30- 8:00	5:30- 8:00	6:30-10:00
WGM, Atlanta, Ga.	429	9:30-10:30	9:30-10:30	12:00- 1:00	9:30-10:30	9:30-10:30	9:30-10:30	7:30- 8:00
WGR, Buffalo, N. Y.	319	4:30- 8:00	4:30- 6:45	4:30- 8:00	4:30- 5:30	5:30- 8:00	4:30- 6:45	.....
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00	.....	6:45- 9:00	6:45-11:00	.....	5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30	.....	7:30- 8:30	.....	7:30- 8:30	.....	.....
WHAS, Louisville, Ky.	400	.....	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	.....
WHAZ, Troy, N. Y.	380	8:00- 9:30	.....	.....	.....	.....	.....	.....
WHB, Kansas City, Mo.	411	.....	8:00-10:00	.....	8:00-10:00	.....	.....	8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WHN, Brooklyn, N. Y.	360	6:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00
WIP, Philadelphia, Pa.	509	4:00- 5:30	4:00-10:00	4:00- 5:30	4:00- 8:00	4:00- 5:30	4:00-10:00	.....
WJAX, Cleveland, O.	390	.....	6:30- 8:30	.....	6:00- 8:30	.....	.....	.....
WJAZ, Chicago, Ill.	448	.....	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	9:00- 1:00	5:00- 8:00
WJY, New York, N. Y.	405	.....	5:30- 9:30	.....	5:30- 9:30	5:30- 9:30	.....	4:00- 4:30
WJZ, New York, N. Y.	455	5:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 9:30	5:30- 9:30	5:30- 9:30	6:30- 8:30
WKAQ, San Juan, P. R.	360	.....	9:00-10:55	.....	.....	.....	9:00-10:55	.....
WLAG, Minneapolis, Minn.	417	5:30-10:00	5:30-10:00	5:30-12:00	5:30-10:00	5:30-12:00	6:30-10:30	7:45- 8:45
WLW, Cincinnati, O.	309	7:00- 9:00	9:00-11:00	7:00- 9:00	9:00-11:00	.....	.....	.....
WMAQ, Chicago, Ill.	448	.....	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	6:00- 9:00	.....
WMC, Memphis, Tenn.	500	8:00- 9:30	8:00-12:00	.....	8:00- 9:30	8:00-12:00	8:00- 9:30	.....
WNAC, Boston, Mass.	278	.....	7:00- 9:00	8:00-10:00	7:00- 9:00	7:00- 9:00	8:00-10:00	5:30- 7:30
WOAI, San Antonio, Texas	385	.....	9:30-10:30	.....	7:30- 8:30	.....	9:30-10:30	5:00- 6:00
WOAW, Omaha, Neb.	526	9.00-10:00	9:00-10:00	.....	9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	7:00- 8:30	.....	10:00-11:00	7:00- 8:30	7:00- 8:30	9:30-10:30	7:00- 9:00
WOO, Philadelphia, Pa.	509	5:45- 9:00	.....	.....	.....	5:45- 9:00	.....	.....
WOR, Newark, N. J.	405	6:00-10:00	4:15- 5:30	6:00-10:00	4:15- 5:30	4:15- 5:30	6:00-10:00	.....
WOS, Jefferson City, Mo.	441	8:00- 9:30	.....	8:00- 9:30	.....	8:00- 9:30	.....	.....
WSAI, Cincinnati, O.	309	.....	7:00- 9:00	.....	7:00- 9:00	.....	9:00-11:00	.....
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00 12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	8:00- 8:45	.....	8:00- 8:45	.....	8:00- 8:45	.....	7:30- 8:30
WWJ, Detroit, Mich.	517	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	6:00- 7:30	.....	7:30- 8:30

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours. If in addition your city is using Daylight Saving Time, add one hour to this result.

Broadcasting in Southern France

WASHINGTON.—An attempt is being made by local business men in Marseilles to establish a broadcasting station in collaboration with the newspapers of the city.

Italy Begins Broadcasting

WASHINGTON.—An agreement between a number of Italian Radio manufacturers, whereby a broadcasting station is to be constructed.

NC-4 FIRST TO USE AIRCRAFT COMPASS

PREVENTED FAILURE OF ATLANTIC FLIGHT

Commander of Flying Boat Picks Up Lost Course by Aid of Radio

By Carl H. Butman

WASHINGTON.—The use of the Radio compass on aircraft of the navy dates back to the trans-Atlantic flight of the three NC boats in May, 1919, on which occasion Commander Reed of the NC-4 made a very practical use of his direction-finding instrument.

In taking off from Horta, Azores, to Lisbon, the third leg of the trip, Commander Reed in his report states that a rather hard "porpoise," or bump on the surface of the sea, was made. This caused one of the gimbals of the navigator's compass to jump out, causing an error of 7 to 8 degrees, although it was not known until some time later. The first destroyer stationed on the route was picked up apparently in its proper place, but it must have been south of its position on a line to Lisbon, it was discovered later. The NC-4 passed ten to twelve miles to the south of Destroyer No. 2, only the smoke being sighted, while No. 3 was not seen at all.

Radio Compass Corrects Error

Commander Reed here decided he was far south of his route and headed north. With the aid of his Radio compass he picked up Destroyer No. 4 just off his port bow, and then continued eastward, sighting all the remaining destroyers as he proceeded to Lisbon.

If he had not been able to check his position, or locate the fourth destroyer by means of the Radio compass, it is possible that he would not have reached Lisbon, and the trans-Atlantic air trip might never have been completed.

Today, many naval long range aircraft, including the ZR-1 airship, are fitted out with Radio compasses in the interests of safety and so that navigators can check their positions independently of their regular compasses.

Madagascar Has Receiving Station

WASHINGTON.—Pending the establishment of a permanent Radio station at Tullear Bay, Madagascar, a temporary receiving station with the call FTL has been established. This station receives on a wave length of 600 meters from 9 to 11 a. m. and 7:30 to 9:30 p. m. daily.

Walter Tison, operator for Station WSB, the Atlanta Journal, heard Miss Carolyn Hinkle playing her guitar and singing in Virginia. He wrote to praise her art and now they are going to be married.

SONG BIRDS OF CHICAGO POLICE FORCE ON AIR

This line-up represents the pick of the song birds of the Chicago Police Department as they broadcast one of their favorite selections at their recent field meet in Grant Park, Chicago. Many attempts have been made to induce these men to go in vaudeville © U. & U.

WGR Presents Receiving Set to Buffalo City Hospital

BUFFALO, N. Y.—Mayor Francis X. Schwab was recently the recipient of a complete wide range receiving set for the patients of tuberculosis and similar diseases at the Buffalo City hospital located at Perrysburg, N. Y. The set was given by the Federal Telephone & Telegraph Co., through the interest of M. A. Rigg, manager of Station WGR, and J. P. Quinn, director of an orchestra which frequently broadcasts there.

Good Book Talk by Publisher

NEWARK, N. J.—Congressman David J. O'Connell of Brooklyn, connected with metropolitan book publishing for more than forty years, recently delivered a short lecture entitled, "The Value of Good Books," at Station WOR, L. Bamberger & Co., here.

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Purpose of Special Plate Lead

(Submitted by A. E. C., Toronto, Canada.)

Question. What is the function of the special lead from the plate circuit and how does it operate?

Is there any special reason why the grid leak is connected across the grid condenser instead of the positive A?

If a .001 variable condenser were connected in parallel with .006, should it not control the blocking frequency more easily than a variable grid leak only?

Answer. Your first question is a rather difficult one to answer specifically, but we might say that in general it is used as a tie back for the plate voltage. Every circuit has its little peculiarities in the wiring diagram that are of more or less importance. The lead you speak of is, however, of very prime importance in the Flewelling circuit and should be connected exactly as shown in the diagrams. There is not much opportunity for variation here.

So far as the reason for connecting the grid leak across the condenser is concerned, there is plenty of leeway. The circuit will function just as well, so far as we have been able to find out, if the leak is carried over the grid to one of the A terminals; which one depending upon where the best results are secured. As a matter of fact, I often prefer, for convenience sake, to use a leak at this point rather than across the condenser. It is then, as you can see, entirely optional.

The use of a .001 variable condenser in parallel with .006 would be a useless waste of time as you would not notice any effect from this addition. Many attempts have been made to place variable condensers at this point and without much success, as you will see from the following: As a rule, a circuit will work best with a .006 condenser—never any less, but frequently very much more. A good saving and sure value is that given by two .006 condensers in parallel, or a total capacity of .012. Above this point not much effect is shown until values in the neighborhood of .25 mfd. are used, at which point we begin to lose the benefits. It is, however, possible and rather convenient to control the blocking frequency by the use of a variable grid condenser rather than a variable grid leak. The best way to do this is to place a fixed grid leak of 1 or 2 megohms in the regular circuit, as shown—it makes no difference which size—and substitute a fixed .00025 grid condenser with a .001 variable condenser. It will be found then that the blocking frequency may be controlled over wide limits. This is a very convenient way in which to do it, but has not been referred to much before this, because the use of a variable grid condenser, due to its effect on the tuning of the circuit, really complicates the tuning operation and makes the set a little more difficult to operate. There is a point in this—that is, combinations of grid leaks and grid condensers—well worth investigation by those who care to experiment with the circuit.

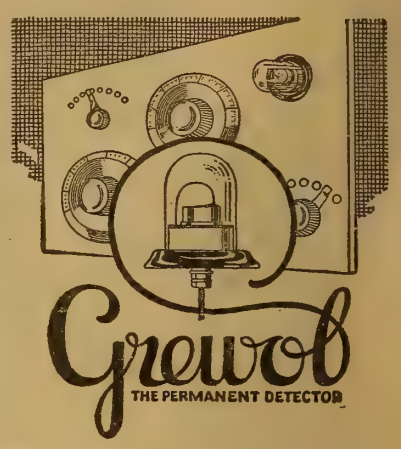
Paris taxicabs are on the boulevards with Radio receiving sets to entertain the fares. Concerts are picked up from the Eiffel Tower, as well as England and Holland. The fare is two francs higher.

Speeding Train Keeps in Touch with World's News

Convention Special Brings Concerts to Its Passengers

CALGARY, ALTA.—An observation car equipped with a Radio set for the purpose of receiving messages and concerts for passengers in the car was one of the features of the special train which left here recently for Victoria, B. C. The annual convention of the Association of Canadian Clubs was to be held in that city, and one of the most complete trains ever operated over a railway system in Canada carried the delegates. Arrangements were made with newspapers and firms broadcasting Radio concerts to broadcast to the train programs of entertainments and the world's news during the progress of the journey.

The dining cars of the palatial train were equipped with phonographs operated by special storage batteries, and passengers were entertained while eating.



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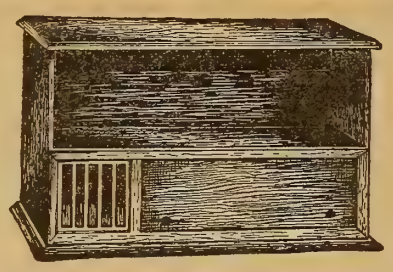

LOUD SPEAKER CABINET

This Cabinet has the best features of Modern Radio Equipment. Install your favorite hook-up in it, making an attractive, complete set at a very moderate cost. Panel size is 7x21. A Horn is built in the lower compartment, equipped to receive any Standard Speaker Unit.

Price $12.00

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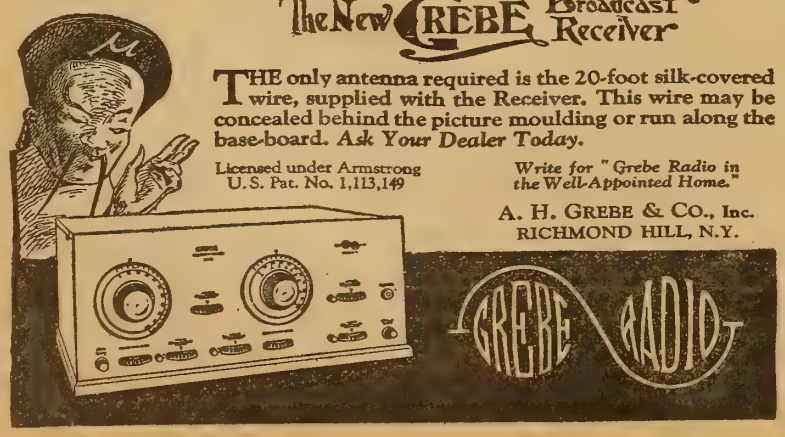
The Highest Refinements in Modern Radio—

Regeneration and Tuned Radio Frequency Amplification—find their first successful combination in

The New GREBE Broadcast Receiver



THE only antenna required is the 20-foot silk-covered wire, supplied with the Receiver. This wire may be concealed behind the picture moulding or run along the base-board. *Ask Your Dealer Today.*

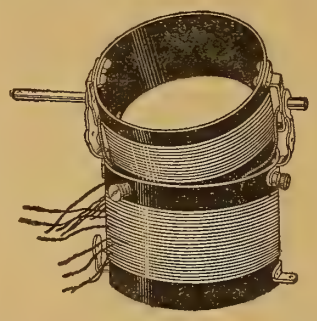
Licensed under Armstrong U.S. Pat. No. 1,113,149

Write for "Grebe Radio in the Well-Appointed Home."

A. H. GREBE & CO., Inc.
RICHMOND HILL, N.Y.

Closer Tuning — Greater Selectivity with the Federal Variocoupler, No. 95

$7.00



130 Federal Standard Radio parts offer the radio enthusiast a complete line of guaranteed parts of one quality—the best.

THIS variocoupler makes it easy to tune out local interference and bring in DX stations, because the relation between primary and secondary provides selective coupling over a wide range.

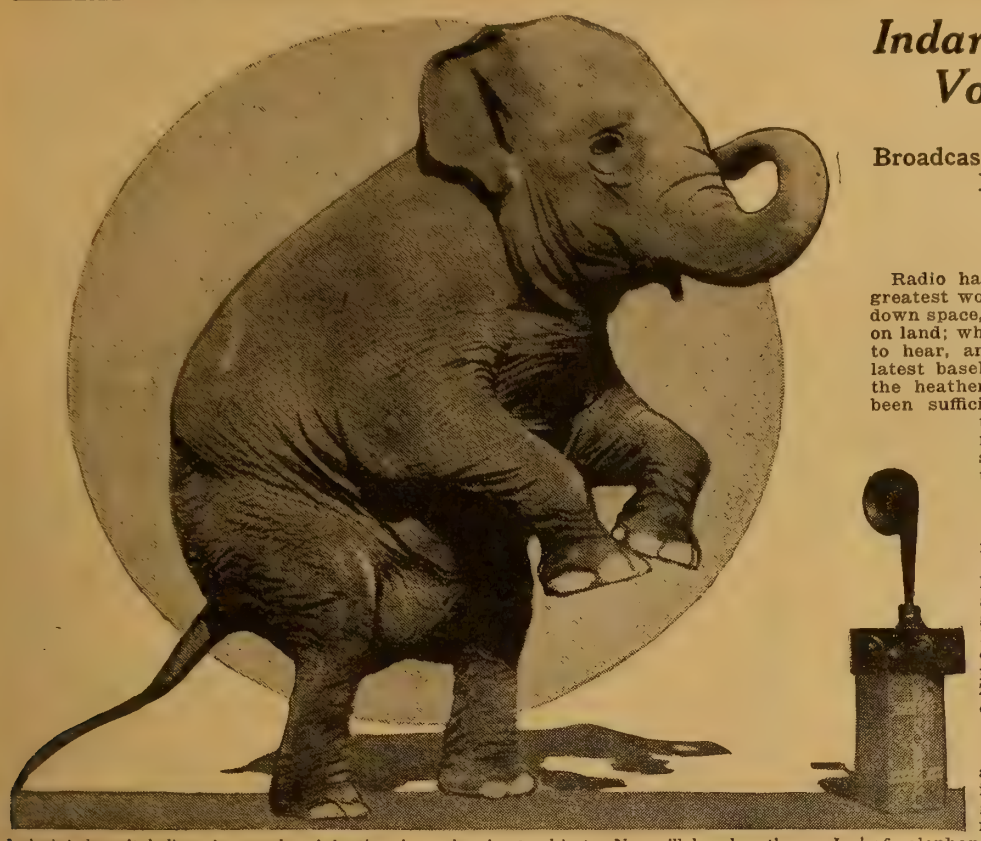
Federal engineers made a searching and extended study before determining primary and secondary inductance values—and every detail of construction meets the Federal standard of workmanship.

Improve your set's performance with a No. 95 Federal Variocoupler, $7.00.

Federal Telephone and Telegraph Company
Factory: Buffalo, N. Y.
Boston New York Philadelphia Chicago
San Francisco Pittsburgh
Bridgeburg, Canada London, England

Federal Radio Equipment

HE WAS A WISE OLD ELEPHANT!



Indarini doesn't believe in sounds originating in an inanimate object. Nor will he obey them. In fact, he was very highly indignant, as this photo of him will substantiate © U. & U.

Indarini Didn't Recognize His Master's Voice; Zoo Elephant Proves Waterloo

Broadcasting Meets Obstacle in Huge Form of Zoo's Prize Specimen—He Just Couldn't Believe It Was Syed Ali Who Told Him by Radio to "Eat His Hay"

By E. E. Leibner

Radio has been stumped at last. The greatest wonder of the age, which has cut down space, helped cure the sick at sea and on land; which has made many of the deaf to hear, and which could have sent the latest baseball scores and live news into the heathen lands, had the people there been sufficiently interested, has encountered its first, apparently insurmountable obstacle in the massive form of an elephant in captivity.

The waves that have carried almost every known sound through the air, as well as many sounds and squeaks and speeches hitherto unknown, have finally cracked under the strain of the elephant language. And Syed Ali, native Indian mahout, nurse and companion of Indarini, the prize elephant of the London Zoo, has lost all faith in modern methods and contraptions.

Inherit Elephant Lingo

It seems that for centuries and centuries, dating back into the dim mists of the beginnings of time, the Indian mahouts, keepers and trainers of elephants, have inherited, son from father, an elephant language that all the huge pachyderms heed, understand and obey. The principal commands in this "Hathi ki Bat"—"Tongue of the Elephants"—are:

Eat your hay! Drink the water! Get up! Lie down! Pick it up! Pull! Stop that noise!

"Indarini is a smart elephant," said Syed Ali, the London keeper, to himself, "but not quite up-to-date. I'll have to teach him some of the new ways."

Ali Decides to Broadcast

So Ali dressed himself in state clothes, with crimson headdress and all, and went to a broadcasting station four miles away from the Zoo. He was going to give his orders to Indarini, the elephant, in the way of 1923—by Radio.

Arriving at the station, Syed Ali sent out his commands. From the attendants, who remained at the Zoo to watch the developments, he soon received reports by telephone, regarding the outcome of his experiment.

Did Indarini obey the commands? He did not.

Indarini Says, "Nothing Doing"

Did he heed his master's voice? Nothing doing on that score. After several attempts, Ali gave up the attempt in disgust. For instead of following the commands of his master, the elephant went on calmly munching the apples, potatoes and locust beans that the London kids, visiting the Zoo, offered him.

Zoologists now believe that elephants will not obey a disembodied voice. These animals apparently must see and smell their master—and they can't do that by Radio—yet.

And that presents an opportunity for some ambitious, far-seeing and ingenious inventor to carve his name in the hall of fame.

Queen Alexandra returned thanks to the British people for their greeting on the sixtieth anniversary of her wedding day by broadcasting.

RADIO WILL GUIDE ZR-3 ACROSS OCEAN

TO HELP GIANT ZEPPELIN ON 3,600-MILE TRIP

Giant German-Built Craft to Be Protected on Flight by Weather Broadcasts

By Carl H. Butman

WASHINGTON.—Early in November it is expected that the Zeppelin Company will point the nose of the great ZR-3 toward the West and the long overseas journey of the navy's second airship will begin. On her maiden trip to her American home at Lakehurst, N. J., a distance of approximately 3,600 nautical miles, Radio will guide this latest Zeppelin.

She will not be under Radio control, as was the old battleship "Iowa" when sunk by naval gunfire, but Radio will carry to her twice daily complete forecasts of the weather ahead and the meteorological conditions on the southern trans-Atlantic steamship route along which, it is understood, she will proceed under the direction of the German officers and crew. The only American officer who is certain of making the trip over is Capt. G. W. Steele, U. S. N., her future commander.

Description of Giant Craft

Briefly, the characteristics of the new aerial passenger cruiser (she is not a war craft, at least not yet) are: Length 660 feet, slightly less than the American built ZR-1; diameter, 90 feet; power, four 400 horsepower Maybach engines, giving a speed of approximately 80 miles per hour.

Through arrangements between the weather bureau, navy, shipping board vessels and certain other north Atlantic ships, meteorological data from all along the ZR-3's route will be compiled and Radioed twice a day to a station ship in mid-Atlantic. This vessel will have a powerful Radio set and will transmit to NAA, Arlington, Va., bulletins for broadcasting to the ZR-3, both before and during her flight.

Little is known of the Radio equipment of the ZR-3, but it is said that it is also of the latest German type, and that transmission and reception are assured all the way across the Atlantic, although half that range would be sufficient, due to the cooperation of the station ship and NAA.

New Service for Lake Shipping

WASHINGTON, D. C.—Weather bulletins and hydrographic information are being broadcast twice daily by the Intercity Radio Company, located in Cleveland, on Lake Erie. The service is intended for the shipping on the Great Lakes, and will be broadcast on a wave length of 706 meters, spark. The call of the station is WTK. This station also is licensed to communicate with Rogers City, Mich., on a wave of 1,764 meters.

STOPS PROGRAM TO AID GROUNDED SHIP

WJAZ Picks Up Distress Call of Stranded Vessel in Lake Michigan

CHICAGO.—For the first time in the history of Great Lakes navigation a broadcasting station came to the rescue of a distressed steamship, when Station WJAZ, the Edgewater Beach hotel, recently picked up the SOS call of the Canadian Adventurer off the harbor of South Chicago.

While the program of the broadcasting station was being given, one of the receiving sets, equipped with a wave trap for the reception of signals on a different wave length than that used by the broadcasting station, picked up the distress signal.

R. H. G. Mathews, manager of the central division of the American Radio Relay league, and one of the owners of Station WJAZ, ordered the program stopped and took down the following message:

"SOS. Send tug to Canadian Adventurer, aground outside South Chicago pier."

Mr. Mathews communicated with the ship and learned that the operator had been frantically endeavoring to rouse the Great Lakes station. He then phoned the Dunham Towing company, which at once dispatched tugs to pull the vessel off the shoal. The craft was not damaged.

FRANCE AND AMERICA STANDARDIZE WAVES

Compare Frequencies Used in Trans-Atlantic Communication

WASHINGTON.—In an effort to standardize Radio frequencies used in trans-Atlantic communication, the Navy Department is co-operating with the French Government and once a month the frequencies of the Annapolis and Lafayette Radio stations are recorded and compared. Transmission on standard frequencies, or wave lengths, is essential to efficient communication in order that all stations can keep to the wave length assigned them by national or international law. Special efforts are now being made by the United States and foreign governments to keep all their stations on the prescribed waves and it is essential that their standards be equivalent and their instruments be calibrated.

When all stations maintain their proper wave lengths or frequencies exactly, tuning in will be more readily accomplished, it is pointed out, the process approaching the simple adjustment of a dial to a known position. Perhaps dials will be marked "London," "Paris," "Berlin," etc., in the future.

John Osborn, well-known Philadelphian, attracted considerable attention recently by appearing on the Fairmount Park bridle path wearing a complete portable Radio set with a loop aerial on his back.

The "B" Battery is the Life of Your Radio Set

THIS IS NUMBER ONE OF A SERIES

THE only function of your Radio set is to produce sound-waves—those mechanical disturbances in the air caused by some rapidly vibrating body. So far as the Radio set itself is concerned the actual source of the sound is the "B" Battery. It is not an exaggeration to say that the "B" battery is the "life of your Radio"; for the set itself is simply a device to reproduce sounds, and the sounds all have their origin in the "B" Battery.

The "B" Battery is simply a box full of electrical energy; harnessed for you by experts. Without the Radio wave the flow of energy from the "B" battery is smooth, steady and *silent*. It is the final aim and purpose of all the many parts which go to make up a Radio receiving set, to convert the otherwise steady flow of electrical energy from the "B" Battery, into a rippling, vibrating, throbbing, audible current.

As the sound-waves—whether caused by the human voice in talking or singing, or by musical instruments—are modulated up and down—now high—now low; so does the current from the strongly vital "B" Battery follow the modulations and the variations, so that the original message, in all its delicacy of tone and vibration, comes clear and distinct through your Radio set.

Not a mere adjunct to the pleasure-giving quality of your Radio set is the "B" Battery—instead, it is the vital, life-giving part—the very heart of your Radio set.

Do not slight this vital part—give your Radio set the advantage of the best—use Eveready "B" Batteries.

Note: This is No. 1 of a series of informative advertisements which will appear in this magazine. They are designed to help Radio users get the most out of their Batteries and Radio sets. If you have any battery problem, write to G. C. Furness, Manager Radio Division, National Carbon Co., Inc., Long Island City, N. Y.

The *New* Metal Case Eveready "B" Battery

(No. 766)

"The Life of Your Radio"

The same popular 22½ volt Eveready "B" Battery in a *new*, handsome, durable, waterproof, metal container. Eveready quality throughout. At all dealers, $3.00.

The "B" Battery is the vital part of any radio receiving set. Eveready Batteries — especially made for Radio—serve better, last longer and give better results.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
Long Island City, N. Y.

EVEREADY
Radio Batteries
—they last longer

FANS DECIDE FATE OF KGB BY BALLOT

VOTE TACOMA LEDGER'S PLANT MUST CARRY ON

Support of Listeners In Enables Station to Open on Scale Ten Times Greater Than Before

By A. M. Ottenheimer

TACOMA, WASH.—Radiophans throughout the Northwest are hailing the new 100-watt broadcasting station of the Tacoma Daily Ledger as a distinct triumph for listeners in and an example of what Radiophans can do when they work together.

The new Ledger station, with its old call letters, KGB, still retained, was opened recently with a gala program. Early in June the Ledger contemplated discontinuing broadcasting. Today, instead of quitting, it is operating a new station 10 times larger than its former outfit. Thereby hangs a tale.

Late in May, Ledger officials were on the verge of closing up KGB. There was no method to ascertain the extent of the audience reached by the plant and there was a great deal of doubt in the minds of the officials whether the number of listeners in was sufficiently large to warrant the expenditure of time and money that the constant operation of the station demanded.

Leave KGB Fate to Listeners

Attempts through the usual requests for letters were made on a number of different occasions to make a check on the number of listeners. This was each time unsuccessful and the number of responses was discouragingly small. Finally matters came to a climax, it was decided that KGB's destinies should rest in the hands of its listeners.

In consequence, there appeared in an edition of The Ledger in June a notice informing the Radiophans as follows: "KGB contemplates discontinuance. If you desire the station to go on with its programs, fill out the blank below saying so, and sign your name and address. KGB's fate is in your hands."

The Radiophans were given a week in which to get their votes into The Ledger office. More than 500 votes were received immediately from fans in Tacoma and twenty-four communities in the state. Some of these votes represented organizations with twenty-five or thirty members. "Keep on broadcasting, KGB," was the universal plea.

So The Ledger decided not only to continue broadcasting, but to do it on a much larger scale. Consequently, the order for the larger set was placed. It was built entirely by Alvin Stenso, chief operator.

Alaska Company to Install Terminal at Aberdeen, Wash.

ABERDEEN, WASH.—This city is contemplated as one of the possible sites for a large Alaska-Pacific Radio plant, according to Antone Anderson, Radio engineer of Seattle, who visited this city recently in the interests of the Alaska Communication Company. Several locations in this city and Hoquiam, nearby, are under consideration, according to Mr. Anderson. The terminal would be the only one of the company in the States, and the plant one of the largest on the Pacific Coast. Several stations would be established by the company throughout Alaska, he declared.

France has the largest, most efficient and most powerful Radio equipment in Europe.

OPERATIC ARIA EASY FOR EIGHT-YEAR-OLD

Irma Brahn, the popular "Baby Prima Donna" who has made several very successful concert appearances at eastern broadcasting stations. Miss Brahn sings operatic arias as well as many grand opera stars in spite of the fact that she is only eight years of age

Navy Station Moved

WASHINGTON.—The naval Radio station at Point Isabel, Tex., is being removed to Fort Brown, Brownsville, Tex., and combined with the army Radio station there. Navy personnel will operate the station, using high and medium power tube sets.

The Department of Agriculture has 41 stations throughout the United States for broadcasting weather, crop and market news.

Improved Ground Clamp

Equipped with Fahnestock Patent Wire Connectors
Easily Attached
No Soldering. For Radio Use Only

At Your Dealers

Fahnestock Electric Co.
Long Island City, N. Y.

PARIS CAFES ANXIOUS TO INSTALL RECEIVERS

Demands for Installation of Sets Increase Monthly

PARIS.—Radio telephony is making marked progress in western France, where, through the efforts of dealers, the demand for installations is increasing every month. Evening concerts are given in Paris by two Radio companies, and the latest commercial, financial and sporting news is broadcast for interested fans. Cafes, hotels and country homes outside the city limits are said to be especially interested in securing receiving sets.

At Nantes, situated about 250 miles from Paris, most of the receiving stations are equipped with four to six tubes; one Radio high frequency, one detector and two audio frequency. Double wire antennae about 131 feet long and raised about twenty-three feet from the ground are popular.

Government taxes on transmitting stations run from 100 francs per year up, according to the power and operation; receiving stations pay a tax of 10 francs per annum.

—Of special interest to Radio Dealers!

One of Chicago's oldest and largest exclusive radio stores sold more Mu-Rad Receiving Sets in 1922-23 than all other types of Receivers combined!

Mu-Rad sells—and sells!

That fact has been repeatedly verified by our many other Mu-Rad dealers in the middle-west. Why not join them? Why not enjoy as they do the ASSURED PROFITS of good radio merchandise well advertised?

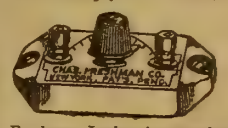
Write for a Mu-Rad Franchise

To get complete details of our special Mu-Rad proposition will not obligate you. Write also for a copy of our handbook catalog of other profitable Radio merchandise. Write today before someone else in your neighborhood gets exclusive Mu-Rad privileges.

Chicago Radio Apparatus Company
Jobbers of Good Radio Merchandise
General Offices: 407 South Dearborn
CHICAGO

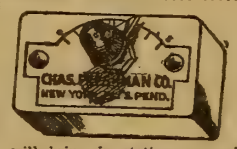
FRESHMAN
Resistance Leaks
The largest and most complete line in the world

Our new construction of all types Variable Resistance Leaks produces a product which we can now guarantee indefinitely as being scientifically correct, mechanically perfect and built for unusual durability.



BASE MOUNTING TYPE VARIABLE RESISTANCE LEAKS

Freshman Leaks give an absolute unbroken range of 180 degrees from zero to 5 Megohms.
With either .00025 or .0005 Freshman Condenser **$1.00**
Without Condenser ..... **.75**



PANEL MOUNTING TYPE VARIABLE RESISTANCE LEAKS

will bring in stations never heard before. Can be mounted on any panel in a few seconds. When mounted, only the knob shows on the panel. The latest and most essential part of an efficient tube set.
With either .00025 or .0005 Freshman Condenser **$1.00**
Without Condenser ..... **.75**

FRESHMAN FIX-O

Fixed Resistance Leak Combination—4 in One

Freshman Condenser .00025
Leak Mounting
Freshman Resistance Leak
Safe-T Handle
} **Price Complete 65c**

Separate Leak & Safe-T Handle.....30c
Separate Condenser & Mounting.....40c
At your dealers—otherwise send purchase price and you will be supplied postpaid.

Also ask your dealer for our free diagrams of the Flewelling and Neutrodyne Circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 SEVENTH AVENUE NEW YORK

Make Pennies Do What Dollars Did Before

Never before in the history of Radio have pennies done so much. The Michigan "Midget" gives you everything that any set you could pay dollars for will give you—and yet the price is small.

Long distance	The Michigan "Midget" gives it to you.
Selectiveness	The "Midget" cuts out local stations and brings in out of town stations.
Ease of Adjustment	Any ten-year-old boy or girl can operate a "Midget."
Sharpness of Tuning	A slight movement of the controls brings in other stations.
Portability	Weighing but 6 lbs. it is ideal for home use or for camping, touring and resort use. You can always take your "Midget" with you.
Operations	It operates on all makes of 6-volt and equally as well with all dry-cell tubes. It can be used with one or more headphones or can be used with any one or two stage amplifier for loud speaker reception.
Price	**$27.00, without tubes or accessories**

And so we say we have made pennies do what dollars did before. Go to your dealer, ask him to show you a Michigan "Midget"—test it out for yourself. Also ask about the Michigan "Midget" Two Stage Amplifier and our exclusive line of Condensers, Variocouplers, Variometers, Rheostats, etc. When you send for circular, give us the name of your favorite radio dealer.

MICHIGAN RADIO CORPORATION
GRAND RAPIDS, MICHIGAN

2 VOLT 4 VOLT 6 VOLT

World Storage Batteries Save You 50% And You Get a Written 2-Yr. Guarantee

We maintain the same high quality material and workmanship found on the most expensive batteries and still are able to allow our remarkably low sale price by greatly reducing our overhead and sale costs.

Special 2 Volt Storage Battery for WD-11 and WD-12 Tubes..... **$5.00**
Special 4 Volt Storage Battery for UV-199 Tubes **$8.00**
200 Hours' service on one charge. Rechargeable.

6 Volt 60 Amp. **$ 8.50**
6 Volt 80 Amp. **10.00**
6 Volt 100 Amp. **$12.50**
6 Volt 120 Amp. **14.50**
6 Volt 140 Amp. **16.50**

SEND NO MONEY. We ship C. O. D., subject to inspection, or will allow 5% discount for cash with order. Shipment made same day order is received. Save 50% on your next battery and get better service and longer life. Our written guarantee is your proof of satisfaction. The Big Fall Radio Season is on now. To get the full benefit of it order your new WORLD battery today!

WORLD BATTERY CO.
69 EAST ROOSEVELT ROAD, CHICAGO, ILLINOIS

WBAP CLAIMS TO BE WEST-OF-'SIPPI KING

RE-OPENS MUSICAL PROGRAMS FOR WINTER

Station's Power Increased Fifty Percent —Many Entertainment Treats Scheduled for Winter

FORT WORTH, TEX.—Station WBAP, The Star-Telegram broadcaster, has officially opened the 1923-24 musical concert season as the largest broadcasting station in the Southwest, and also it claims, west of the Mississippi River. The power of WBAP has been increased from 500 to 750 watts, and the change, which increases the power by fifty percent, required many exhaustive private tests during the past few weeks.

These all showed vastly increased range and power. The data on the tests was of such a successful nature that it was decided to institute the new 750-watt power two weeks ago when the fall season began. Musical programs have now been resumed for the winter with two high class concerts daily except Saturday and Sunday—the silent nights for the station.

Plan Many Feature Programs

Among the features completed for the fall and winter is a monthly musical treat by the Fort Worth Harmony Club, whose programs last year did much to add to Fort Worth's prestige as a musical center.

The Texas Hotel Orchestra will present dance and concert music every Wednesday night all winter for the entertainment of Radioland, through arrangements made by the station with Fenton Baker, manager of the hotel.

Sam Losh, well known artist of this city, will handle a once-a-month program, featuring pupils and contemporary artists. Brooks Morris and Guy Pitner will collaborate on a monthly concert on the same basis, and E. Clyde Whitlock is another of the leading artists to be in charge of several programs during the winter.

FANS DANCE TO WJAX SYNCOPATED FEATURES

Ohioans' Letters Tell Satisfaction with Cleveland Plant

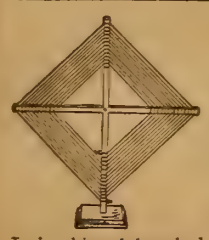
CLEVELAND.—A syncopation concert was featured by the Cleveland News in the Radio program broadcast recently from the Rainbow room of the Winto by Station WJAX of the Union Trust company.

The Vernon-Owen orchestra was the attraction. Songs by Miss Rose S. Seton and instrumental solos by Barney Schoen, Boyd Bunch, Dick Johnson and Jack Miles were featured. Especially pleasing to fans was a novelty saxophone solo by Mr. Johnson. The program was given in two parts with an hour and a half intermission. Hundreds of Radiophans in various parts of the city and out of town danced to the tunes played by it in the latter half of the program. The concerts of the Cleveland News from WJAX are popular over the entire state.

Radio Fog Signals Now Sent by Nantucket Shoals Light

WASHINGTON.—A new light ship equipped with a Radio fog signal was recently put into service on Nantucket Shoals, Secretary of Commerce Hoover has announced. The new vessel will have the first Radio fog signal, an automatic apparatus sending during fog a group of four dashes every thirty seconds, enabling vessels with Radio direction finders or compasses to obtain an accurate bearing from a distance of thirty miles or more in any weather, and to steer for and "make" the light ship.

The light vessel will also have two other fog signals, a powerful steam whistle, and a submarine bell; a little later a submarine oscillator will be substituted for the bell. The electric signal light of 3,000 candlepower will show at the masthead. There is Radio equipment for communication, with an operator in attendance, reporting vessels in distress, as well as for the maintenance of the light vessel itself.



Loop Antenna

The loop is coming more into favor each day, because it makes a set more portable and does away with the outdoor aerial.

It is shipped knocked down but complete—all binding posts, wire, etc. Postpaid in U. S. A..... $1.25

ROBBINS WOODWORKING CO.

Dept. C LIBERTYVILLE, ILL.

TAKES WORK TO KEEP BEAUTIFUL

Miss Marian Ford, Boston girl who won contest for the most beautiful limbs, keeps fit by limbering up to Radio tunes. She exercises religiously for forty minutes every day © K. & H.

Tommy Gibbons Gives Inside Story of Fight

He Is Second Title Contender to Speak from KGB

TACOMA, WASH.—Tommy Gibbons, world's heavyweight boxing championship contender, was a recent attraction at KGB, The Tacoma Daily Ledger broadcasting station here. Mr. Gibbons and his manager, Eddie Kane, gave the Radiophans some inside information on Gibbons' bout with Champion Jack Dempsey at Shelby, Mont., July 4.

This makes the second world's heavyweight contender to speak at The Ledger station. Jess Willard spoke at KGB some months ago.

Among the other celebrities appearing at The Ledger station recently were Guy Bates Post, world-famous actor; Wesley Barry, juvenile film celebrity; Fritz Leiber, Shakespearean actor of note, and Nan Halperin, noted musical comedy star.

Greenwich Village History Retold in Radio Lecture

NEW YORK.—Radio folk recently heard Mrs. Katherine Parker Clivette, president of The Greenwich Village Historical Society broadcast from WDT here, a tale about the rise and fall of Richmond Hill Mansion, the truth about Aaron Burr, and about the olden days when Richmond Hill Mansion was the scene of diplomatic circles, society revels and intrigue. Mrs. Clivette's concise descriptions added to the interest of the story much of the charm which histories omit.

YELLOWTIP

MICROMETER ADJUSTING

CRYSTAL DETECTOR

Any adjustment made in a moment—fixed instantly! Hold indefinitely, until you wish to change, then—"A Twist of the Wrist—It's Set." Ideal for reflex and other circuits. $2

Write for folder, and name of your nearest dealer

Wholesale Radio Equipment Co.

Exclusive Factory Representatives

35 William Street, Newark, N. J.

Dealers and Jobbers—Write for Attractive Proposition

Belief in Astrology Shown by Pastor's Broadcast Talk

NEW YORK.—Rev. Dr. Arthur Brooks spoke recently from WDT on "The Turn of the Wheel of Events" and simpler points of astrology. Dr. Brooks in his broadcast said that the laws concerning cosmic influences given centuries ago by the ancient masters of astrology, when, as a science, astronomy and astrology were one, are serviceable to men today and that to a large extent the tendency of the future of the turn of the wheel of events can be clearly shown by a knowledge of the movement of the major planets in their orbits, which of course can be calculated with mathematical precision.

U. S. RADIO POLICY CONFEREES CHOSEN

Will Meet Soon on International Communication Problem

WASHINGTON.—The United States committee of electrical and Radio experts representing eight governmental departments having to do with Radio and other electrical communications has just been announced by the State Department. This committee, headed by under Secretary Phillips of the State Department, will meet at an early date to consider the plans and policies of this Government on matters pertaining to international electrical communications.

The agenda prepared by the committee will become the basis for the United States' report to the Fourth International Electrical Communication Conference when it is held in Paris. It is probable that the American delegates to the International Conference will be selected from the personnel of the committee, but no date for the general conference has been set because of European troubles.

MISSING WHAT YOU GET

YOUR set is probably bringing in DX stations you never hear because your rheostat cannot control your filament action. The Fil-Ko-Stat gives infinite adjustment and enables you to magnify the weak stations and bring them in strong and clear.

Full resistance 30 Ohms, adjusted to ALL TUBES. $2

"Avoid the use of inferior powdered carbon rheostats."

At All Dealers in High Grade RADIO SUPPLIES

FIL-KO-STAT

Made and Guaranteed by Dx Instrument Co., Harrisburg, Pa.
Sole International Distributors.

Radio Stores Corp., 218 W. 34, N. Y. City

THE

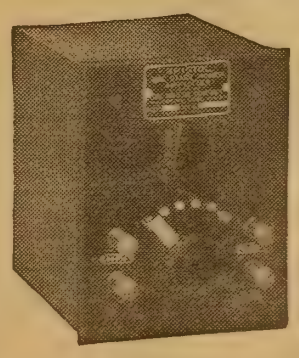
TRADE MARK

AUDIOPHONE

REG. U. S. PAT. OFFICE

Quality of reproduction such as only the original itself can equal. Speech that is so distinct that the voice heard is the actual voice of the speaker. Music that requires no tolerant imagination to be recognized as music of the finest type.

Bristol's Single Stage Power Amplifier



gives additional VOLUME with any two stage amplifier. No separate batteries required. It provides the additional volume necessary to bring in very distant stations on the loud speaker.

Write for bulletin and address of the nearest dealer handling our instruments

THE BRISTOL COMPANY

WATERBURY, CONN.

Boston New York Philadelphia Pittsburgh Detroit Chicago St. Louis San Francisco

NEW MILOPLEX CIRCUIT

(Continued from page 1)

two, anyone can build it in a few moments' time, and most important of all—it works! How it works is still open to conjecture. But that doesn't lessen its efficiency. The mysterious inventor vouches that it reflexes and "soups" in a most peculiar manner, but believes its secret lies in its accomplishment of a perfect equalizing of the three capacities present in every vacuum tube. At any rate, as the inventor says, the Miloplex smashes the tube with its volume.

The first of a series of several articles, prepared by the designer of the set, is given in this issue. The remaining articles will be given in succeeding issues. The first article follows:

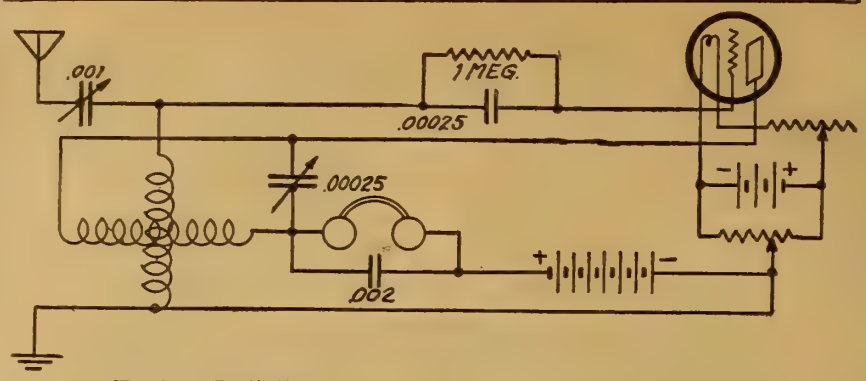
ONCE upon a time—as all good stories begin—a Radio bug didn't know any better than to try to make one of the oldest and most simple "single tuber" circuits do a few new tricks.

Thirty-one minutes was the slow record in hooking it up; thirty-one days have passed and he is still trying to find why it "soups" reflexes with a volume that almost makes a three tube job sit up to take nourishment.

It works; that's a feature, and best of all anyone can build it with the writer's guarantee that it will start "perking" and not quit when company comes. It is passed on to you (not with the usual editor's note and the discoverer's autobiography) but for experiment and advice because somewhere, somehow, some fellow is going to discover, and tell me, why it decides to smash the tube with volume.

I confess only that way back in my younger days there was a theory that if one could but equalize, not the total tube capacity, but rather the three counter capacities indicated by plate, filament and grid—look out—something big would happen. And it did; if you don't believe it, build it yourself and be prepared to fall in love with it. Is it selective? Well, Los Angeles doesn't bother me nearly as often as it does some single jobs that "go west" every night. But it so happened that I found one easy landlord in Chicago; hence my address is just six blocks from WJAZ, four miles from WDAP, and just to keep me busy, two miles from WPAD.

DIAGRAM FOR WIZARD MILOPLEX



Here's an Invitation

Come over any night I am busy and watch me tune out that fellow six blocks away; in fact the only station I cannot tune out is the fellow next door but I'm going to buy him another record; then he will have two but they won't bother me, 'cause he'll have to shut down when his kids go to bed.

But let's get serious. Don't just glance at the circuit and say "old stuff," perhaps if you look twice you will discover something; also if you know how to separate circuits, you may find something else. Its most desirable feature is that it has no "dead end" losses in the tuning element.

Of course you know just why "dead end" losses are bad pills in Radio. Then listen—when you tap a coil and put on switch points, between every two points and the leads running to them is a condenser or capacity effect (bad business) but the worst of it is those windings which are dead or not in circuit from the last tap you are using, on to the end, have a very impolite habit of oscillating at frequencies other than those you desire and thus cut down your signal voltage. And that's that, as Jack Nelson at WDAP says. So I saved 27 cents for switches and points and gave her more steam.

What Is a Good One?

The variable condensers, particularly the one in the slate circuit, should be class AAA. My definition of a good one is that it should cost three or four dollars. Those funny pigtails in the drawing are supposed to be the picture of a split variometer; but don't split it as the fellow did with an axe and then wonder which half went where. (Radio is maddening, isn't it?) But here's a secret—you must use a split variometer; procure one that has a lot of wire on it, the more the better; the one I use has 62 turns on the stator and the same number on the rotor, size 22. Remember that. And now that you have missed supper you may as well read on, for here comes the "big idea," the inside story, the main reason why, it super-reflexes and what not. Be very certain to run your minus B battery lead direct to ground, not on to minus or plus A as is usually done; then (now be careful) tap the minus B to ground lead, running this tap to the center contact on your potentiometer. That's all except that, of course, you know you should try different

(Continued on page 20)

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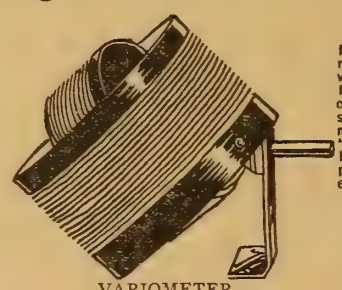

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WATCH FOR OUR ANNOUNCEMENT

Simple Explanation of Radio for Everybody

Chapter I—Atmosphere and "Ether"

By M. W. Thompson

THE following article is the first of a series for Radio beginners. written by Marvin W. Thompson, well known in airphone circles for his understandable style of approaching his subject, and his ability as a Radio engineer. Mr. Thompson is now an associate editor on the staff of Radio Digest. A preliminary outline of the Chapters to follow is:

Chapter II — Electrical and Radio Terms.
Chapter III—Rectification and Receiver Essentials.
Chapter IV—Inductances—Fixed and Variable.
Chapter V — Condensers — Fixed and Variable.
Chapter VI—Vacuum Tubes.
Chapter VII—Antennas and Grounds.
Chapter VIII—Regeneration.
Chapter IX—Audio Frequency Amplification.
Chapter X—Loud Speakers.

THE history of Radio communication will not be taken up in this series of articles as the owner of a set, or the Radio experimenter, is interested primarily in what we know of Radio now and not in how this knowledge was evolved through the years, nor by whom it was brought to light.

The Atmosphere

Radio communication and entertainment is carried from place to place by the atmosphere. That we know, but on the subject of just how the atmosphere is utilized many of our leading scientists, such as Steinmetz, Sir Oliver Lodge, Fleming and Elihu Thomson, are disagreed. However, the generally accepted theory at present, and one which seems correct on our present knowledge of the atmosphere and electricity, is as follows:

The atmosphere is composed of atoms of oxygen, nitrogen, helium and other known gases suspended in what most of us would call "nothing" or vacuum. This "nothing" is known to Radio engineers as the ether. To this ether can be given a wave motion similar to that which occurs in water and other fluids.

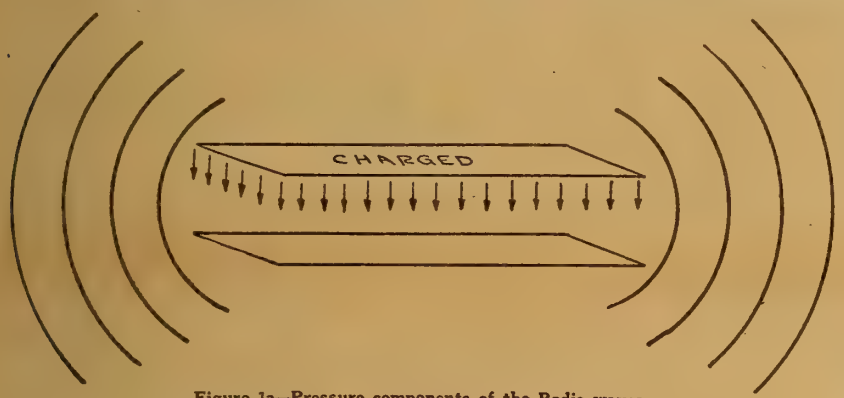

Figure 1a—Pressure components of the Radio waves

Proof of "Ether's" Existence

That some such great invisible, unmeasurable medium does exist is proven by the following physics experiment familiar to all high school students. A large glass bottle is connected to a mercury pump and evacuated, that is, all the elements with which we are familiar, such as oxygen, nitrogen, etc., are removed. Yet, if an object is placed behind the bottle we can see the object through the glass and the "nothing" within. Obviously, something carries the light rays through the bottle to the eye. As we know that light rays are wave motion, it follows that a medium which for want of a better name we call "the ether" must exist.

Radio's Use of the "Ether"

To transmit Radio signals, either in the form of dots and dashes or as Radio telephony (broadcasting), it is necessary, therefore, to first create waves in varying groups and of varying, predetermined strength, frequency and length, and second to intercept them with apparatus for changing them to sound or light waves.

It is the practice, at present, in creating Radio waves, to use two electrically conductive surfaces separated by a distance of from ten to several hundred feet and to create between them an electrical pressure which changes its direction (first toward one surface, then toward the other) hundreds of thousands of times per second. To explain the term "electrical pressure," let us imagine a very large, shallow pan of water and resting on the water's surface a flat piece of wood. If we press the wood, waves or ripples go out in all directions. Just so with the atmosphere; if one surface is charged with electricity which tends to reach the other surface and presses on the intervening atmosphere in its efforts to do so, waves are created which go out in all directions. See Figure 1a.

As Radio communication is carried on just now, we use the ground for one surface and provide another by erecting a structure composed of one or more wires, insulated from the earth and suspended many feet above it.

These electrical pressure waves are, however, only part of a Radio wave. From any wire in which electrical current is flowing, we know that waves of a different character are thrown off, as shown in Figure 1b. These are, for various reasons, termed "electromagnetic" waves and the distance they travel before dying out varies with the quantity of current flowing in the wire and the number of times per second that current changes its direction in the wire. This reversal of current phenomenon will be discussed in the next chapter. Radio waves are made up then, of both "electrical pressure" and "electromagnetic" waves. This fact should be kept well in mind as we will find later that certain devices and methods of construction which seem illogical are made necessary because of these two components of a Radio wave.

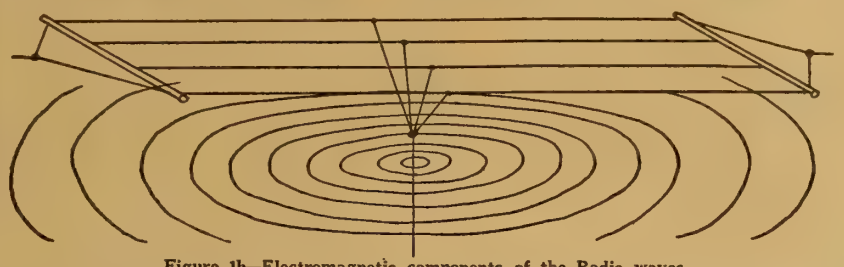

Figure 1b—Electromagnetic components of the Radio waves

Some Properties of the "Ether"

Our present knowledge of the ether leads us to believe it an unanalyzed, immeasurable, invisible element possessing some qualities similar to the fluids with which we are familiar and present in all the vast space between our earth and the other planets. We know that such elements as oxygen, nitrogen and water vapor cease at distances estimated at from 20 to 50 miles from the earth's surface, yet the rays of the sun and of other planets reach us. There seems every reason to believe that this unknown quantity, ether, is present between the atoms and molecules of all solid objects such as wood, stone and cement because Radio waves travel through these materials.

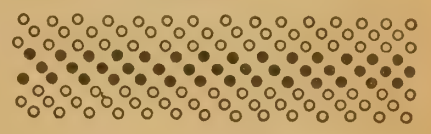

Figure 2a—Ether particles in normal position undisturbed

One peculiar feature of the ether is the difference in behavior of the various waves traveling through it. Light waves which are but tiny fractions of an inch in length cannot be conducted by it through such objects as wood and stone, nor can they turn corners and affect the eye of a person between whom and the source of light there is a solid material such as a piece of wood. Yet radio waves, whose lengths vary from ten yards to several miles, not only can pass through these objects but seemingly, also, around on either side of an object and form again.

Steel and iron, for reasons which we will discuss later, seem to have the property of absorbing or nullifying the wave motion in ether. If a Radio wave consisted only of the "electrical pressure" component this would probably not be true. It seems logical to suppose that it is the "electromagnetic" component which is nullified because iron is an electrical conductor and has magnetic properties.

Broadcasting has been received, it is true, when both aerial and receiver were within a bank vault made entirely of steel, but the signals were much weak-

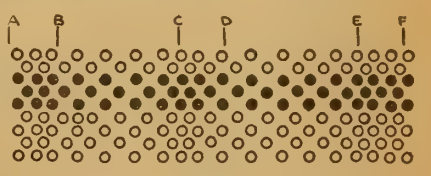

Figure 2b—The "pressure" method of wave travel through the ether

(Continued on page 20)

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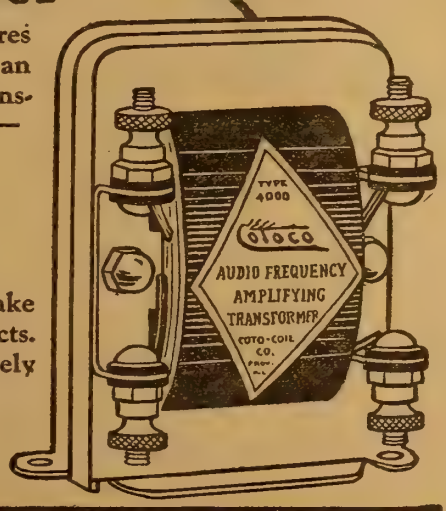

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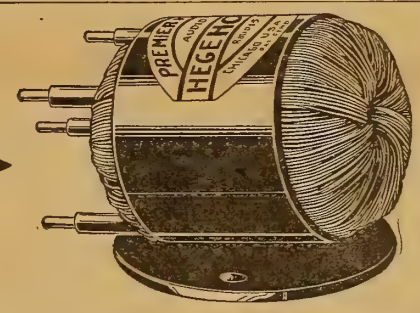

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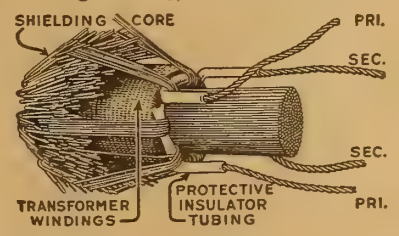

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MANY BRILLIANT FEATURES MARK C

The Week's Headliners on the Air

SCANNING the offerings of the week, one can hardly complain for lack of choice. Let us see. On Tuesday night WOAW has an excellent classic program.

How about Wednesday? Well there's a good classic program on at KDKA, an orchestra concert at KSD, a Cuban Navy band concert at PWX, and a special birthday party and jazz song riot at WDT. Then for the children, WLW is giving a child play.

Aspiring writers would do well to listen into WBZ Thursday, when Dr. J. Berg Esenwein tells, "What Is a Plot?" And on the same evening William Johnson at WJZ gives another installment of his detective serial story, "The Waddington Cipher."

Friday looms up with two Radio dramas; at WDAR and WGY. WMAQ wil devote Friday night to a special Indian program, while WOAW will give two hours of good dance music.

WJZ's Peruvian Night on Saturday ought not be boring. Sunday let's tune in WDAP and hear the Drake Concert Ensemble, and Monday—let's see—ah, Monte Cross will give us some real baseball dope via WIP.

"Herbie" Mintz, left, popular pianist who will be heard at Station KYW, Chicago, Tuesday, Thursday and Friday this week

Some
Players,
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Tuesday, September 25

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "A Ball Scene," "Passepied," "Minuet," "Molly on the Shore," Star Concert Orchestra; "Cradle Song," "O, Dry Those Tears," "I Hear a Thrush at Eve," Ina Lockart, contralto; Cello Solo, selected.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victorola and Victor records, S. Hamilton Company; Piano and player rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period, Dreamtime Lady; 7:05, "Need for Trained Men," John T. Morris, director College of Industries, Carnegie Institute of Technology; 7:20, Concert, Pittsburgh Musical Institute.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Talk, Jeannette P. Cramer, home economics editor of The Oregonian; 10:00, Dance music, George Olsen and his Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert features; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, De Luxe Program, Flourney's Californians.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Program to be announced.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program; 4:00, News; 5:50, Children's bedtime story; 7:00-7:58, Merrie Mintz, pianist; Sallie Menkes, accompanist; A. W. "Sen" Kaney, specialty act; Schlewsig Helsteiner Saengerbund (Male Voices); Mr. Hotton, director; "Concerto," "Andante," "Will O' the Wisp," "Fen Follett," Mary McAuliffe, pianist; Isham Jones and his Dance Orchestra; 8:01, Program, American Farm Bureau Federation.

WBZ, Springfield, Mass. (Eastern, 337), 6:30 P. M., Bedtime story for children; 7:00, Concert, Mrs. Florence W. Rosenberg, pianist; Pauline Ewig, contralto; Mrs. Van Buren, accompanist; 8:00, Bedtime story for Grown-ups, Orison S. Marden; Speeches and music, National Convention of the Exchanges Club.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, Frederick W. Agard, tenor; Bob Cougle, pianist; Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Orchestra; Soprano solos; 4:30-5:55, Song recital; 7:30, Bedtime stories, Uncle Wip; Drama review, Walter Greenough.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00 M., "Blue Hoosier Blues," "Hi-Lee-Hi-Low, "No, No, Nora," Bob Miller, tenor; Herbert Steiner, pianist; **12:15 P. M.,** "Carolina Mammy," "Swinging Down the Lane," "Steve, Rose, and Ben," Lewis Pianni, soloist; Herbert Steiner, pianist; "Wonderful One," "Cry Myself to Sleep," Jimmy Flint, soloist; **12:45,** "Saw-Mill River Rose," Bob Mill, soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., DeWitt McMurray, lecturer; 8:30-9:30, Sanger Brothers, choral club; 11:00-12:00, Footwarmers' Orchestra.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra; **3:00 P. M.,** Song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Dance Orchestra; 7:00-7:30, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Boy Scout Radio Corps; 9:00, Song recital; 10:30, Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; **3:30,** Recital, Dorothy Lockwood, pianist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; Topics of scientific interest.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M., Music and address, Mrs. Chester Moore; 7:45, Musical program; Selections, The Lawrence Trio, William T. Lawrence, violinist; Willard D. Lawrence, cellist; Eleanor Padley, pianist; Mrs. William T. Lawrence, soprano; Eleanor Padley, accompanist; Address, Dr. Louis C. Cornish.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; "Just Among Home Folks"; Selections, Alamo Theater Orchestra; 7:30-9:00, Concert, Henry M. Schilling and His Orchestra; Fred Wells, tenor; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:02, Dinner music, Dick Regan's WIP Little Symphony Orchestra; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talks; 8:15, Song recital; 9:00, Musical program; Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 P. M., Concert program, the Cleveland News-Leader; 7:30-8:00, Song recital for children, Clarabelle Johnson; Bedtime story; 8:00-10:00, Thow's Syncopators; 10-piece jazz orchestra in popular dance music; Vocal selections, Soprano Trio, Miss Helen Cannon, Miss Rose Seton, Miss Dorothy Maskell.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2:00 A. M., Selections, Oriole Orchestra; "I Hear a Thrush at Eve," "At Dawning," Charlotte Howard, soprano; Clarinet solos, E. E. Harder; "Until," "On the Road to Mandalay," Tony Corcoran, baritone; Piano solos, Margaret Garrity; "The Tryst," "At Eventide," Charlotte Howard, soprano; Clarinet solos; "Sweet Little Woman of Mine," Tony Corcoran; Piano solos, Margaret Garrity; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 4:05 P. M., Recital, Maddalena Houff, soprano; 6:05, "The Little Lame Prince," bedtime story; 7:35, Address, Dr. Leland E. Cofer; 7:45, "Causes of Business Failures," Herbert F. De Bower; 8:00, Address, James W. Gerard, former U. S. ambassador to Germany; 8:15-10:00, Musical; Annette Royak, soprano; Felix del Sarto, violinist; Joseph Zellman, baritone; Dance program, Hotel Astor Dance Orchestra; 11:00, Dance music, Hotel Astor Dance Orchestra.

WLW, Cincinnati, Ohio(Eastern, 309), 10:00 P. M., Selections, Circle Orchestra; "Veracini Sonata," William Stoess, violinist; Rosemary Ellerbrock, accompanist; "Pale Hands," "Till I Wake," solos, Mrs. Hazel H. Carter; Piano solos, Lilliam Duerig; "Red Hot Blues," "She Got That Too," Circle Orchestra; "Valse Triste," "Rodino," William Stoess, violinist; "Annie Laurie," "The Last Rose of Summer," "Swanee River," Mrs. Hazel H. Carter; "Ballade Polonaise," William Stoess; Concluding numbers, Circle Orchestra.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program, Glenn Dillard Gunn School of Music, 7:00-8:00, Talk no foreign relations, Edward Price Bell; Irish ballads, Simon H. Rhoades, colored tenor; 9:00, La Salle Hotel Orchestra; 9:15, Musical program, Jennie F. W. Johnson.

WAOW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Piano duet, "Slavonic Dance," Henrietta Rees, Edith Wagoner; "Thy Beaming Eyes," "Absent," "Springtide of Love," Maude Gutzmer, contralto; "Romance," Louise Zabriskie, violinist; "Hail, Thou Dwelling Lowly," H. J. Poore, tenor; "The Linden Tree," Belle von Mansfeldt, cellist; "The Girl with the Flaxen Hair," "Dance of Harlequins," Henrietta Rees, pianist; Scotch and Irish Songs, Margaret Ames, soprano; "Ah! Mon Fils," "Le Prophete," Maude Gutzmer, contralto; "Adagio," Louise Zabriskie, violinist; "I Passed by Your Window," "Moon of My Delight," "Persian Garden," H. J. Poore, tenor; "From the Land of the Sky Blue Water," "Evening Star," Belle Von Mansfeldt, cellist; "Sunshine Song," "Ave Maria," Margaret Ames, soprano; "Polonaise," Edith Wagoner, pianist; "Caprice Viennois," Louise Zabriskie; Aria from "Shanewis," Maude Gutzmer.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chinese concret; **3:30 P. M.,** Educational Program, A. G. Hinrichs; Music; 5:45, Chimes concert.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 9:45 A. M., "Ironing Day," program, Fred Shaw, pianist and songster; Margery Richmond, pianist; 12:00 M., Detroit News Orchestra; 8:30, Detroit News Orchestra; Town Crier; Clinto Shanasto, guitar soloist.

Wednesday, September 26

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Overture, "Zampa," "Forget-Me-Not," "A Day in Venice," "A Perfect Day," "Le Pere de La Victoire," Star Concert Orchestra; Nocturne in E Flat, "The Meistersingers," Harry Adaskin, violinist; "Selected," Alex Elder, baritone.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and player rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, KDKA Little Symphony Orchestra; 6:30 Literary program, Marjory Stewart; 6:45, Children's Period; Dreamtime Lady; 7:05, "Applying Art to Modern Industry," Prof. H. T. Goodwin, Head of the Department of Architecture, Carnegie Institute of Technology; 7:20, Selections, "Overture, William Tell," "Serenade," "The Vanishing Race," "Traumerei," Group of Popular Songs, Selections from "The Mikado," "Toreadore and Andalouse," "Second Hungarian Rhapsody," KDKA Little Symphony Orchestra; Soprano solos, Frances Adeline Peake.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Children's program; 8:00, Concert, Columbia All-Artist Orchestra, Harry Linden, director; 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Program, "Uncle John"; 8:00-10:00, De Luxe Program, Lucille Holman, mezzo-soprano; Virginia Hubbard, violinist; Edna B. Hanna, pianist.

KSD, St. Louis, Mo. (Central, 546), 7:00 P. M., Concert, Abergh's Concert Orchestra of the Hotel Statler.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News; 5:50, Children's bedtime story; 7:00-7:58, Isham Jones and his Dance Orchestra; Harry Geise, pianist; Mary Lee, soprano; Marguerite Kugel, soprano; 8:05, Readings from the latest books, Llewellyn Jones.

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M., Concert, Cuban Navy Band.

WBZ, Springfield, Mass. (Eastern, 337), 5:00 P. M., Dinner concert, "Pique Dame Overture," "Serenade," "Anvil Chorus," "Bolero," "In a Canoe," Interlude "Orientale," "Dolores Waltz," "Minuet," "Entr' Acte Gavotte," "Ole South March," WBZ Trio; 6:30, Bedtime story for the children; Farmer's Night, New England Homestead Humorous Program; 7:00 P. M., Concert, L. Hazel Childs, soprano; WBZ Trio; 8:00, Bedtime story for grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, Salvation Army Staff Band; Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Piano solos, Edna Finestone; Arcadia Cafe Concert Orchestra; 4:30-5:55, Song recital; 7:30-8:00, Bedtime stories, Dream Daddy; 8:00, Current topics by Arthur D. Reese; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Features from Stanley Theater; Short talk about Philadelphia industries.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., "Mama Goes Where Papa Goes," "Louisville Lou," "You Didn't Want Me When I Wanted You," Jack Yellen, soloist; Merty Howard, pianist; "Neath the Egyptian Sky," "Come Let Us Dance the Waltz of Love," Merty Howard, pianist; "Big Blonde Mama," "First, Last, and Always," Billy Burke, soloist; Matty Levine, pianist; "Louisiana," "Dreamy Melody," Max Hetrig, soloist; Matty Levine, pianist; 7:00-8:00, Vaughn De Leath's first birthday party.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "Removing the Handicap," J. O. Mahoney, principal of the Dallas night schools.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Musical program and short talks; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Children's bedtime stories.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 8:45, Address, Sidney Coleman, secretary of the Buffalo Safety Council, on "Fire Prevention"; 9:00, Concert, South Side Choral Club.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; "Just Among Home Folks," the Courier-Journal; Selections, Rialto Theater organ; 7:30-9:00, Concert, Bel Conto Male Quartette; Harry N. Clarke, C. Marvin Locke, William K. Schmidt, Carl Shackleton; Reading, "An Interesting Historical Episode.

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Popular music; 6:02, Dinner dance music, Jordan-Lewis Orchestra, director Bob Lewis; 7:00-7:30, Bedtime stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "Araby," "Russian Lullaby," Neva Near, soprano; "Caprice Espagnol," Helen Rauh, pianist; Selections, Oriole Orchestra; "Walthers Prize Song," "Nejro Hati," Genevieve Hunter, violinist; "Because," "Gray Days," Harry Hauge, baritone; Selections, Oriole Orchestra; Piano solos, Helen Rauh; "Keep on Hoping," "Rose in the Bud," Neva Near, soprano; Selections, Oriole Orchstra.

WJZ, New York, N. Y. (Eastern, Daylight Savings, 455), 3:00 P. M., Concert, Hotel Astor Organ, Harry Riggs, organist; 6:05, "The Adventures of Peter," Florence Smith Vincent; Address, E. J. Mehren; 8:30-10:15, Recital, Benjamin Listengart, violinist; Ernesto Bertumen, pianist; Walter Mills, baritone.

WLW, Cincinnati, Ohio (Eastern, 309), 8:00 P. M., Vocal selections, Class of Arnold Schroder; "The Magic Journey" (children's play), Reulman School of Expression; "Serenade," Irene Warndor, soloist; "Toreador Song," Clifford Donnelly; "The Magic Journey," Ruelman School of Expression; "Return Victorious," Irene Warndor, soloist; "Thy Beaming Eyes," Clifford Donnelly, baritone; Duet, Irene Warndor and Clifford Donnelly; Entertainment, Southern Serenaders, Ray Murphy, pianist; Alvin Morrie, saxophonist; Robert Bellonby, saxophonist; George Sturm, banjoist; Robert Murphy, drummer.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 1:15 P. M., Speech, Chicago Chamber of Commerce luncheon; 4:30, Program, Cosmopolitan School of Music and Dramatic Art; 7:00, Children's stories, Georgene Faulkner, Story Lady; 7:30, Lecturer, American Chemical Society; 9:00, Dance music, La Salle Hotel Orchestra, E. E. Sheetz, Jr., and his Californians; 9:15, Program, Ava Whitlow, contralo; Ernest Dewey, bass.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; **3:30 P. M.,** Educational Program, Clyde G. Kern; Music; 6:30, Sandman's visit; 8:00, Pipe organ recital, Erwin Swindell; Edith Barlow, reader; 10:00, Artist Musical Program; Erwin Swindell, musical director.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra; 8:30 P. M., Detroit News Orchestra; Town Crier; Lyle Cook, baritone; Elsie Bond, soprano.

Thursday, September 27

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Melodique, "Serenade Espagnole," Selection from "The Country Girl," "Moment Musical, Valse Bluette," Star Concert Orchestra; The Last Watch," "The Dream Cottage," "Mountain Lovers," Fred Rogers, tenor; "Londonderry Air," "Selected," Manni Roth, violinist.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and player rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period, Dreamtime Lady; 7:20, "Bereause," "Second Waltz," "Ave Marie Stella," "Minuet," "Scherze," "Melody in F," "Waltz from Serenade"; Violin solos; "Ich Leibe Dich," "Auf Dem Bergen"; Contralto solo: "Three Little Fairy Songs," "Children of Men," "Wind Song," "Bird Raptures"; Dormont Ladies Trio; Mrs. Donald Maxwell, violinist; Ruby Dunn MacCurdy, cellist and contralto; Elizabeth Florin Evans, pianist.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Woman's program on Child Training; 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert program; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's program, Hancock Trio; G. Allen Hancock, cellist; Albert Angermayer, violinist; Mrs. Albert Angermayer, pianist; Rev. Thomas Lutman, lecturer.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program; 4:00, News; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Chicago Musical College; Isham Jones and his orchestra; Herbie Mintz, pianist; Sallie Menkes, accompanist; A. W. "Sen" Kaney, specialty act; 8:05, Twenty Minutes of Good Reading, J. J. Pernin.

WBZ, Springfield, Mass. (Eastern, 337), 6:30 P. M., Bedtime story for the children; "What Is a Plot," Dr. J. Berg Esenwein; 7:00, Concert, Harold H. Kreimendahl, tenor; Mrs. Myers, accompanist; Samuel Leventhal, violinist; 8:00, Bedtime story for grownups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 9:45-12:00 P. M., Dance music, Meyer Davis Le Paradis Band, Roof Garden of the Le Paradis Restaurant.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, John Stamford, tenor; Artists from the Metropolitan Conservatory of Music; Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, concert, Arcadia Cafe Concert Orchestra; Song recital, Edna Finestone, accompanist; 4:30-5:55, Short talks and musical program; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Concert, Leslie Smith, pianist; Lillian Croxton, soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "The Community Chest," T. P. Junkin, lecturer; 8:30-9:30, Recital, Choral Club.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Children's Own Half Hour, Stories by Cousin Sue; 8:00, Recital; Dance music, Jack Leroy and his orchestra from Cathey Tea Garden.

DO YOU LIKE DANCE MUSIC?

FOR LOVERS of syncopation, the following list of broadcasting stations whose programs include dance music on the nights named, will be an invaluable aid:

Tuesday, September 25: Stations KGW, KYW, WDAP, WFAA, WFI, WIP, WJAX, WJAZ, WJZ and WMAQ.

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...RRENT WEEK'S PROGRAM OFFERINGS

Left, Dr. Henry P. Eames, director of special Indian program Friday, September 28, and in circle, Jennie F. W. Johnson, contralto, who will give song recital Tuesday, September 25, at the Chicago Daily News Station, WMAQ

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WHO TO TUNE IN THIS WEEK

...r 26: Sta... ...AP, WDAR, ...nd WMAQ. ...27: Stations ...WFI, WIP, ...and WMAQ. ...: Stations ...DAR, WDT, ...WOO.

Saturday, September 29: Stations KGW, KYW, WCAP, WIP, WJAZ and WOC.

Sunday, September 30: Station WJAZ.

Monday, October 1: Stations WDAR and WOO.

...n. Daylight Sav... ...t. George Albert ...0. George Albert ...gest of the day's ... "The American

...astern, 380), 2:00 ...talk, by courtesy ...oncert program; ...triott, soprano; ...Martin Stopfer, ...ll, bass; Solo, ...Reading, Alvina ...sie C. Herriott, ...alto. ...4. 400), 4:00-5:00 ...on Theater Or... ...: "Just Among ...al; Selections, ...Harry S. Currie, ...ert, Concordia ...ard Dentinger, Theater Orches... ...m, Daylight Sav... ...g recital; 7:00, ... 8:00, Address: ...Get There," by ...of Automobile ... Dance music, ...ras from Hotel ...Organ recital, ...Theater; 9:15, ...music, Charlie ...ra. ...m, 390), 8:00 P. ...eland Orches... ... 9:30, Musical ...rio: Mrs. Wm. ...ssler, violinist; ...

...Daylight Saving, ...Selections, Oriole ..."Baby," Janice ... Gladys Wolge; ...: "Hungarian ...l, pianist; "To ...O'Connel, bari... ...hestra; Piano ...uden, "When ...ard; Selections.

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"Abide with Me," Chorus Choir; Violin solo; "March of the Priests," Chorus Choir; Serenade, "Good Night," Men's Chorus; Entertainment, Eastern Hills Dance Orchestra.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Musical program; 7:00-8:00, Weekly talk to Boy Scouts; Talk, Rockwell R. Stephens, Automobile editor of the Daily News; Talk on South America, E. M. Newman, travelogist; 9:00, La Salle Hotel Orchestra; 9:15, Program, Elizabeth Stokes, soprano.

WOAW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Selections, Nehawka Orchestra; "The Daisies," Leona Pollard (8 years old); "To Spring," Hazel Carper, pianist; Reading, "Kentucky Philosophy," Isadora Stone; "I Give It All to You," Mary Pollard (12 years old); Old-time fiddler—selected, H. H. Stoll; "Cavalleria Rusticanna," DeForest Philpot, violinist; Skit, "Dot Entertains," Mary Ketch, Esther St. John; Reading, Elizabeth Sheldon (9 years old); Talk, A. F. Sturm; Old fiddler—selected, Wm. Steel; "Out of the Dusk to You," Ladies' Quartet; "My Mother of Pearl," Mrs. John Hansen, soloist; "When You and I Were Young, Maggie," Mrs. R. B. Stone and daughters, Verle, Kathryn; Clara Schlichtemier, pianist; "The Fortune Teller," Mrs. J. Hansen, soloist; Gladys Wolfe, pianist; Old-time fiddler—selected, Wm. Balfour.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Educational program, Karl G. Stephan; Music, 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, P. S. C. Orchestra, popular music.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra; 8:30 P. M., Detroit News Orchestra; Town Crier; Robert and Paul Smith, baritone; Mrs. Kathleen Hague, soprano; 11:00, Detroit News Orchestra; Robert and Paul Smith, baritones.

Friday, September 28

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program; Overture, "Mignon," "Shadowland," "Naila," "Dance of the Flutes," "Air de Ballet," "H. M. S. Pinafore," Star Concert Orchestra; "Selected," Arthur Semple, Flute solo.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and player rolls, C. C. Mellon Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:30, Address to the Farmers, Frank E. Mullen; 6:45, Children's period, Dreamtime Lady; 7:20, Concert, Lyman Almy Perkins, director; Mrs. Brabazon Rutherford, contralto; Robert M. Gibb, baritone.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Women's program; 8:00, Vocal solos; 8:15; George Olsen.

KHJ, Los Angeles (Pacific, 395), 12:30-1:15 P. M., Concert entertainment; 2:30-3:30, Matinee Musicale; 6:45-7:00, Children's program, "Uncle John," 7:00-7:30, Organ recital, First Methodist Episcopal Church; Prof. Arthur Blakeley, organist; 8:00-10:00, De Luxe program.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Operatic program arranged by Warren Lemon; 11:00, Dance music, Silverman's Dance Orchestra, Hotel Jefferson.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News; 5:50, Children's bedtime story; 9:00-10:30, Isham Jones and his Dance Orchestra; Herbie Mintz, pianist; Harry Geise, pianist; Sallie Menkes, accompanist; Sen Kaney, specialty act; Mary Lee, soprano.

WBZ, Springfield, Mass. (Eastern, 337), 5:00 P. M., Dinner concert, "Social Life," "The Skaters," "Song Without Words No. 1 and 2," "Hungarian Dance No. 5," "Narcissus," "La Paloma," "Espana," "Passacalle," "Morning, Noon and Night in Vienna," WBZ Trio; 6:30, Bedtime story for the children; Current Book Review, R. A. MacDonald; 7:00, Concert, "Thorn Rose," "Told at Twilight," "Strumming," "Military March," WBZ Trio; Mrs. W. W. Macalpine, soprano; Harry Kellogg, accompanist; 8:00, Bedtime story for grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, Rosemary Hughes, soprano; George R. Hill, Jr., baritone; Jack Chapman and his Drake Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Short talks and musical program; 4:30-5:55, Song recital; 7:30-8:00, Bedtime stories, Dream Daddy; Book review, Doris Hyde; Song recital; Piano solos, Edna Finestone; Dance music, Howard Lanin's Arcadia Cafe Orchestra; Songs by Harry Glyn; Radio drama directed by Walter Greenough.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Selections by Oliver's Kings Jazz Orchestra; Eli Dawson, soloist; Banjo selections, Miss Breen; 11:30-11:50, "Bebe," "Susan," "Barney Google," WDT Orchestra; Vaughn De Leath in Original Songs; "When the Sun Shines for Me," "Where the Sacramento River Flows," "New Orleans," "Bambalina." "Wild Flower," "Lady Luck," WDT Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "Great Characters Among Early Christians," Dr. Robert Stewart Hyer; 8:30-9:30, Helen Fuots and assisting artists in song.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; Harold Simonds, baritone; Caroline Hoffman, pianist; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; Road reports; 9:00, Mixed program, Buffalo Electric Club.

WGY, Schenetady, N. Y. (Eastern, 380), 2:00 P. M., Music and address, Dr. William Burges Cornell; 7:45 Musical program; Instrumental selection, Gibson Mandolin Club, Arthur Lessor, 1st mandolin; William F. Jacob, 1st mandolin; Howard I. Becker, 2nd mandolin; William H. Fowler, 2nd mandolin; Cornelius Young, mandola; Harry MacMullen, mandolo-cello; Walter Fisher, harp-guitar; Isabelle Franklin, soprano, orchestra accompaniment; 10:30, Radio Drama, "The Romantic Age," WGY Student Players; Cast, Ruth Bentley, Arline Montgomery, Rose Cohn, Robert Parry, Jerome Lovenheim, Gemma Votties, Edward H. Smith, Charles S. Baumes, John Loftus; Orchestral selection, WGY Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Strand Theater Orchestra; Harry S. Currie, conductor; Selections, Mary Anderson Theater Orchestra; Ollie Jones, conductor; "Just Among Home Folks," Courier-Journal; Selections, Rialto Theater Organ; 7:30-9:00, Concert, auspices of Helen I. Mitchell; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 6:45 P. M., "Radio Baseball Dope," by Monte Cross, old-time baseball player; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Song recital; 9:30, Musical program.

WJAX, Cleveland, Ohio (Eastern, 390), 7:00 P. M., until 1:00 A. M., Vocal, instrumental, and orchestral selections, May Company of Cleveland Annual May Day program; Surprise features.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "Waltz in G Major," "In the Time of Roses," Grace Gordon, violinist; "Chinese Lullaby," "To a Wild Rose," Esther Lang, soprano; Selections, Oriole Orchestra; "The Rancher's Song," "Pining," Leonard Huber, baritone; Piano solos, Elsie Barge; Selections, Oriole Orchestra; "Dream Boat," "Indiana Moon," Leonard Huber, baritone; "Nocturne in E Major," Grace Gordon, violinist; Norma Johnson, contralto; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 3:00 P. M., Fashion developments, Women's Wear; 3:05, Mme. Miltonella Beardsley, pianist; 4:05, Concert, Theodore Van Yorx, director; 5:15, "The Larger Aspect of World Affairs," Frederic Dixon; 6:05, "Cloverfield Farm Stories," Helen Fuller Orten.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 P. M., "Your Success," May Cornell Stolber.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program, Bush Conservatory of Music; 7:00-8:00, Indian program, Henry Purmort Eames, director; Opening Talk on Indian music, Dr. Eames; Indian music, Mrs. Edith Shaw Brown, pianist; Talk by Robert J. Hamilton, Blackfeet Indian representative in Washington; Indian music, Paul Vernon, violinist; Blanch Weber Vernon, pianist; Indian songs, Amy Dorith, soprano; Two horn solos, John M. Kuhn, Yankton-Sioux.

WOAW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Wowl dance program, George Reider and his Ragabonds; "Blue Hoosier Blues," "Carolina Mammy," "I Cried for You," "When My Sweetie Went Away," "Wet Your Thumb," "Louisville Lou," "That Red-Head Gal," "Dreamy Melody," "Saxophobia," "Rose of Picardy," "Swinging Down the Lane."

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert; 3:30 P. M., Educational program, C. E. Wilent; Music, 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Musical program; Erwin Swindell, director; E. H. Hass, reader; Mrs. Martin Silberstein, harpist; Herbert Silberstein, violinst; Dwight Slade, baritone.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:40, Dinner music, Hotel Adelphia Roof Garden Concert Orchestra; 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra; piano recital; 11:10, Dance music, Hotel Adelphia Roof Garden Orchestra, Walter Miller, director.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra; 8:30 P. M., Detroit News Orchestra; Town Crier; Anne Campbell, News Poet; E. M. Murray, baritone; Lillian Shimberg Freedman, pianist.

Saturday, September 29

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical Program, "Three Dances from Henry VIII," "Turkish March," "Gold and Silver Waltz," "Pulcinello," "Carmen." Star Concert Orchestra; "Selected," Mrs. Marshall, soprano; "Meditation from Thais," "Viennese Melody," Harry Adaskin, violinist.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music; 11:30, Victrola and Victor records, S. Hamilton Company; Piano and player rolls, C. C. Mellor Company; 5:15 P. M., Concert, Westinghouse Band; 6:45, Children's period, Dreamtime Lady; 7:20, Overture, "Barber of Seville," "Narcissus," "The Darkies' Dream," "Attila," "Sweetest Story Ever Told," "Prelude," Excerpts from "Beautiful Galatea," "Potpourri, A Night in Berlin," "The Swan," Intermezzo "Cavalleria Rusticana," Overture "Morning, Noon and Night," Westinghouse Band; T. J. Vastine, director.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Children's program; 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, De Luxe program, G. A. Phelps, of the Suburban Estates Company, assisted by the Robertson-Cole Studios.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Orchestral concert, organ recital, vocal and instrumental specialties; Missouri Theater.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News; 5:50, Children's bedtime story; 7:00-7:58, Isham Jones and his Orchestra; Mary Lee, soprano; Harry Geise, pianist; 8:05, Under the Evening Lamp, "Youth's Companion."

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M., Maria Fantoli, soprano; Mr. Carrasco, tenor; Elvira Roca, pianist.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 P. M., Dinner concert, Hotel Kimball Trio; 6:30, Bedtime story for the children; "Bringing the World to America, prepared by "Our World Magazine"; "This Week's Judge"; 7:00, Concert, Alwyn E. W. Bach, baritone; Mrs. May Major, accompanist; Myrtle Celeste Atchinson, pianist; 8:00, Bedtime story for grown-ups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 9:45-12:00 P. M., Dance music, Meyer Davis Le Paradis Band, Roof Garden of the Le Paradis Restaurant.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, Betty Holmes, soprano; Fred Rose, pianist-composer; Bob Brown and his famous overseas Ukulele Melodians Quartette; Jack Chapman and his Drake Hotel Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; 4:30-5:55, Dance music; 5:55, Baseball scores; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., "Tinkerman and the Wheezed Taxi," Edith J. Craine; "Big Blonde Mama," "First, Last and Always," Max Hertig, soloist; "Dreamy Melody," "Louisiana," "Babbling Brook," Harry Lee, soloist; "You Can't Make a Fool Out of Me," "Barney Google," Billy Burke, soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "Use and Misuse of the Automobile," E. Gordon Perry; 8:30-9:30, Emmett B. Peck, violinist; Martha M. Whitaker, pianist; 11:00-12:00, Jimmy Allen's Serenaders.

WFI, Philadelphia (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Musical program, Loretta Kerk at the piano; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 8:00, Song recital and short talks.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Selections, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections, The Strand Theater Orchestra; Harry S. Currie, conductor; "Just Among Home Folks," Courier-Journal; 7:30-9:00, Concert, auspices of Miss Caroline Pell, Selections, Strand Theater Orchestra; Reading, "An Interesting Historical Episode."

WIP, Philadelphia (Eastern, Daylight Saving, 509), 3:00 P. M., Dance music; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talk; 8:15, Program of operatic selections; 10:30, Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "The Three Questions," "Under the Weeping Willows," Ella Zoff, soprano; "I Love a Little Cottage," "Over Where the West Begins," Jack Stillerman, baritone; Selections, Oriole Orchestra; Piano solos, Mamie Stillerman; "The Rosary," "Old Black Joe," Beulah Rosine, cellist; Selections, Oriole Orchestra; "Mah Lindy Lou," "Russian Folk Song," Jack Stillerman; Soprano solos, Ella Zoff; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 3:00 P. M., Fashion developments, Women's Wear; 6:05, "Uncle Wiggily Stories," Howard Garis; 8:00, Concert, Department of Street Cleaning Band; 10:00, "Peruvian Night Program," arranged by Senor Daniel Alomia Robles.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 3:00 P. M., La Salle Hotel Orchestra; 8:15, Pennsylvania Railroad Fort Wayne Division Orchestra; 9:00-10:00, Musical program, Chicago Theater.

WOAW, Omaha, Nebraska (Central, 526), 9:00-11:00 P. M., "Praise Ye the Father," Park Sextet; Overture, "Hallelujah," Park Orchestra; "He Did Not Die In Vain," Lieben and Francois; "Holy City," Dorothy G. Park, violinist; "Father, Protect Us Through the Night," Mr. and Mrs. Park, Dorothy and Lieben; "Cupid's Heart," Air from "Rigoletto," "Spring Song," Park Orchestra; "Little Buttercup," Genevieve Park; Flute, "Minuette," Lieben Park; "Come Where the Lilies Bloom," Mrs. Park, Dorothy; "Souvenir de Wieniawski," "Tyroler Heimathklaenge," Dorothy Park, violinist; "Don't Use Big Words," "The Bootblacks," C. A. Park, reader; "O Dry Those Tears," Dorothy Park; Violin and flute duet, "Somewhere a Voice Is Calling," Dorothy, Lieben Park; "Barcarolle," "Melody in F," Park Orchestra; Italia, "Lucrezia," Park Sextet; "My Ain Folk," "When Irish Eyes Are Smiling," "National Hymn of Spain," Dorothy Park; "Medley of Patriotic Airs," Park Orchestra.

WOC, Davenport, Iowa (Central, 484), 12:00 P. M., Chimes concert; 3:30 P. M., Educational program, C. C. Hall; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 9:00, Dance program, P. S. C. Orchestra.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra; 7:30 P. M., Detroit News Orchestra.

Sunday, September 30

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 A. M., Sacred service; 10:30-11:00, Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist; 7:00-7:30 P. M., Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist.

KYW, Chicago, Ill. (Central, 345), 10:00 A. M., Church Services, Central Church; Rev. Dr. F. F. Shannon, pastor; 5:00-8:00, Sisson Trio; A. L. Shyman, pianist; Theodore Ratzer, cellist; George Bass, violinist.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 9:15 P. M., Henry Selinger and the Drake Concert Ensemble; Soloist to be announced.

WFAA, Dallas, Texas (Central, 476), 2:30-3:30 P. M., Radio Chapel Bible Class, Dr. William M. Anderson Jr., Pastor First Presbyterian Church; Half hour Bible teaching; half hour Gospel singing, I. Wesley Hubbell, teacher; 9:30-10:00, Sacred music recital, singers from Oak Cliff Presbyterian Church; Alice Knox Ferguson, director; 10:00-11:00, Brilling's Dallas Cafeteria Orchestra; Lou Goldberg, conductor.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 7:30 P. M., Church services. Arch Street Presbyterian Church; organ recital.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 3:00 P. M., Vesper service, the Rev. G. A. Butterick.

WGY, Schenectady, N. Y. (Eastern, 380), 10:30 A. M., Church service, Albany Street Methodist Episcopal Church, Schenectady, N. Y., Reverend Albert D. Angell; D. D., Pastor; 7:30 P. M., Church service, Albany Street Methodist Episcopal Church; Reverend Albert D. Angell, D. D., Pastor.

WHAS, Louisville, Ky. (Central, 400), 9:57 A. M., Organ music; 10:00, Church services, Crescent Presbyterian Church; Rev. Dr. J. V. Logan, pastor; 4:00-5:00 p. m., Concert, Isabelle Wetzelberger, director.

WHK, Cleveland, Ohio (Eastern, 360), 8:00 P. M., Musical program, WHK Orchestra and vocal solos by popular entertainers.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 6:00-9:00 P. M., Selections, Oriole Orchestra; "Polish Dance," "Rustle of Spring," Margaret Neff, pianist; "Pro Peccatis," R. G. Ball, baritone; Selections, Oriole Orchestra; "Dawn," "Stars Brightly Shining," Cora Allen Pripps, contralto; "Anitra's Dance," "The Cuckoo," Margaret Neff; Cello solos, Hugo Sansone; Selections, Oriole Orchestra; "I Hear a Thrush at Eve," "Gray Days," "To You," R. G. Ball; Selections, Oriole Orchestra.

WOAW, Omaha, Nebraska (Central, 526), 9:00 A. M., Radio chapel service, Rev. R. R. Brown; Musical chapel service, Third Presbyterian Church.

WWJ, Detroit, Mich. (Eastern, 517), 11:00 A. M., Church services, St. Paul's Episcopal Cathedral; 4:00 P. M., Detroit News Orchestra; Cyril Wezmael, baritone; Leo Robitaille, tenor.

Monday, October 1

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Song recital; Piano selections, Edna Finestone; 4:30-5:55, Short talks and song recital; 7:30-7:45, Bedtime stories, Dream Daddy; 7:45, Moving picture review; 8:00, Song recital; Dance music, Howard Lanin's Arcadia Cafe Orchestra; Special WDAR features.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Popular musical selections; 6:30, Dinner music Meyer Davis Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Statler Hotel Ball Room music, National Safety Congress Ball.

WGY, Schenectady, N. Y. (Eastern, 360), 2:00 P. M., Music and fashion, by courtesy of Modern Priscilla; 7:45, A Night of Jewish Melody; Orchestra selection, WGY orchestra; Rose Cohn, mezzo soprano; Edward A. Rice, violinist; Address, E. Merris.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Selections, Strand Theater Orchestra; Harry S. Currie, conductor; Selections, Mary Anderson Theater Orchestra; Ollie Jones, conductor; Selections, Rialto Theater organ.

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 P. M., Artist recital; 6:45, "Radio Baseball Dope" by Monte Cross, old-time ball player; 7:00-7:30, Bedtime stories, Uncle Wip.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra; A. Candelori, director; 8:30, Band concert and organ recital; 9:30, Dance music, Hotel Adelphia Roof Garden Orchestra, Walter Miller director.

The Week's Headliners on the Air

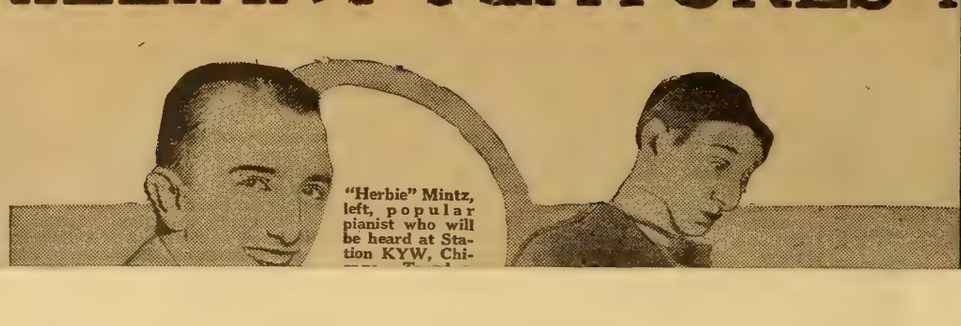
SCANNING the offerings of the week, one can hardly complain for lack of choice. Let us see. On Tuesday night WOAW has an excellent classic program.

How about Wednesday? Well there's a good classic program on at KDKA, an orchestra concert at KSD, a Cuban Navy band concert at PWX, and a special birthday party and jazz song riot at WDT. Then for the children, WLW is giving a child play.

Aspiring writers would do well to listen into WBZ Thursday, when Dr. J. Berg Esenwein tells, "What Is a Plot?" And on the same evening William Johnson at WJZ gives another installment of his detective serial story, "The Waddington Cipher."

Friday looms up with two Radio dramas; at WDAR and WGY. WMAQ wil devote Friday night to a special Indian program, while WOAW will give two hours of good dance music.

WJZ's Peruvian Night on Saturday ought not be boring. Sunday let's tune in WDAP and hear the Drake Concert Ensemble, and Monday—let's see—ah, Monte Cross will give us some real baseball dope via WIP.



"Herbie" Mintz, left, popular pianist who will be heard at Station KYW, Chi-

Tuesday, September 25

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 40
8:00-9:00 P. M., Musical program, "A Ball Scene "Passepied," "Minuet," "Molly on the Shore," St Concert Orchestra; "Cradle Song," "O, Dry Th Tears," "I Hear a Thrush at Eve," Ina Lockart, cc tralto; Cello Solo, selected.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M Music; 11:30, Victorola and Victor records, S. Ham ton Company; Piano and player rolls, C. C. Mel Company; 5:15 P. M., Dinner concert, Grand Symp ony Orchestra; 6:45, Children's period, Dreamti Lady; 7:05, "Need for Trained Men," John T. Mc ris, director College of Industries, Carnegie Instit of Technology; 7:20, Concert, Pittsburgh Musical I stitute.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Ta Jeannette P. Cramer, home economics editor of T Oregonian; 10:00, Dance music, George Olsen and I Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 M., Concert features; 2:30-3:30, Matinee Musical 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:3 De Luxe Program, Flournoy's Californians.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Pr gram to be announced.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Stud program; 4:00, News; 5:50, Children's bedtime sto 7:00-7:58, Herbie Mintz, pianist; Sallie Menkes, s companist; A. W. "Seu" Kaney, specialty a Schlewsig Helsteiner Saengerbund (Male Voices); M Hotton, director; "Concerte," "Andante," "Will the Wisp," "Fen Follett," Mary McAuliffe, pianis Isham Jones and his Dance Orchestra; 8:01, Progra American Farm Bureau Federation.

WBZ, Springfield, Mass. (Eastern, 337), 6:30 P. M Bedtime story for children; 7:00, Concert, Mrs. Flo ence W. Rosenberg, pianist; Pauline Ewig, contralt Mrs. Van Buren, accompanist; 8:00, Bedtime sto for Grown-ups, Orison S. Marden; Speeches a music, National Convention of the Exchanges Club.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360 7:00 P. M., Drake Concert Ensemble; Henry Selinge director; Blackstone String Quintette; Irving Ma grath, director; 10:00, Frederick W. Agard, teno Bob Cougle, pianist; Jack Chapman and his Dan Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Savin 395), 12:00-12:54 P. M., Organ recital, Stanley The ter; Dinner music, Arcadia Cafe Concert Orchestr 2:00-3:00, Concert, Arcadia Cafe Orchestra; Sopra solos; 4:30-5:55, Song recital; 7:30, Bedtime storie Uncle Wip; Drama review, Walter Greenough.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395 12:00 M., "Blue Hoosier Blues," "Hi-Lee-Hi-Low "No, No, Nora," Bob Miller, tenor; Herbert Steine pianist; 12:15 P. M., "Carolina Mammy," "Swingin Down the Lane," "Steve, Rose, and Ben," Lew Pianni, soloist; Herbert Steiner, pianist; "Wonde ful One," "Cry Myself to Sleep," Jimmy Flin soloist; 12:45, "Saw-Mill River Rose," Bob Mil soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M DeWitt McMurray, lecturer; 8:30-9:30, Sanger Brot ers, choral club; 11:00-12:00, Footwarmers' Orchestra

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395 1:00 P. M., Dinner music, Meyer Davis Bellevu Stratford Orchestra; 3:00 P. M., Song recital; 6:3 Dinner music, Meyer Davis Bellevue Stratford Dan Orchestra; 7:00-7:30, Children's Own Half Hou Stories by Cousin Sue; 8:00, Boy Scout Radio Corps 9:00, Song recital; 10:30, Dance music, Meyer Dav Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360 12:00-12:30 P. M., George Albert Bouchard, organis 3:30, Recital, Dorothy Lockwood, pianist; 6:30-7:0 George Albert Bouchard, organist; 7:00, Digest the day's news; Topics of scientific interest.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M Music and address, Mrs. Chester Moore; 7:45, Mu sical program; Selections, The Lawrence Trio, William T. Lawrence, violinist; Willard D. Lawrence, cellist Eleanor Padley, pianist; Mrs. William T. Lawrence soprano; Eleanor Padley, accompanist; Address, Dr Louis C. Cornish.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra; Ollie Jones, conductor; "Just Among Home Folks"; Selections, Alamo Theater Organ; 7:30-9:00, Concert, Henry M. Schilling and His Orchestra; Fred Wells, tenor; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital; 6:02, Dinner music. Dick Regan's WIP Little Symphony Orchestra; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, Short talks; 8:15, Song recital; 9:00, Musical program; Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 P. M., Concert program, the Cleveland News-Leader; 7:30-8:00, Song recital for children, Clarabelle Johnson; Bedtime story; 8:00-10:00, Thow's Syncopators; 10-piece jazz orchestra in popular dance music; Vocal selections, Soprano Trio, Miss Helen Cannon, Miss Rose Seton, Miss Dorothy Maskell.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:50 P. M.-12:00 A. M., Selections, Oriole Orchestra

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Children's program; 8:00, Concert, Columbia All-Artist Orchestra, Harry Linden, director; 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert; 2:30-3:30, Matinee Musicale; 6:45-7:30, Children's Program, "Uncle John"; 8:00-10:00, De Luxe Program, Lucille Holman, mezzo-soprano; Virginia Hubbard, violinist; Edna B. Hanna, pianist.

KSD, St. Louis, Mo. (Central, 546), 7:00 P. M., Concert, Abergh's Concert Orchestra of the Hotel Statler.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News; 5:50, Children's bedtime story; 7:00-7:58, Isham Jones and his Dance Orchestra; Harry Geise, pianist; Mary Lee, soprano; Marguerite Kugel, soprano; 8:05, Reviews of the latest books, Llewellyn Jones.

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M., Concert, Cuban Navy Band.

WBZ, Springfield, Mass. (Eastern, 337), 5:00 P. M., Dinner concert, "Pique Dame Overture," "Serenade," "April Chorus," "Polero," "In a Canoe," Interlude,

concert; 3:30 P. M., Educational Program, Clyde G. Kern; Music; 6:30, Sandman's visit; 8:00, Pipe organ recital, Erwin Swindell; Edith Barlow, reader; 10:00, Artist Musical Program; Erwin Swindell, musical director.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt; 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra; 8:30 P. M., Detroit News Orchestra; Town Crier; Lyle Cook, baritone; Elsie Bond, soprano.

Thursday, September 27

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Melodique, "Serenade Espagnole," Selection from "The Country Girl,"

Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director; 10:00, John Stamford, tenor; Artists from the Metropolitan Conservatory of Music; Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, concert, Arcadia Cafe Concert Orchestra; Song recital, Edna Finestone, accompanist; 4:30-5:55, Short talks and musical program; 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Concert, Leslie Smith, pianist; Lillian Croxton, soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "The Community Chest," T. P. Junkin, lecturer; 8:30-9:30, Recital, Choral Club.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music.

MANY BRILLIANT FEATURES MARK CURRENT WEEK'S PROGRAM OFFERINGS

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Friday looms up with two Radio dramas; at WDAR and WGY. WMAQ will devote Friday night to a special Indian program, while WOAW will give two hours of good dance music.

WJZ's Peruvian Night on Saturday ought not be boring. Sunday let's tune in WDAP and hear the Drake Concert Ensemble, and Monday—let's see—ah, Monte Cross will give us some real baseball dope via WIP.

"Herbie" Mintz, left, popular pianist who will be heard at Station KYW, Chicago, Tuesday, Thursday and Friday this week

Some of the WGY Student Players, who will end their 1922-23 "season" at the famous Schenectady station of the General Electric Company on the evening of Friday, September 28, with the Radio drama "The Romantic Age"

Left, Dr. Henry P. Eames, director of special Indian program Friday, September 28, and in circle, Jennie F. W. Johnson, contralto, who will give song recital Tuesday, September 25, at the Chicago Daily News Station, WMAQ

DO YOU LIKE DANCE MUSIC? HERE'S WHO TO TUNE IN THIS WEEK

FOR LOVERS of syncopation, the following list of broadcasting stations whose programs include dance music on the nights named, will be an invaluable aid:

Tuesday, September 25: Stations KGW, KYW, WDAP, WFAA, WFI, WIP, WJAX, WJAZ, WJZ and WMAQ.

Wednesday, September 26: Stations KGW, KYW, WDAP, WDAR, WIP, WJAZ, WJZ and WMAQ.

Thursday, September 27: Stations KGW, KYW, WCAP, WFI, WIP, WJAX, WJAZ, WLW and WMAQ.

Friday, September 28: Stations KGW, KSD, WDAP, WDAR, WDT, WJAZ, WOAW and WOO.

Saturday, September 29: Stations KGW, KYW, WCAP, WIP, WJAZ and WOC.

Sunday, September 30: Station WJAZ.

Monday, October 1: Stations WDAR and WOO.

Tuesday, September 25

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, "A Ball Scene," "Passepied," "Minuet," "Molly on the Shore," Star Concert Orchestra, "Cradle Song," "O, Dry Those Tears," "I Heard a Thrush at Eve," Ina Leckart, contralto, Cello Solo, selected.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music, 11:30, Victorola and Victor records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company, 5:15 P. M., Dinner concert, Grand Symphony Orchestra, 6:45, Children's period, Dreamtime Lady, 7:05, "Need for Trained Men," John T. Morris, director College of Industries, Carnegie Institute of Technology, 7:20, Concert, Pittsburgh Musical Institute.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Talk, Jeannette P. Cramer, home economics editor of The Oregonian; 10:00, Dance music, George Olsen and his Orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert features, 2:30-1:30, Matinee Musicale; 6:45-7:30, Children's Hour, "Uncle John", 8:00-10:00, De Luxe Program, Flournoy's Californians.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Program to be announced.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program, 4:00, News, 5:50, Children's bedtime story, 7:00-7:30, Herbie Mintz, pianist, Sallie Menkes, accompanist; A. W. "Sen" Kaney, specialty act, Schleswig Holsteiner Saengerbund (Male Voices), Mr. Hotton, director, "Concerto," "Andante," "Will O' the Wisp," "Ten Follett," Mary McAuliffe, pianist, Isham Jones and his Dance Orchestra, 9:01, Program, American Farm Bureau Federation.

WBZ, Springfield, Mass. (Eastern, 337), 6:30 P. M., Bedtime story for children, 7:00, Concert, Mrs. Florence W. Rosenberg, pianist, Pauline Earle, contralto; Mrs. Van Horn, accompanist, 8:00, Bedtime story for Grown-ups, Orison S. Marden, Speeches and music, National Convention of the Exchange Club.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble, Henry Selinger, director, Blackstone String Quintette, Irving Margrath, director; 10:00, Frederick W. Agard, tenor, Bob Gangle, pianist; Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Concert, Arcadia Cafe Orchestra, Soprano solos, 4:30-5:55, Song recital, 7:30, Bedtime stories, Uncle Wip, Dream Daddy, Walter Greenough.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00 M., "Blue Hoosier Blues," "It Lee Hi Low," "No No Nora," Bob Miller, tenor, Herbert Steiner, pianist, 12:15 P. M., "Carolina Mammy," "Swinging Down the Lane," "Steve, Rose, and Ben," Lewis Pianist, soloist, Herbert Steiner, pianist, "Wonderful One," "Cry Myself to Sleep," Jimmy Flint, soloist; 12:45, "Saw Mill River Road," Bob Mill, soloist.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., DeWitt McMurray, lecturer, 8:30-9:30, Sanger Brothers choral club, 11:00-12:00, Fostwortners Orchestra.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Orchestra, 3:00 P. M., Song recital, 6:30, Dinner music, Meyer Davis Bellevue Stratford Dance Orchestra, 7:00-7:30, Children's Own Half Hour Stories by Cousin Sue, 8:00, Boy Scout Radio Corps, 9:00, Song recital, 10:30, Dance music, Meyer Davis Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist, 3:30, Recital, Dorothy Lockwood, pianist, 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, Topics of scientific interest.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M., Music and address, Miss Chester Moss, 7:45, Musical program, Selections, The Lawrence Trio, William T. Lawrence, violinist, Wilbert P. Lawrence, cellist, Eleanor Pailler, pianist, Mrs. William T. Lawrence, soprano, Eleanor Pailler, accompanist, Address, Dr. Lewis C. [illegible]

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie [illegible], Alamo Theater Organ, 7:30-9:00, Concert, Helen M. Schmitt and His Orchestra, Talk [illegible]

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Artist recital, 6:02, Dinner music, [illegible] WIP Irish Orchestra, 7:00-7:30, Bedtime story, Uncle Wip, 8:00, Sport talk, 8:15 [illegible] 9:00, Musical program [illegible] Vigilon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 P. M., Concert [illegible] New Leader, 7:30-8:00, Song recital [illegible] Cleveland [illegible] Bedtime story, 8:00-10:00, [illegible] Syncopators [illegible] jazz orchestra in popular dance music, Vocal selections, Soprano Trio, Miss Helen Cannon, Miss Rose Seton, Miss Dorothy Mayfield.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2:00 A. M., Selections, Oriole Orchestra, "I Hear a Thrush at Eve," "At Dawning," Charlotte Howard, soprano, Clarinet solos, [illegible] "On the Road to Mandalay," Tony Corcoran, baritone, Piano solos, Margaret Garrity, "The [illegible]," "At Twilight," Charlotte Howard, soprano, Clarinet solos, "Sweet Little Woman of Mine," Tony Corcoran; Piano solos, Margaret Garrity; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 4:00 P. M., Recital, Madaleine Houff, soprano, 6:05, "The Little Lame Prince," bedtime story, 7:35, Address, Dr. Leland E. Cofer, 7:45, "Causes of Business Failures," Herbert F. De Bower, 8:00, Address, James W. Gerard, former U. S. ambassador to Germany, 8:15-10:00, Musical, Annette Royak, soprano; Felix del Sarto, violinist, Joseph Zellman, baritone, Dance program, Hotel Astor Dance Orchestra, 11:00, Dance music, Hotel Astor Dance Orchestra.

WLW, Cincinnati, Ohio (Eastern, 309), 10:00 P. M., Selections, Circle Orchestra, "Veracini Sonata," William Stoess, violinist, Rosemary Ellerbrock, accompanist, "Pale Hands," "Till I Wake," solos, Mrs. Hazel B. Carter, Piano solos, Lillian Duerig, "Red Hot Blues," "She Got That Too," Circle Orchestra; "Valse Triste," "Rodino," William Stoess, violinist, "Annie Laurie," "The Last Rose of Summer," "Swanee River," Mrs. Hazel B. Carter, "Ballade Polonaise," William Stoess, Concluding numbers, Circle Orchestra.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program, Glenn Dillard Gunn School of Music, 7:00-8:00, Talk on foreign relations, Edward Price Bell, Irish ballads, Simon H. Rimsden, colored tenor, 9:00, La Salle Hotel Orchestra, 9:15, Musical program, Jennie F. W. Johnson.

WAOW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Piano duet, "Slavonic Dance," Henrietta Rees, Edith Wagoner, "Thy Beaming Eyes," "Absent," "Springtide of Love," Maude Gutzmer, contralto, "Romance," Louise Zabriskie, violinist, "Hail, Thou Dwelling Lowly," H. J. Poore, tenor, "The Linden Tree," Belle von Mansfeldt, cellist, "The Girl with the Flaxen Hair," Dance of [illegible], Henrietta Rees, pianist, Scotch and Irish Songs, Margaret Ames, soprano; "Ah! Mon Fils," "Le Prophete," Maude Gutzmer, contralto, "Adagio," Louise Zabriskie, violinist, "I Passed by Your Window," "Moon of My Delight," "Persian Garden," H. J. Poore, tenor, "From the Land of the Sky Blue Water," "Evening Star," Belle Von Mansfeldt, cellist, "Sunshine Song," "Ave Maria," Margaret Ames, soprano, "Palmates," Edith Wagoner, pianist, "Caprice Viennois," Louise Zabriskie, Aria from "Shanewis," Maude Gutzmer.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert, 3:30 P. M., Educational Program, A. G. Huebner, Music, 5:45, Chimes concert.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., Dinner music Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 9:45 A. M., "Tonight Day" program, Fred Shaw, pianist and songster, Margery Richmond, pianist, 12:00 M., Detroit News Orchestra, 8:30, Detroit News Orchestra, Town Crier; Clinto Shanasto, guitar soloist.

Wednesday, September 26

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, Overture "Zampa," [illegible] "A Perfect Day," "I Petre de la Victoire," Star Concert Orchestra, Nocturne in E Flat, The Melting Tiger, Harry Adaskin, violinist, Selected, Alex Yoder, baritone.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music, 11:30, Victorola and Victor records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company, 5:15 P. M., Dinner concert, KDKA Little Symphony Orchestra, 6:30, Literary program, Mabel [illegible], 6:45, Children's Period, Dreamtime Lady, 7:05, Applying Art to Modern Industry, Prof. H. T. Goodwin, Head of the Department of Arts, Carnegie Institute of Technology, 7:20, [illegible] Overture, William Tell, Serenade, The Vagabond, [illegible] Travesty, Group of Popular Songs, [illegible] Second Hungarian Rhapsody, KDKA Little Symphony Orchestra, [illegible] Peake.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Children's program, 8:00, [illegible] Orchestra, [illegible] 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., [illegible] 6:45-7:30, Children's [illegible] 8:00-10:00, De Luxe Program [illegible] Virginia Hubbard, violinist [illegible]

KSD, St. Louis, Mo. (Central, 546), 7:00 P. M., Concert, [illegible]

KYW, Chicago, Ill. (Central, 345), 4:30 P. M., News, 5:50, Children's bedtime story, 7:00-7:58, [illegible] Isham Jones and his Dance Orchestra [illegible] 8:00, Reviews of the latest [illegible]

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M., Concert, Cuban Navy Band.

WBZ, Springfield, Mass. (Eastern, 337), 5:00 P. M., Dinner concert [illegible] "Ole South March" [illegible] Bedtime story for grown ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble; Henry Selinger, director; Blackstone String Quintette; Irving Margrath, director. 10:00, Salvation Army Staff Band, Jack Chapman and his Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Piano solos, Edna Finestone, Arcadia Cafe Concert Orchestra, 4:30-5:55, Song recital, 7:30-8:00, Bedtime stories, Dream Daddy, 8:00, Current topics by Arthur D. Reese, Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra, Features from Stanley Theater, Short talk about Philadelphia industries.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:30 P. M., "Mama Goes Where Papa Goes," "Louisville Lou," "You Didn't Want Me When I Wanted You," Jack Yellen, soloist, Merty Howard, pianist, "'Neath the Egyptian Sky," "Come Let Us Dance the Waltz of Love," Merty Howard, pianist; "Big Blonde Mama," "First, Last, and Always," Billy Burke, soloist, Matty Levine, pianist; "Louisiana," "Dreamy Melody," Max Heitrig, soloist; Matty Levine, pianist, 7:00-8:00, Vaughn De Leath's first birthday party.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "[illegible]," J. O. Mahoney, principal of the Dallas night schools.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Musical program and short talk, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 7:00, Children's bedtime stories.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, 8:45, Address, Sidney Coleman, secretary of the Buffalo Safety Council on "Fire Prevention," 9:00, Concert, South Side Choral Club.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Mary Anderson Theater Orchestra, Ollie Jones, conductor, "Just Among Home Folks," the Courier-Journal, Selections, Rialto Theater organ; 7:30-9:00, Concert, Del Canto Male Quartette, Harry S. Currie, C. Marvin Locke, William K. Schmidt, Cecil Shackleton, Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., Popular music, 6:02, Dinner dance music, Jordan-Lewis Orchestra, director Bob Lewis, 7:00-7:30, Bedtime stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., Selections, Oriole Orchestra; "Araby," "Russian Lullaby," Neva Near, soprano; "Caprice Espagnol," Helen Rauh, pianist, Selections, Oriole Orchestra, "Walthers Prize Song," "Negro Hall," Genevieve Hunter, violinist, "Because," "Gray Days," Harry Hauge, baritone, Selections, Oriole Orchestra, Piano solos, Helen Rauh, "Keep on Hoping," "Rose in the Bud," Neva Near, soprano, Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, Daylight Savings, 455), 3:00 P. M., Concert, Hotel Astor Organ, Harry Riggs, organist; 6:05, "The Adventures of Peter," Florence Smith Vincent, Address, F. [illegible]; 8:30-10:15, Recital, Benjamin Listengart, violinist, Ernesto Bertonni, pianist, Walter Mills, baritone.

WLW, Cincinnati, Ohio (Eastern, 309), 8:00 P. M., Vocal selections, Class of Arnold Schroeder, "The Magic Forest" (children's play), Reulman School of [illegible], "The Jealous [illegible]," Irene Wainscott, soloist, [illegible] George Sturm.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 1:15 P. M., Speech, Chicago Chamber of Commerce [illegible] 4:30, Program, Cosmopolitan School of Music and Dramatic Art, 7:00, Children's stories, Georgene Faulkner, Story Lady, 7:30, Lecture, American Classical Society, 9:00, Dance music, La Salle Hotel Orchestra, F. E. Sheets, Jr., and his Californians, 9:15, Program, Ada Whittow, contralto, Ernest [illegible]

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes [illegible] 3:30 P. M., Educational Program, Chas. G. [illegible], Music, 6:30, Sandman's visit, 8:00, Pipe organ recital, Erwin Swindell, Edith Ryder, reader, 10:00, Artist Musical Program, Erwin Swindell, musical director.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra, 8:30 P. M., Detroit News Orchestra, Town Crier, Lyle Cook, baritone, Elsie Bond, soprano.

Thursday, September 27

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, [illegible] "The Country Girl," [illegible] Star Concert Orchestra, [illegible] The Dream Cottage, [illegible] Fred Rogers, tenor, "Londonderry Air," [illegible]

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music, 11:30, Victorola and Victor records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company; 5:15 P. M., Dinner concert, Grand Symphony Orchestra; 6:45, Children's period, Dreamtime Lady, 7:20, "Berceuse," "Second Waltz," "Ave Maria," Stella," "Minuet," "Scherzo," "Melody in F," "Waltz from Serenade", Violin solos; "Ich Liebe Dich," "Auf Dem Bergen", Contralto solo, "Three Little Fairy Songs," "Children of Men," "Wind Song," "Bird Raptures"; Dormont Ladies Trio; Mrs. Donald Maxwell, violinist, Ruby Dunn MacCurdy, cellist and contralto; Elizabeth Florin Evans, pianist.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Woman's program on Child Training, 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert program, 2:30-3:30, Matinee Musicale, 6:45-7:30, Children's program, "Uncle John"; 8:00-10.00, De Luxe program, Hancock Trio, G. Allen Hancock, cellist, Albert Angermayer, violinist, Mrs. Albert Angermayer, pianist; Rev. Thomas Lutton, lecturer.

KYW, Chicago, Ill. (Central, 345), 1:35 P. M., Studio program, 4:00, News, 5:50, Children's bedtime story, 7:00-7:58, Musical program, Chicago Musical College; Isham Jones and his orchestra, Herbie Mintz, pianist; Sallie Menkes, accompanist, A. W. "Sen" Kaney, specialty act, 8:05, Twenty Minutes of Good Reading, C. J. Pernin.

WBZ, Springfield, Mass. (Eastern, 337), 6:30 P. M., Bedtime story for the children, "What Is a Plot," Dr. J. Berg Esenwein; 7:00, Concert, Harold H. Krelinwald [illegible], Mrs. Myers, accompanist, Samuel [illegible], violinist, 8:00, Bedtime story for grown ups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 9:45-12:00 P. M., Dance music, Meyer Davis Le Paradis Band, Roof Garden of the Le Paradis Restaurant.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble, Henry Selinger, Director, Blackstone String Quintette, Irving Margrath, director, 10:00, [illegible] tenor, Artists from the Metropolitan, Conservatory of Music, Jack Chapman and his Drake Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra, Song recital, Edna Finestone, accompanist, 4:30-5:55, Short talks and musical program, 7:30-8:00, Bedtime stories, Dream Daddy.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:55 P. M., Concert, Leslie Smith, pianist, Lillian Crowther, contralto.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "The Community Chest," T. P. Junkin, lecturer, 8:30-9:30, Recital, Choral Club.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Recital, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 7:00, Children's Own Half Hour Stories by Cousin Sue, 8:00, Recital, Dance music, Jack Lerry and his orchestra from Cathay Tea Garden.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist, 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, Boy Scout Program, "The American Boy."

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M., Music and talk, by courtesy of [illegible]; Concert program, Quartet selections, [illegible] Herriott, piano, Edna M. [illegible], Martin Stopfer, tenor, and [illegible] Grace M. [illegible], Reading, Alvina Winkler [illegible], Jessie C. Herriott, soprano, Edna M. [illegible], alto.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, [illegible] Theater Orchestra, Ollie Jones, conductor, Just Among Home Folks, the Courier-Journal; Selections, Strand Theater Orchestra, 7:30-9:00, Concert, Harry S. Currie, director, Selections, [illegible] Bernard Dentinger, tra, Harry S. Currie [illegible] Strand Theater Orchestra.

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 3:00 P. M., [illegible] Song recital, 7:00, Bedtime stories, Uncle Wip, 8:00, Address, "When to Go and How to Get There," by courtesy of Automobile [illegible] 8:15, Dance music, [illegible] from Hotel Walton Roof Garden, 9:00, Organ recital, Karl Bonawitz [illegible] Theater, 9:15, Song recital, 10:10, Dance music, Charlie Kerr's Cafe L'Aiglon Orchestra.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 P. M., [illegible] Orchestra, [illegible] 9:30, Musical program [illegible] Mrs. Wm. Kessler, violinist.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., [illegible] Oriole Orchestra [illegible]

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 3:00 P. M., Concert [illegible] 4:05, Recital [illegible] 6:05 [illegible] Robert [illegible] 7:45 [illegible] 8:00 [illegible] Organ recital, [illegible]

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 P. M., [illegible] "Abide with Me," Chorus Choir; Violin solo; "March of the Priests," Chorus Choir, Serenade, "Good Night," Men's Chorus, Entertainment, Eastern Hills Dance Orchestra.

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Musical program, 7:00-8:00, Weekly talk to Boy Scouts, Talk, Rockwell R. Stephens, Automobile editor of the Daily News, Talk on South America, E. M. Newman, travelogist, 9:00, La Salle Hotel Orchestra, 9:15, Program, Elizabeth Stokes, soprano.

WOAW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Selections, Nebawka Orchestra, "The Dahlias," Leona Pollard (8 years old); "To Spring," Hazel Carper, pianist; Reading, "Kentucky Philosophy," Isadora Stone; "I Give It All to You," Mary Pollard (12 years old); Old-time fiddler selected, H. H. Steil, "Cavalleria Rusticana," DeForest Philpot, violinist; Skit, "Dot Entertains," Mary Ketch, Father St. John, Reading, Elizabeth Shelton (9 years old), Talk, A. F. Sturm, Old fiddler selected, Wm. Steel, "Out of the Dusk to You," Ladies' Quartet, "My Mother of Pearl," Mrs. John Hansen, soloist, "When You and I Were Young, Maggie," Mrs. R. B. Stone and daughters, Verle, Kathryn, Clara Still, [illegible], pianist, "The Fortune Teller," Mrs. J. Hansen, soloist; Gladys Wolfe, pianist, Old-time fiddler—selected, Wm. Balfour.

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert, 3:30 P. M., Educational program, Karl G. Stephan, Music, 5:45, Chimes concert, 6:30, Sandman's visit, 8:00, P. S. C. Orchestra, popular music.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra, 8:30 P. M., Detroit News Orchestra, Town Crier, Robert and Paul Smith, baritone, Mrs. Kathleen Hague, soprano, 11:00, Detroit News Orchestra; Robert and Paul Smith, baritones.

Friday, September 28

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical program, [illegible] Star Concert Orchestra, "Selected," Arthur Semple [illegible]

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music, 11:30, Victorola and Victor records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company, 5:15 P. M., Dinner concert, Grand Symphony Orchestra, 6:30, Address to the Farmers [illegible], 6:45, Children's period, Dreamtime Lady, 7:20, Concert [illegible]

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Women's program, 8:00, Vocal solos, 8:15; George Olsen [illegible]

KHJ, Los Angeles (Pacific, 395), 12:30-1:15 P. M., Concert entertainment, 2:30-3:30, Matinee Musicale, 6:45-7:00, Children's program, "Uncle John," 7:00-7:30, Organ recital, First Methodist Episcopal Church, Prof. Arthur Blakeley, organist, 8:00-10:00, De Luxe program.

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Operatic program arranged by Warren Lemon, 11:00, Dance music, Silverman's Dance Orchestra, Hotel Jefferson.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News, 5:50, Children's bedtime story, 9:00-10:30, Isham Jones and his Dance Orchestra, Herbie Mintz, pianist; Harry Geise, pianist, Sallie Menkes, accompanist, Sen Kaney, specialty act, Mary Lee, soprano.

WBZ, Springfield, Mass. (Eastern, 337), 5:00 P. M., Dinner concert, "Social Life," "The Skaters," "Song Without Words No. 1 and 2," "Hungarian Dance No. 5," "Narcissus," "La Paloma," "Fiesta," "Pasquinade," "Morning, Noon and Night in Vienna," WBZ Trio, 6:30, Bedtime story for the children, Current Book Review, R. A. MacDonald, 7:00, Concert, "Thorn Rose," "Told at Twilight," "Strumming," Military March," WBZ Trio, Mrs. W. W. Macalpine, soprano, Harry Kellogg, accompanist, 8:00, Bedtime story for grown ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., Drake Concert Ensemble, Henry Selinger, director, Blackstone String Quintette, Irving Margrath, director, 10:00, Rosemary Hughes, soprano, George R. Hill, Jr., baritone, Jack Chapman and his Drake Dance Orchestra.

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Short talks and musical program, 4:30-5:55, Song recital, 7:30-8:00, Bedtime stories, Dream Daddy, Book review, Dance music, Song recital, Piano solos, Edna Finestone, Dance music, Howard Lanin's Arcadia Cafe Orchestra, Soloist, Harry Olsh, Radiodrama directed by Walter Greenough.

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-12:50 P. M., Selections by Ollie's Kite's Jazz Orchestra, [illegible] Dawson, soloist, Banjo selections, Miss Breen, 11:30-11:50, "Bebe," "Struttin'," "Barney Google," WDT Orchestra, Vaughn De Leath in Original Songs, "When the Sun Shines for Me," "Where the Sacramento River Flows," "New Orleans," "Ramblin'," "Wild Flower," "Lady Luck," WDT Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., "Great Characters Among Early Christians," Dr. Robert Stewart Hyer, 8:30-9:30, Helen Foote and assisting artists in song.

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Concert, Harold Simonds, baritone, Caroline Hoffman, pianist, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., George Albert Bouchard, organist, 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, Real estate, 9:00, Musical program, Buffalo Electric Club.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M., Music and address, Dr. William Burgess Cornell, 7:45, Musical program, Instrumental selections, Mandolin Club, Arthur Leese, 1st mandolin, William F. Jacob, 1st mandolin, Howard J. Rose, 2nd mandolin, William H. Fowler, 2nd mandola, Orestus Young, mandola, Harry MacMullen, mandocello, Walter Fisher, harp-guitar, [illegible], Frank [illegible], orchestra, accompaniment, 10:30, Radio Drama, "The Romantic Age," WGY Student Players, Cast, Ruth Bentley, Arline Montgomery, Rose Coss, Robert Barry, Jerome Lowenheim, Gertrude Vetten, Edward H. Smith, Charles S. Holmes, John Lettice, Orchestra, [illegible], WGY Orchestra.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., Concert, Strand Theater Orchestra, Harry S. Currie, conductor, [illegible] Mary Anderson Theater Orchestra, Ollie Jones, conductor, "Just Among Home Folks," Courier-Journal, Selections, Rialto Theater Organ, 7:30-9:00, Concert, [illegible] Mitchell, Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 6:45 P. M., Baseball talk by Monte Cross, old time baseball player, 7:00-7:30, [illegible] Wip, 8:00, Song recital, 9:00, Musical program [illegible]

WJAX, Cleveland, Ohio (Eastern, 390), 7:00 P. M., until 1:00 A. M., Vocal [illegible] Concert [illegible] May [illegible]

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., [illegible] "Waltz in G Minor" [illegible] Grace [illegible]

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 3:00 P. M., [illegible] Women's [illegible] 4:05 [illegible] 5:15 [illegible] Agent of World Affairs [illegible] 6:35 [illegible]

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 P. M., "Your [illegible]"

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), 4:30 P. M., Program [illegible] 7:00-8:00, Indian program, Henry P. Eames, director, Opening Talk [illegible], Indian music, Mrs. Edith Shaw Brown, pianist, Talk by Robert J. Hamilton, Blackfeet Indian, representative in Washington, Indian music, Paul Vernon [illegible], Blanche Weber Vernon, pianist, Indian songs, Ava [illegible] soprano, Two-horn solos, John M. [illegible], Yankton Sioux.

WOAW, Omaha, Neb. (Central, 526), 9:00-11:00 P. M., Wood farce program, George Reeder and his Bass Bands, "Blue Hoosier Blues," "Carolina Mammy," "I Cried for You," "When My Sweetie Went Away," "Wet Your Thumb," "Louisville Lou," "That Red Head Gal," "Dreamy Melody," "Marcheta," "Rose of Picardy," "Swinging Down the Lane."

WOC, Davenport, Iowa (Central, 484), 12:00 M., Chimes concert, 3:30 P. M., Educational Program, [illegible] Wilbert [illegible] 5:45, Chimes concert, 6:30, Sandman's visit, 8:00, Musical program [illegible] director, [illegible] Mrs. Martel [illegible], Herbert Silberstein, violinist, Dance music [illegible]

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt, 7:30, Dance music, Hotel Adelphia's Roof Garden [illegible] Orchestra, 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra, [illegible] 11:10, Dance music, Hotel Adelphia Roof Garden Orchestra, Walter Miller, director.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra, 8:30 P. M., Detroit News Orchestra, [illegible] News [illegible] M. Murray, [illegible], Lillian Stamberg Freedman, pianist.

Saturday, September 29

CFCA, Toronto, Ont. (Eastern, Daylight Saving, 400), 8:00-9:00 P. M., Musical Program, Three Dances from Henry VIII, [illegible] Silver Waltz, [illegible] Carmen, Star Concert Orchestra, Selected, Mrs. MacDonald, soprano, [illegible] Harry Adaskin, violinist.

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 9:00 A. M., Music, 11:30, Victorola and Victor records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company, 5:15 P. M., Concert, Westinghouse Band, 6:45, Children's period, Dreamtime Lady, 7:20, [illegible] "Prelude," Excerpts from [illegible] A Night in Berlin, [illegible] Night, [illegible] T. J. Vastine, director.

KGW, Portland, Ore. (Pacific, 492), 3:30 P. M., Children's program, 10:00, Dance music, George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 P. M., Concert, 2:30-3:30, Matinee Musicale, 6:45-7:30, Children's program, [illegible] 8:00-10:00, De Luxe program, [illegible] Company, assisted by the [illegible]

KSD, St. Louis, Mo. (Central, 546), 8:00 P. M., Orchestral concert, [illegible] recital of vocal and instrumental [illegible], Missouri Theater.

KYW, Chicago, Ill. (Central, 345), 4:00 P. M., News, 5:50, Children's bedtime story, 7:00-7:58, Isham Jones and his Orchestra, Mary Lee, soprano, Harry Geise, [illegible] 8:00, [illegible] the Evening [illegible] Campanini.

PWX, Havana, Cuba (Eastern, 400), 9:00-11:30 P. M., [illegible] soprano, Mr. Carrasco, [illegible]

WBZ, Springfield, Mass. (Eastern, 337), 6:00 P. M., Dinner concert, Hotel Kimball Trio, 6:30, Bedtime story for the children, [illegible] 8:00, Bedtime story for grown ups, Orison S. Marden.

WCAP, Washington, D. C. (Eastern, 469), 9:45-12:00 P. M., Dance music, Meyer Davis Le Paradis Band, Roof Garden of the Le Paradis Restaurant.

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 7:00 P. M., [illegible]

WDAR, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 12:00-12:54 P. M., [illegible]

WDT, New York, N. Y. (Eastern, Daylight Saving, 405), 12:00-1:00 P. M., [illegible]

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 P. M., [illegible] 11:00-12:00 [illegible]

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), 1:00 P. M., [illegible] Loretta Kerk at the piano, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 8:00, Song recital and short talks.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., [illegible] 6:00-7:00, George Albert Bouchard, organist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., [illegible]

WIP, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 1:00 P. M., [illegible]

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 10:00 P. M.-2 A. M., [illegible]

WJZ, New York, N. Y. (Eastern, Daylight Saving, 455), 1:00 P. M., [illegible]

WMAQ, Chicago, Ill. (Central, Daylight Saving, 447), [illegible]

WOAW, Omaha, Nebraska (Central, 526), 9:00-11:00 P. M., [illegible]

WOC, Davenport, Iowa (Central, 484), 12:00 P. M., [illegible] 6:30 [illegible] Orchestra.

WOO, Philadelphia, Pa. (Eastern, Daylight Saving, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., Dinner music, Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 M., Detroit News Orchestra, 7:30 P. M., Detroit News Orchestra.

Sunday, September 30

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 A. M., Sacred service, 10:50-11:00, Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist, 7:00-7:15 P. M., Organ recital from the First Methodist Episcopal Church, Prof. Arthur Blakeley, organist.

KYW, Chicago, Ill. (Central, 345), 10:00 A. M., Church services, Central Church, Rev. Dr. F. F. Shannon, pastor, 3:00-4:00, [illegible]

WDAP, Chicago, Ill. (Central, Daylight Saving, 360), 9:15 P. M., [illegible] and the Drake Concert Ensemble [illegible]

WFAA, Dallas, Texas (Central, 476), 3:30-4:00 P. M., Radio Chapel [illegible] Dr. William M. Anderson [illegible] 9:30-11:00 [illegible]

WFI, Philadelphia, Pa. (Eastern, Daylight Saving, 395), [illegible]

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 8:00 P. M., [illegible]

WGY, Schenectady, N. Y. (Eastern, 380), 11:00 A. M., [illegible] 7:30 P. M. [illegible]

WHAS, Louisville, Ky. (Central, 400), 9:57 A. M., Organ [illegible] 10:00 [illegible] 4:00-5:00 [illegible]

WHK, Cleveland, Ohio (Eastern, 360), 6:00 P. M., Musical program, WHK Orchestra and vocal soloists.

WJAZ, Chicago, Ill. (Central, Daylight Saving, 448), 6:00-9:00 P. M., [illegible] Oriole Orchestra [illegible]

WOAW, Omaha, Nebraska (Central, 526), 9:00 A. M., [illegible] Musical [illegible]

WWJ, Detroit, Mich. (Eastern, 517), 11:00 A. M., Church [illegible] Episcopal Cathedral, 4:00 P. M., [illegible] Cyril Wezemael, [illegible]

Monday, October 1

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 P. M., Organ recital, Stanley Theater, [illegible] 2:00-3:00 [illegible] 4:30-5:55 [illegible] 7:30-7:45 [illegible] 8:00 [illegible]

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 P. M., [illegible] 6:30 [illegible] Meyer Davis [illegible]

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:00-12:30 P. M., [illegible] 7:00, [illegible]

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 P. M., [illegible]

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 P. M., [illegible] Harry S. Currie [illegible] Theater [illegible] Rialto [illegible]

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 P. M., [illegible] baseball [illegible] 7:00-7:30 [illegible]

WOO, Philadelphia, Pa. (Eastern, 509), 11:00 A. M., Organ recital, Mary E. Vogt, 12:00-12:54 P. M., [illegible] Wanamaker Tea Room Orchestra, 4:45-5:00 [illegible] Walter Miller, director.

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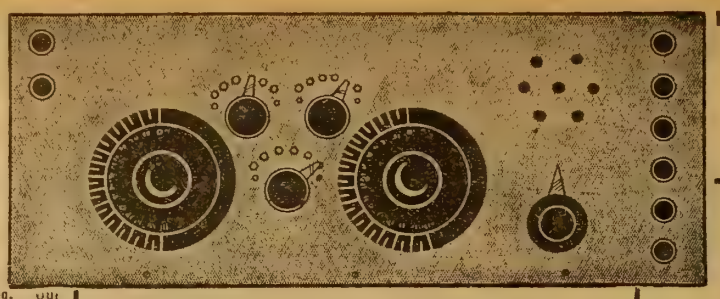

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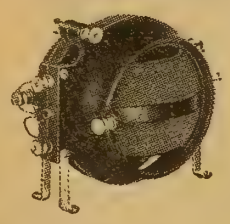

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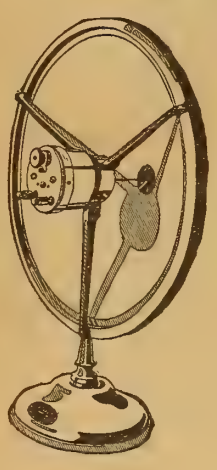

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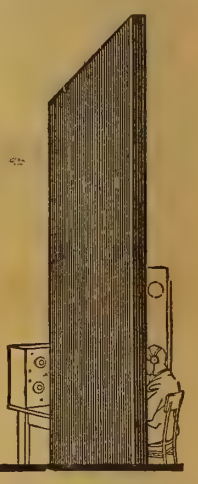

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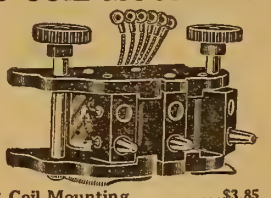

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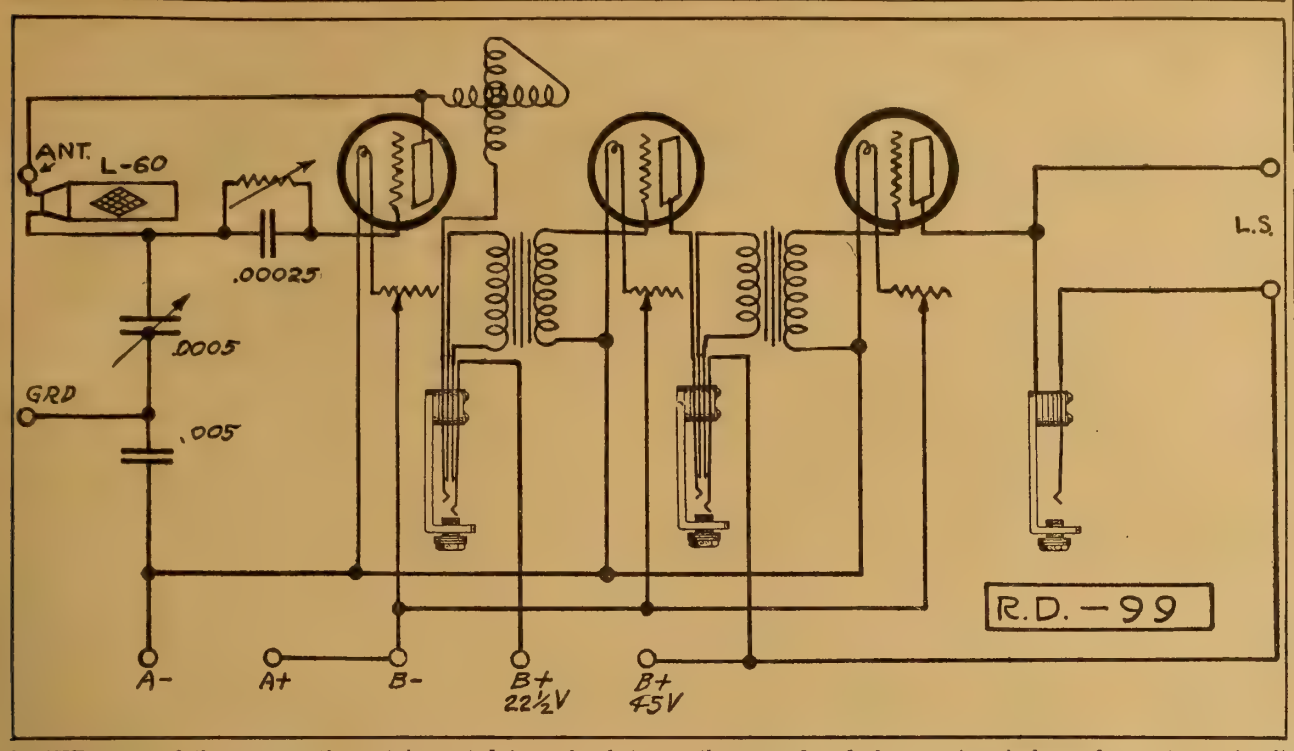
LONG DISTANCE RECEIVER HOOK-UP



THE range of the regenerative set is well known. The unusual performance of the Ultra Audion has attracted numerous enthusiastic boosters. Two important little changes have developed a new circuit with unusual selectivity, clarity and, with two stages of audio frequency amplification, more than sufficient volume for any home.

The circuit, as presented in Hook-up R. D.-99, has two stages of amplification and jacks so that phones or loud speaker can be plugged in where desired.

The honeycomb coil in the antenna circuit has only 60 turns; this can be taken care of by unwinding 15 turns off a 75 turn coil or by winding 60 turns of number 22 dcc. wire on a 3 inch tube.

The variable condenser should have a vernier control and a capacity of .0005 mfd. A .005 mfd. fixed condenser is inserted in series between the ground and the negative filament battery. A variable grid leak with a .00025 mfd. grid condenser is necessary. The variometer between the place and grid increases the selectivity and volume of reception.

The jacks are not the filament control type but consist of two double circuit or four spring jacks and one open circuit jack.

This circuit can be used with any of the tubes at present on the market. The rheostats must be suited to the tubes and batteries. The detector plate voltage should be not more than 22½ and the amplifier 45 or more.

Long Strip of Bus Bar Excels Soldered Wires

Do you use many short pieces of wire to connect from instrument to instrument in your set, with soldering at each end of each bit of wire? Don't do it. Put a clip or other binding post on each instrument, then take a long strip of bus bar or plain copper wire and start at one instrument, put the wire through the binding post, run it to the next instrument and through the binding post, and so on. You can sometimes run half way around your set with one strang of wire, with no breaks, good contacts, and a minimum of soldering. The reduction of resistance brings in the DX and saves the annoyance of broken soldering connections.—Guy M. Chase, Elizabeth, N. J.

Headphones are most sensitive when wound with the finest wire to give the greatest number of turns; copper is the best kind of wire.

RUSONITE
CRYSTAL RECTIFIER
(Patent Pending)

THE PERFECT SYNTHETIC CRYSTAL DETECTOR, SENSITIVE OVER ENTIRE SURFACE. No Hunting for "Spots." Loud and Clear. Endorsed by thousands of satisfied users. Sensitiveness Guaranteed. Price, Mounted..... 50c

14 K. GOLD SUPERSENSITIVE RUSONITE CATWHISKER. Permanent. Will Not Oxidize. Price..... 25c

RUSONITE REFLEX CRYSTAL. Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage. Guaranteed. Price, Mounted.. $1.00

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WALNART VARIABLE CONDENSERS

Dependable—and efficient—accurate at all times. These condensers permit of unusually fine tuning. The spacing between the stator plates is positive—no washers are used. The plates are locked into grooved rods. They cannot short circuit. For extremely fine tuning, nothing will be found to equal the Vernier Type.

Plate	Plain	Vernier
3	$1.50	....
5	1.65	....
13	2.25	$4.25
23	3.00	5.00
43	3.50	6.00

We also manufacture the Walnart Induction Switch, Friction Vernier Adjuster, Variable Grid Resistance and Walnart Vacuum Tube Sockets.

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WALNART ELECTRIC MFG. CO.
Dept. 402, 1249 W. Van Buren St.
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Every Radio "Bug" OK's the Kellogg Variometer

A product that stands up under the test of service of the widest range. The stator and rotor shells are of molded Bakelite, of extra strong rib design. A handsome brown in color.

The windings are of the highest grade insulated wire, terminating on binding posts securely molded in the Bakelite shell. The flexible wires used to bring the rotor leads to the outside of the variometer are of special construction with a heavy insulation.

Ample size bearings assure smooth, even movement with long life, a spring of proper tension takes up all play and prevents back lash. There are no sliding contacts, nothing to wear, nothing to "short," or produce noises.

High inductance and low distributed capacity.

Have your dealer show you other Kellogg radio parts—each in a class by itself. Get the most out of radio. Build it with Kellogg time-tested equipment. Use the following KELLOGG radio equipment for better results:

Variometers, $8.00; Variocouplers, $9.00; Tuner Coils, $3.00; Head Sets, $10.00; Microphones, $8.90; Tube Sockets, $.75; Plugs, $1.00; Four Conductor Jacks, $1.10; Two Conductor Jacks, $.75; Six Conductor Jacks, $1.25, Four Inch Dials, $1.25; Forty Three Plate Varible Condenser with Five Plate Vernier-Four Inch Dials and Knobs, $8.75; Twenty Three Plate Variable Condensers with Five Plate Vernier-Four Inch Dial and Knob, $7.75; Eleven Plate Variable Condensers with Five Plate Vernier-Four Inch Dial and Knob, $6.75; Miniature Condensers, $.75; Rheostats, $2.00; Air Choke Coils, $1.00; Iron Core Choke Coils, $1.35.

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Published by the Radio Digest Publishing Company, Inc.
123 West Madison Street
Telephone: State 4843, 4844, 4845
Chicago, Illinois

E. C. RAYNER, Publisher

Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
H. J. Marx, Technical Editor M. W. Thompson, Associate Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
Telephone Kearney 1472
H. M. Morris, 417 Western Mutual Life Building, Los Angeles
Telephone 12011

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies, 10 cents.

Vol. VI Chicago, Saturday, September 29, 1923 No. 12

Entertainment for the Blind

Concerts Sent on the Air Great Aid to the Sightless

IN LIEU of the inspiration which the artist derives from the up-turned expectant faces of his audience, the singer at the Radio broadcasting station, if he has imagination, can picture hundreds of homes where sit invalids, blind men and women, even deaf persons, thrilled by his every note.

Letters which come to the Radio broadcasting station emphasize the enjoyment which the "stay-at-homes" derive from broadcast music. To many of them "air" entertainment is the only pleasure that breaks the monotony. To many, Radio brings for a time at least surcease from suffering.

Static and Its Elimination

The Trouble May Be Reduced But Not Entirely Cut Out

EVERY Radio enthusiast is deeply interested in the news regarding the development of static eliminators. While such an instrument is still in its experimental stage, the results obtained from the tests seem to indicate that much of the trouble may be eliminated in the near future.

What is expected by many engineers is the early development of some device that will relieve static conditions, which, so far, are among the great mysteries of the age. No one knows what its physical characteristics are. Naturally these must be revealed before direct eliminative steps can be taken.

Everything indicates, however, that before very long there will be perfected some instrument that will relieve the situation which is practically the same as that faced by phonograph manufacturers some years ago. The scratching was terrible, but in time methods of eliminating part of this defect were devised. Scratching never was eliminated, and probably never will be, but it was reduced to such a degree as to make it hardly noticeable.

Thus it may be with static. There may be offered, before many months, an instrument that will relieve the situation but so far as the total elimination of static is concerned the end may be far off.

Evidence of Conception

Protecting Ideas Until Patents Can Be Obtained

IT IS always better to be safe than to have regrets. Perhaps you have an original idea and you do not think it amounts to much. It may not, then again the same idea may be brought out in a new way with just an improvement; then what do you get for your idea? Nothing. It may turn out immensely valuable, but what claim have you on it? Why not play safe and protect your invention from the very start? The fact that you are the original inventor will avail you nothing unless you preserve the evidence to prove this fact, and even then you may not be safe unless you take certain further steps.

Therefore, the moment you conceive a new and useful invention, you should at once prepare the evidence of conception, that is, a sketch signed by the inventor, recording the date of conception, and witnessed by two persons, whose indorsement should contain substantially the following: the date, and a statement that the sketch has been explained to and understood by the witnesses, followed by their signatures.

Such a sketch should also have or be accompanied by a sufficient written description to render the drawing perfectly clear and understandable.

This paper serves several purposes. First, it provides you with two witnesses who can prove your date of conception and date of first disclosure. Then, too, it constitutes your first drawing and first written description. Thus you have, in a single document, the means of answering the first four questions which will arise in any interference proceeding.

The only function of an evidence of conception is to refresh the recollection of one or both of the witnesses, so that he can testify to the dates of conception, drawing, description and disclosure, if necessary, and can make that testimony sound a little more plausible than merely his own uncorroborated word.

RADIO INDI-GEST

Radio in Cactus Center

(Part II (Conclusion). Written and Originally broadcast via WOR, by Arthur Chappman.)

There was various expressions on Bear's face, when come the noise
Of a jazz dance, up in Denver, by the Saxophony Boys.
Then he heard a needed sermon, by a sky pilot in Butte.
After which come op'ry singers, and a solo on a flute
And reports upon the weather and the outlook for the crops
And a swell piece on the organ, by an artist at the stops.
Then Bear slipped his Radio bridle and declared: "And such things seethe
In the air that we've been thinkin' was no good except to breathe!"

So the Radios on the ranches reach up, web-like, all around;
The Hashknife and the Bar X and the Lazy Y resound
To the multitude of good things that is floatin' overhead
When you git up in the mornin', or afore you go to bed.
That is why the cattle punchers hang around and listen in—
Why they slap their leather breeches and exclaim: "By gosh!" and grin;
For we've all got wireless fever, sence that dude put up his kit,
And, in case he runs for Mayor, this same tenderfoot is it.

A Tip for the Calciminers

Lawyer on breach of promise case: "But couldn't you let me have some of his letters?"

Fair Client: "There weren't any; we both had Radio sets.

—*Orosley Weekly.*

A-B-C Lessons for Indigest Beginners

Chapter XV—Even through Solid Ivory at Times

BY GOSH

O IS for Oscillator,
It doesn't move at all,
But yet it sends out waves,
Thru hill and stone and wall.

In quiet below
Rests O. O. Diedsieck,
Took a Micadon
For Piper Heidsieck.

*GALLAGHER & SHEAN, INC., NO. 9094X130M*Z*

Oh, Mr. Gallagher, Oh, Mr. Gallagher,
I paid fifty dollars for a Radio set,
Und my vife is full of smiles, as she fiddles mit da dials,
Dere's no station in da country she don't get.

Oh, Mr. Shean, Oh, Mr. Shean,
Does she get Paris, London, China, and Berlin?
She's a wonder I must say, did she ever hear Bombay?
She gets Chile, Mr. Gallagher.
In the winter, Mr. Shean?

Oh, Mr. Gallagher, Oh, Mr. Gallagher,
Vould you believe she put a vire on da bed,
And vent to sleep last night mit da phones clamped on her tight,
Und vat station do you tink dot she did get?

Oh, Mr. Shean, Oh, Mr. Shean,
Did she get an unknown station in her dream?
If she did it sure was good, was it dear old Hollywood?
It vas Hot Springs, Mr. Gallagher.
I believe you, Mr. Shean.

Oh, Mr. Gallagher, Oh, Mr. Gallagher,
Vill dese vonders dot ve're having never cease,
It was just de other day, dot a lady cross da vay,
Heard some opera from Turkey und from Greece.

Oh, Mr. Shean, Oh, Mr. Shean,
I know the very woman that you mean.
Was she rather short and fat, with a feather in her hat?
Dot's da lady, Mr. Gallagher.
It was my wife, Mr. Shean.

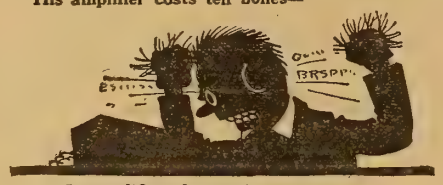
Oh, Mr. Gallagher, Oh, Mr. Gallagher,
Do you tink some day dot we will talk to Mars?
It is not so far away, I have heard some people say,
Und there's even people living on da stars.

Oh, Mr. Shean, Oh, Mr. Shean,
You have some wild illusions in your bean,
What I wanted you to tell, is when will we hear from H—l,
When you get there, Mr. Gallagher?
I will write you, Mr. Shean.

ROZEE.

He Couldn't Have Been Bald Headed

We fear for our friend, Jimpson Jones,
His actions are erratic.
His amplifier costs ten bones—



It amplifies the static.
He tunes with care, then tears his hair
When raucous noises rend the air.

WALT DRUMMOND.

Ask WOC, "Where the Tall Pop Corn Grows"

Dear Unable-to-digest: I received a beautiful selection over my Radio the other evening and believe it was from Walla Walla. It sounded something like unto this: Ta-da-dee-spizzre-e-e-e-ta-da-dee-meow-ow-ow-squeal-squeal-spizz-pop. And now I wish you to confirm my misery by informing me if this was the selection you broadcast from Walla Walla, and if it was followed by this announcement:

"This is station POP-POP-POP located in the—POP—of the POP-POP-POP. Our next POP will be a POP—entitled —POP while you can. By POP—and accompanied on the POP—by Mr. POPOP. One POP please."

LOTTA STATIC.

P. S. Where this (—) is seen it means "Cats-a-fighting."
P. P. S. Mamma won't let me send the dollar, but will enclose a POP instead.

Radio India-Jest

Condensed

By DIELECTRIC

Station WHAZ, Troy, N. Y., gave to the Radio world recently the voice of a man said to have been the oldest Radio soloist. He had marveled at the telephone when that was first used, as you and I were astounded by the wonders of Radio. In spite of his eighty-five years Mr. Dater produced tones of such quality as to bring demands for encores. I don't know of many speakers who have used a microphone who were older than Mr. Dater, but certainly few have talked into one of these modern inventions who were younger than that famous little movie star, Jackie Coogan.

Station WJZ was responsible for listeners in hearing a program somewhat out of the ordinary a short time ago. When the huge ocean liner Leviathan slipped into her dock in New York City Paul Whiteman, "King of Jazz," heard from her decks strains of music from orchestras ashore, musicians in an airplane and others in diving suits. It was a great ovation to Mr. Whiteman, which thousands heard at their sets. One thrilled with the reality of the thing when the whir of the plane could be heard as it flew near the microphone.

If you should happen to enter a library in which a year or so ago you always found certain individuals night after night, then drop in now, most likely you would find them absent. I have known one elderly gentleman whose presence at a certain public library was unfailing. He was a great reader. For a month past he has not been seen near a window with a book in his hands close to the librarian's desk. The reason is to be found in a small Radio set at home. The fascination of listening to lectures, music and book reviews has evidently taken the place of reading by a great many who frequented libraries.

The municipal Radio plant idea is spreading. How far it will go depends largely upon the success of those already in action. Chambers of commerce in various parts of the country may conceive broadcasting as an important ally to publicity gained by advertising. There is no question but that many would hear attractive features of a city described over the Radio whose attention would never be drawn to an advertisement. Citizens of San Diego are busy raising money sufficient to cover the cost of building a municipally owned station.

There is a fascination to a broadcasting studio which impels one to devote considerable time watching the announcer and artists as their voices are carried out into space, while no sound comes to you only a few feet away. One of the most interesting studios is that of station WJAZ, wholly enclosed in glass, where you may observe from any angle. Music from the dance orchestras (one in the hotel, the other on the beach) has been heard in a great many states—much to the pleasure of Radiophans. This station is announcing the movements of the MacMillan party as it seeks to reach the North Pole. An interesting experiment.

Still another broadcasting station has entered its second year "on the air." WHAZ, located at the Rensselaer Polytechnic Institute, Troy, N. Y., broadcast a program at that time by the same group to be heard on their opening night a year ago. In time, of course, broadcasting stations, like women, will cease referring to their age, though at present the former manifest pride in having served a whole year in entertaining Radio audiences. This station is to be congratulated on its great record, including as it does transmission over a greater distance than that of any other station. Its concerts are heard regularly from coast to coast.

First Steps for Beginners in Radio

Chapter XVIII—Testing Radio Instruments

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The articles yet to appear are:

Chapter XIX—Locating Trouble in the Set.

Chapter XX—Useful Information and Formulas.

WHEN difficulty is experienced in inducing a circuit to operate properly the question often arises as to whether there is a defect in one of the instruments. The beginner is often at a loss how to test. In this chapter we will consider a number of tests that can be readily made and that will detect defects in the wiring or assembly of the instruments.

The only apparatus necessary is a dry cell, a buzzer and a telephone receiver. An eighty-ohm receiver fitted with a head band is to be preferred, but if none is available the Radio headset can be used if it is kept in the circuit only for a very short time. To facilitate the tests it is advisable to assemble the instruments on a board and wire in a three-point switch, as shown in Figure 63. Binding posts are provided to connect the test leads and the receivers. The operation of the testing device will be made clear by carefully examining the diagram.

Connections for the Switch

When the switch lever is placed to bridge points 1 and 2 the phones are short-

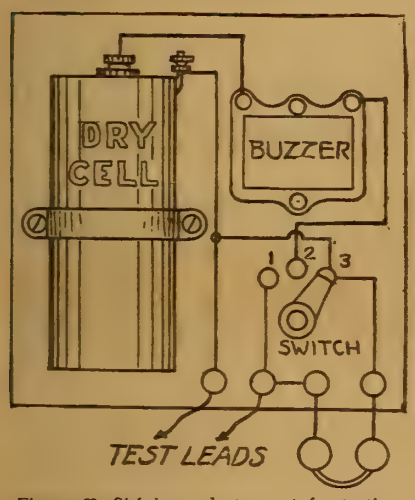


Figure 63—Simply made test set for testing Radio instruments

circuited; the battery and buzzer are on the test leads and the apparatus is set for testing low resistance circuits. The phones can be removed if desired and used otherwise, as will be shown later. On point 2 the phones are in series with the test lead to test high resistances. When on point 3 the phones are connected across the test leads; the reason for this arrangement will be apparent shortly.

Now as to the testing. Let us consider tuning inductances first. With the variometer the usual troubles are an open circuit in the windings or poor contact at the bearings. To test for an open place, switch bridging 1 and 2 and touch the test leads to the terminals of the variometer. If the wiring is not open the buzzer will sound, indicating a closed circuit. If it shows the circuit is open, start at one terminal and follow the wiring and touch the other test lead to the various leads from the windings in order until the locality of the open is determined; then steps may be taken to make repairs. A tapped inductance is tested in the same manner, simply attaching the test leads to the terminals of the winding to determine if the circuit is complete.

Testing for Poor Contact

To test for poor contact at the bearings of a variometer or variocoupler place the switch on point 2, putting the phones in series, and attach the test leads to terminals of the variometer or to the bearings of the rotor in the case of the variocoupler. Rotate the rotor listening in. Poor connections will be indicated by loud clicks in the phones when the circuit is made and broken.

A complete test for a variometer in one operation can be made by bridging points 1 and 2, connecting the test leads to the stator terminals and connecting the phone to the rotor terminals. If everything is right the buzzer will operate and a steady buzz will be heard in the phone. If when rotating the rotor there are breaks in the buzzing it indicates poor contact at the bearings. Large honeycomb coils may have a resistance to operate the buzzer; in that instance the switch is put on point 2; when the circuit to the coil is made and broken a loud click in the phones indicates the coil is not open. A faint click or none at all shows that the circuit is open.

Finding Shorts in Condensers

In testing condensers, particularly of the fixed type, we have a more difficult problem for the condenser may be either short circuited or the leads to the plates may be open. If, on applying the test leads to a fixed condenser with the switch on 1 and 2, the buzzer operates it is shorted. A complete test is made by connecting the leads to the condenser and placing the switch on point 2. A click will be heard when the circuit is closed; a loud click shows a shorted condenser; a very faint one indicates it is not shorted but that the leads may be broken. Therefore we move the switch to point 3 when a faint click should be heard in the phones. The principle of this test is: We first charge the condenser on point 2, then discharge it through the phones by putting the switch on point 3. A good condenser will bring a faint click.

A variable condenser is prone to short circuit. We test it with the switch on points 1 and 2. A buzz indicates a shorted condenser usually due to the rubbing of plates. Many variables are made with a spring pressing against the bottom of the shaft of the movable plates. After a short time this spring makes a poor contact and affects the signals. To detect this defect connect one test lead to the terminal of the rotating plates and the other lead to the shaft of the variable, twisting it tightly. Place the switch on point 2 and listen in the phones while the shaft is turned. Poor contacts will be shown by a series of clicks in the phone as the circuit is opened and closed. The contact spring should be removed and the shaft and spring cleaned with fine emery cloth. To prevent the trouble occurring again it is best to solder a flexible lead to the shaft and arrange some sort of stop for the plates.

Rough Test for Vacuum Tubes

The proper testing of vacuum tubes calls really for meters but a rough test to determine if a tube will work can be made with the simple apparatus we have at our command. Connect the tube in the usual manner with the phones in the B battery circuit. Turn on the rheostat and bring the filament up to brilliancy.

A wire connected to the grid of the tube is touched to the first tap of the B battery—a loud click should be heard in the phones. The effect of this test is to put a positive charge on the grid that increases the current flow through the tube.

The dry battery tubes which work with

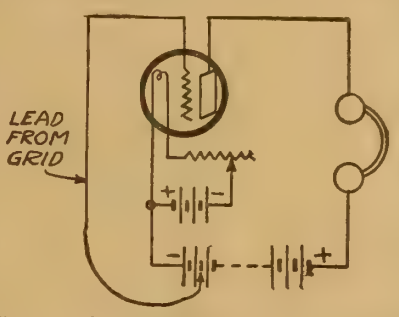


Figure 64—Circuit for testing if tube will work

a dull filament depend for their action on certain chemicals on the filament. When these chemicals are exhausted the tube will not function well without a high plate voltage. Therefore when it is found necessary to increase the plate battery to a great extent to get the signals in with usual strength it is safe to say the tube's life has been ended and that it should be replaced.

The testing of transformers offers no difficulty, yet trouble is often found in these instruments. The windings are of such very small wire that a loose terminal will often result in the wire being broken or when one attempts to solder leads to the terminals the solder on the inside connection may be melted off.

To test a transformer the switch is placed on points 2 and the test leads applied to the terminals of the primary and secondary windings separately. A decided click should be heard in the phones in each case. It will be noted that the secondary of a high ratio transformer gives a weaker sound in the phone than the primary, due to the greater amount of wire. If only a very faint click be heard it will indicate an open circuit in the windings. The faint click is due to the capacity that exists between the sections of the open windings. It is sometimes possible to open an audio frequency transformer and find the trouble, which is usually at the terminals.

The testing of a radio frequency transformer is done in the same way but the sounds will be much louder, due to the lower resistance of the windings.

An Aerial Test

To test an aerial for insulation connect the test leads to the aerial and ground and place the switch on points 1 and 2. If the buzzer souds the aerial is grounded or the lightning arrester is shorted. Remove the arrester and test again. Put the switch on point 2; a slight

(Continued on page 18)

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CAN BE ATTACHED IN 10 SECONDS
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At your dealer or postpaid on receipt of purchase price. Also write for free booklet showing all circuits.

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DIETZEN Tube Set
Completely assembled in handsome oak cabinet (without tube) $10

Dietzen Vernier Condenser

14 Plate $2.65
24 Plate $2.95
46 Plate $3.45

DIETZEN Vacuum Tube
1½ Volt, Operates on one dry cell, either with or without B battery. Wiring diagram Free with each tube.
$1.00
Socket 25c

A.B.C. "B" Battery

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1½ volt twin double duty "A" battery .75

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18 inches high
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WORK-RITE Variometer
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DIETZEN Loop Aerial
Set up in 5 minutes
All parts complete

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Dietzen moulded variocoupler	5.95	Single open circuit jack	.40
Brandes phones	5.45	Double closed circuit jack	.60
Dietzen phones (3000 ohms)	3.75	Socket, standard bakelite	.49
Dictograph phones	5.45	Socket, UV-199, bakelite	.49
		Tubes—WD-11, WD-12, UV-199, UV-201A	5.75

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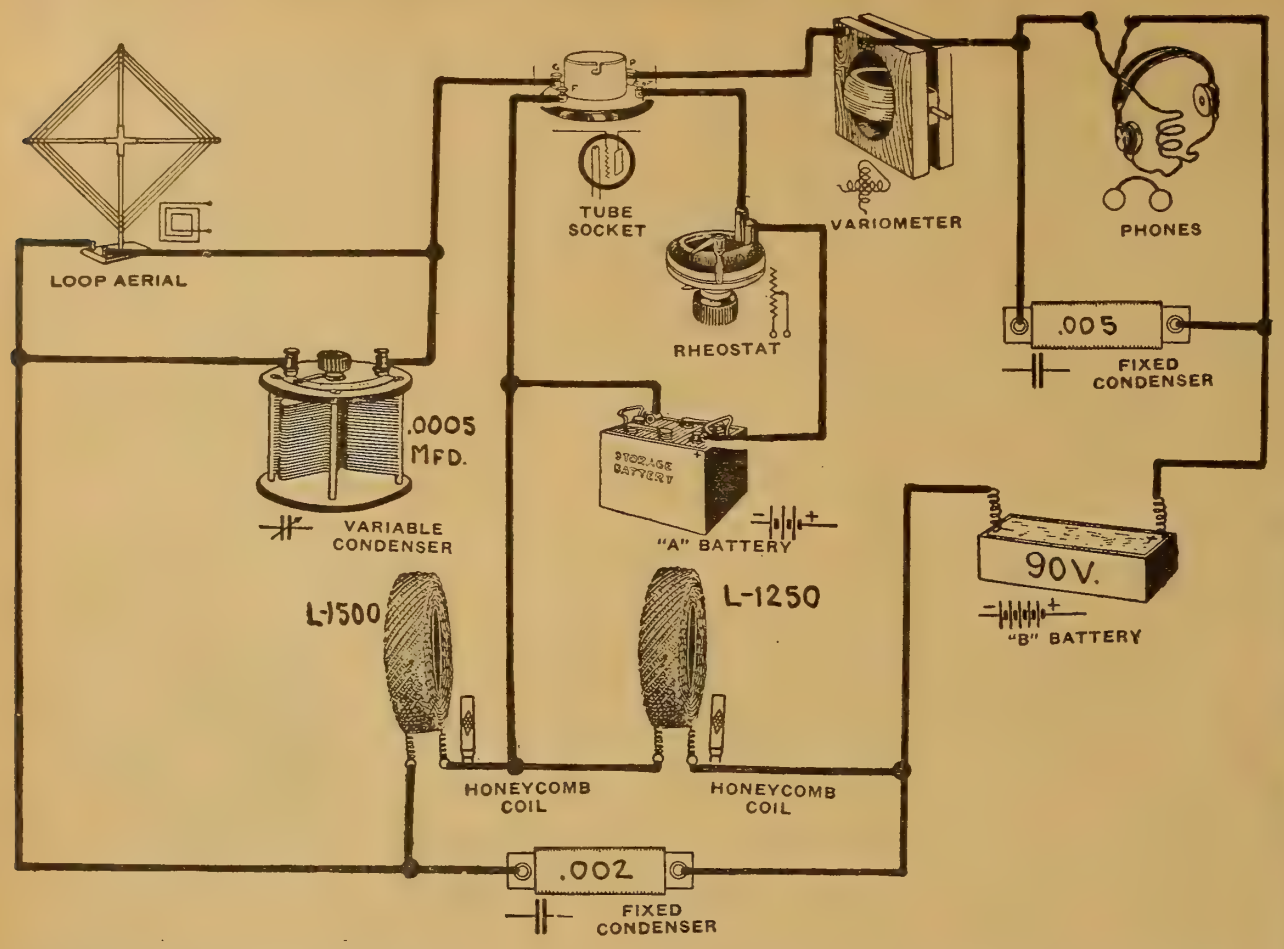
SINGLE TUBE SUPER-REGENERATIVE CIRCUIT



THE single tube super-regenerative circuit has never been shown in the Simplex Diagram form. For the benefit of those fans who find it somewhat difficult to follow the usual wiring diagram it is repeated in this form.

When panel-mounted, the use of shielding on the back of the panel is recommended. For use with a long aerial, it will be found that this circuit is very selective.

The two honeycomb coils are not inductively coupled but two single coil mounts are used, keeping them fairly well separated. A variometer placed in the plate circuit controls regeneration. Wave length tuning is controlled by means of the .0005 mfd. variable condenser shunted across the loop.

The capacity of the phone condenser is rather high, namely .005 mfd. Likewise, a high plate voltage, 90, is required. The tube should be an amplifier, whether storage battery or dry cell type is used. The rheostat should conform with the type required by the tube and filament battery. A .002 mfd. fixed condenser is connected across the two honeycomb coils.

Varnish of No Capacity for Coils Easily Made

A coil varnish with no capacity is the best thing in Radio work. This formula is very cheap, costing but a few cents and can be secured at any drug store. Simply get some sodium silicate or what is commonly known as water glass, and with a brush apply a coat on the coil; then put the coil into an oven or on a stove. After heating about 30 minutes the sodium silicate will become hard; you now have a coil that can be thrown on the floor without breaking off the varnish. I have used this for some time with the best results.—O. Riddel, Chicago, Ill.

Hint for Fine Tuning

For fine tuning, it is best to take a lead pencil with a rubber tip and use it to move the dials. This keeps the hands away from the instruments and eliminates a good part of the body capacity.

FIRST STEPS IN RADIO

(Continued from page 17)

click will be heard as the aerial charges; swinging the switch to point 3 will give another click if the aerial is well insulated. Try this on a wet day to see whether the insulators are good.

With the above suggestions the Radiphan should have no trouble in making other tests that may seem necessary. When the test apparatus is not in use it may be used as a portable call system or as a buzzer test for crystal detectors by simply connecting the interrupter on the buzzer to the ground lead of the set. Having considered the location of faulty instruments the next chapter will consider the location of trouble in the complete set when it fails to function properly.

(TO BE CONTINUED)

Tube Filament in Series

The operation of two vacuum tube filaments in series with a single controlling rheostat necessitates the use of tubes of the same characteristics otherwise it will be impossible to adjust the filament currents to the proper value for satisfactory functioning of the tubes.

Dowel Rod Used as Vernier

A dowel rod or any wooden or fiber rod about the length and diameter of a pencil, with tape or a wide rubber band around one end, is the best vernier you can apply to any dial. It can be used on any dial, is not attached to the panel, keeps the hand as far away as you want it, and does the work.—Guy M. Chase, Elizabeth, N. J.

With an indoor aerial the fact that the doors and windows are closed is no hindrance to Radio waves entering the house.

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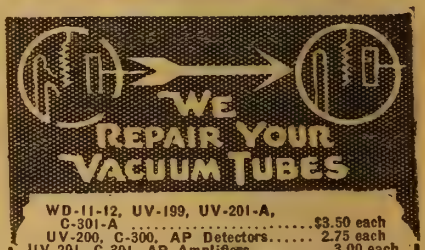

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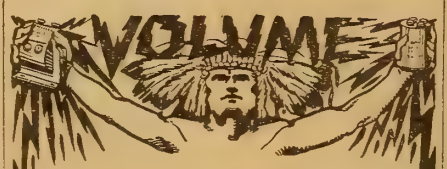

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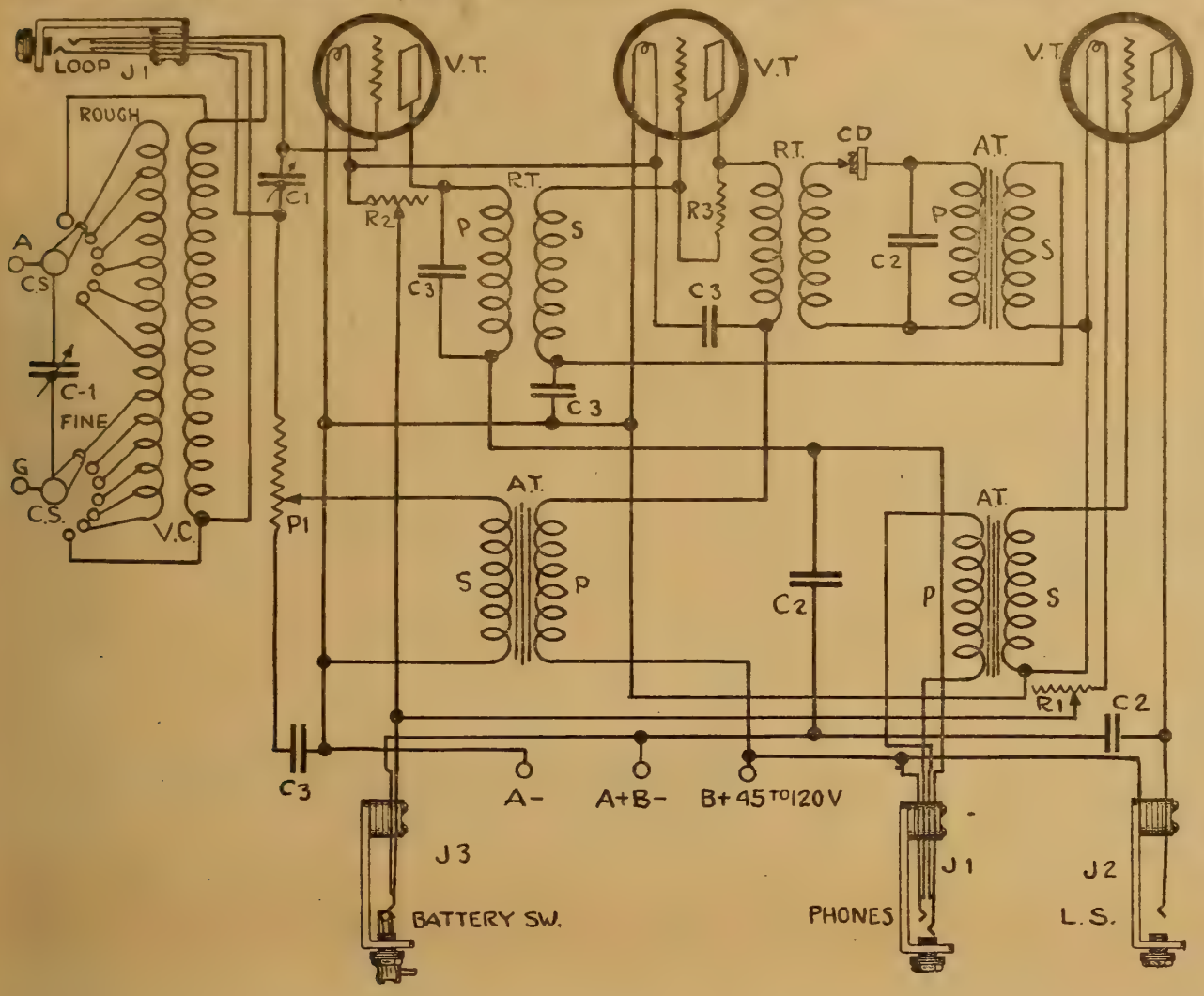
Reflex De Luxe with Loop Aerial

Reception Is Clear, Loud and of Unusual Range

By H. J. Marx

WHEN the details of the Reflex De Luxe were presented in the four May issues of Radio Digest, most of the fans were too busy considering the arrangements for their summer vacations to decide to try out any new Radio circuits. The few that did try it out immediately started writing in and announcing the results obtained. Since then there has been a gradual increase in the demand for a review of the main details and also requests for a simpler arrangement for loop aerial use only.



The Original Circuit

The original Reflex De Luxe with a few improvements incorporated is presented in the first illustration. Only a few unimportant changes have been made. These are the elimination of the loud speaker binding posts, also of the variable grid leak on the last audio frequency transformer; the addition of the grid leak between the grid and plate of the second tube; the placing of all tubes on the same plate voltage and some slight changes in condenser values.

The theory of operation is exactly as before. The circuit is of the inverse reflex type using a crystal detector instead of a tube, for greater ease in the control of the circuit.

The first two tubes are Radio frequency and reflexed audio frequency amplifiers while the last tube provides an additional stage of audio frequency amplification (not reflexed) that makes the set suitable for loud speaker operation even on long distance reception.

Reception with these circuits is clear, loud and of unusual range. The tuning controls present no difficulty in operation, making it possible for anyone in the family to enjoy the music even if the family radio operator doesn't happen to be in.

Identification of Parts

C-1, two .0005 vernier variable condensers; C-2, three .005 mfd. fixed condensers; C-3, four .002 mfd. fixed condensers; VC, vario coupler; J-1, two double circuit jacks; J-2, one open circuit jack; J-3, battery switch; P-1, one 200 ohm potentiometer; R-1, one single tube rheostat; R-2, one two tube power rheostat; R-3, one 1 megohm fixed grid leak; RT, two radio frequency transformers; AT, three audio frequency transformers; CD, one crystal detector; VT, three amplifier vacuum tubes; CS, two lever switches.

Apparatus Details

Numerous questions were asked in reference to the types and ratios of transformers used. High voltage transformer was generally misinterpreted as high ratio. High plate voltages are the direct cause of the burning out of the transformer windings. It is necessary, therefore, to find out the voltage limit recommended by the manufacturers. When this is exceeded and the windings are burned out, fans are usually at a loss for the real reason their circuit isn't functioning properly.

High winding ratios also should be avoided for circuits of this type. The maximum limit should be a five to one ratio.

The resistance of the rheostat is dependent on the type of tube used. Rheostat R-2 controls two tubes and this must be considered in its selection. For dry cell tubes it is not so important, but the ampere flow of two storage battery tubes may be greater than the capacity rating of a 6 ohm rheostat.

The variocoupler should be one with low internal capacity. The lattice wound type fills this requirement very well.

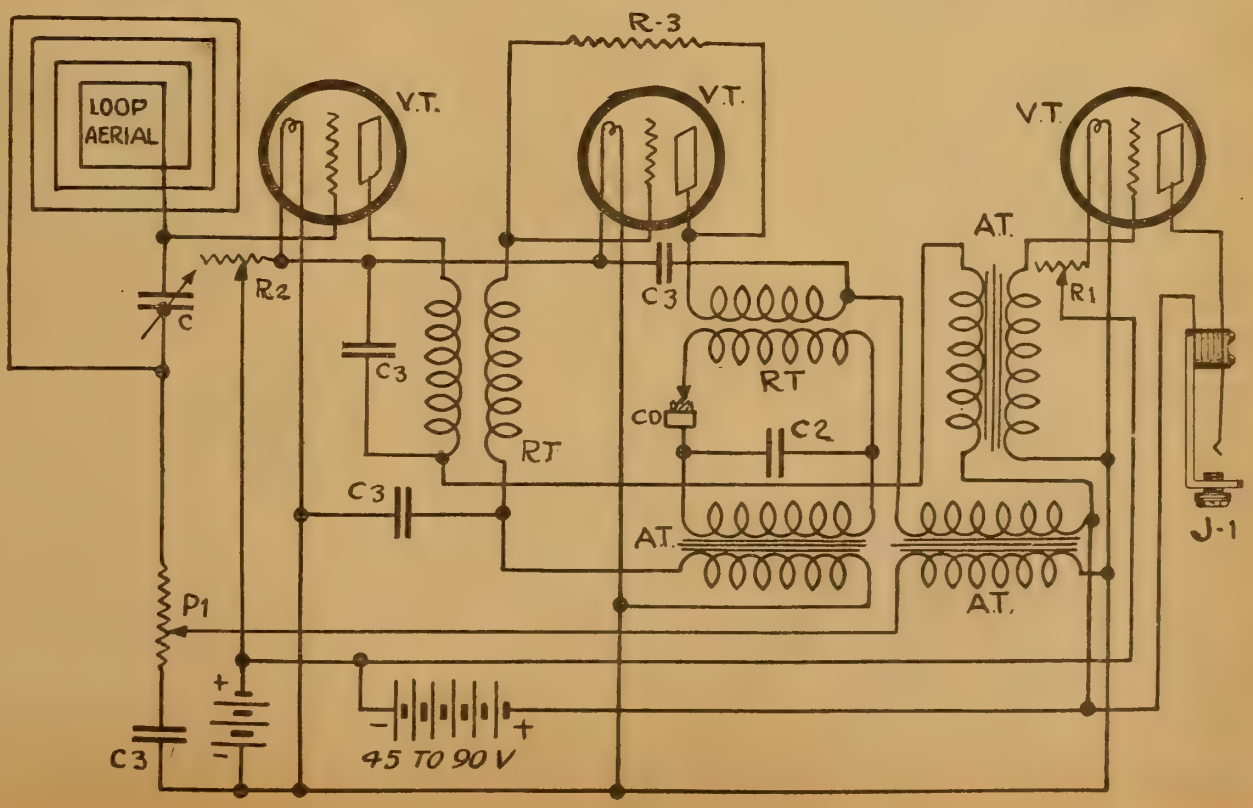
The potentiometer is not effective on local reception but its value immediately becomes apparent on long distance work.

Many of the Radio frequency transformers now on the market can be used, although there are a few that will not function properly. The type with the laminated iron core does not, as a rule, work well, either air core or iron dust core serving best.

Assembly and Wiring

As stated in the original article, the question of assembly and wiring is important. Care must be taken in the arrangement of apparatus and wiring. Inductive interference will give a lot of trouble if wiring is carelessly done. Poor crystal detectors are apt to give trouble. Try lifting the catwhisker off the crystal, the set should immediately begin to howl; in fact as a rule it howls the moment the finger is placed on either crystal terminal. This howl is one means of telling whether that part of the circuit is functioning properly.

Very often tubes will be found that are unsuitable for Radio frequency or reflex work. Try changing the tubes around for best results. If they can be tested, do so, and use the two best in the first two stages and the remaining one in the third or separate audio stage. Don't turn the filament rheostats too far. Distortion and howls are the result of trying to force your tubes. See how low you can burn them.



De Luxe for Loop Aerial

The second illustration presents the hook-up of the Reflex De Luxe for use with loop aerial only. It is considerably simplified, without the battery switch, extra jacks, variocoupler, etc.

Wave length tuning becomes a one control operation and makes it simple for anyone in the family to tune in. The use of a loop aerial helps solve the apartment house problem and eliminates a lot of indoor wiring and trouble. The expense of construction is also considerably reduced.

The same care and attention in assembly and wiring is also necessary, but the work is considerably simplified. The instructions regarding the apparatus used apply in this circuit also.

List of Apparatus

C-1, one .0005 mfd. vernier variable condenser; C-2, one .005 mfd. fixed condenser; C-3, four .002 mfd. fixed condensers; J1, one open circuit jack; P-1, one 200 ohm potentiometer; R-1, one single tube rheostat; R-2, one two tube rheostat; R-3, one 1 megohm fixed grid leak; RT, two radio frequency transformers; AT, three audio frequency transformers; CD, crystal detector; VT, three amplifier vacuum tubes.

Testing Sets

If you like to test sets, here is a suggestion that is very handy: take a bit of old panel; mount it on the edge of a board with a rheostat and a jack on it. Put a tube socket on the board and a grid condenser mounting and a grid leak mounting. Put binding posts, preferably of the clip type, on each lead in and out of the set. Then you can connect any A or B battery and any coil, or any style of plate tuning device. The battery and tube connections are practically standard, unless you want to try the ultra-audion, in which case a slight change will produce it. With flexible wires and the binding posts any hook-up ever drawn can be connected in five minutes.—Guy M. Chase, Elizabeth, N. J.

Protection from Lightning

Protection from lightning lies mainly in the provision for dissipating properly the inductive effects in the immediate vicinity of a powerful flash, rather than protection from a direct hit. An approved lightning arrester is not only required by law but it is also helpful

RADIO FOR EVERYBODY

(Continued from page 11)

ened and not nearly so strong as when the outfit was outside of the steel box. Were the steel walls to be increased to ten feet in thickness it is doubtful whether Radio waves would get through.

Another property of ether that should be brought out is the fact that, no matter what the lengths of either Radio or light waves, their speed forward is 186,000 miles per second, which is seven and one-half times the circumference of the earth.

Wave Motion

The propagation of a wave motion forward can be accomplished in two ways,

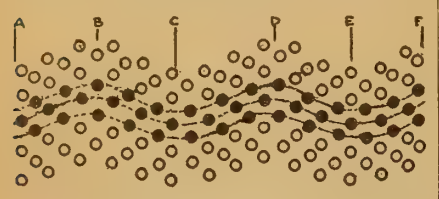


Figure 2c—The "side-to-side" method of wave travel through the ether

and it seems very likely that Radio utilizes both of them.

The ether must be composed of very small particles much as is oxygen or water, as otherwise it would not be capable of carrying wave motion. Normally these small particles would appear as in Figure 2a. One method of wave travel is as shown in Figure 2b and this is known as the "compression" method. From point A to point B, the particles are all pressed together, as they are also from point C to point D. Between the waves or from B to C, however, they are abnormally far apart.

In Figure 2c we see a graphic presentation of the "side to side" method. Here the small particles are caused to swing to one side of their normal position, back through normal, and out to the opposite side of normal. In this diagram we have wave peaks at B, D and F. Radio may utilize either of these methods but due to the fact that, as will be shown later, a Radio wave is made of two components, it appears very probable that both systems of wave motion come into action.

(TO BE CONTINUED)

Old Tube Used as Guide

Did you ever wire a set and then find that some wire was too close to or just over the tube socket? If so, you'll appreciate this suggestion. If you have a burned out tube or can get one, use it as a guide. When you wire a socket, put the tube in the socket. You can't hurt it if the pliers or the iron slips and you have a guide to keep wires properly spaced.—Guy M. Chase, Elizabeth, N. J.

MILOPLEX NEW CIRCUIT

(Continued from page 10)

voltages of B battery for your detector. If you are going to use dry cell tubes your potentiometer should be around 1600 ohms; a 200 ohm one will do for storage cells.

Supper is ready; my better ⅞ths is calling. I have just answered—"in a minute"—so I will take that last minute to tell you something about aerials. No aerial is better than its ground; if you have a good ground get a better one; put on two, keep piling grounds on, the more the better. Let's eat!

Making a Good Ground

Gas pipes are poor grounds, due to insulating joints at the meter. Water pipes are often a long way and a crooked way from the set. If the set is connected to the gas pipe in the room where the set is, with a good ground connector and if a connection is made in the bath room or elsewhere from the gas pipe to the water pipe, using large wire and ground clamps on the pipes, you have a water pipe ground without a long and crooked wire running from the set to the water pipe. —Guy M. Chase, Elizabeth, N. J.

Much of the troublesome "static" can be avoided during the summer months if the right circuit is employed and the aerial shortened.

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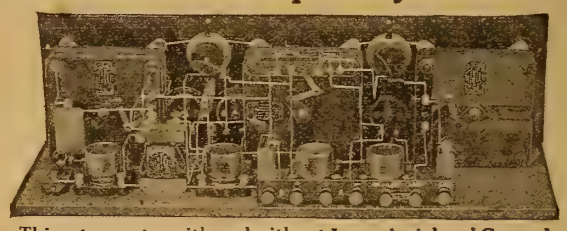

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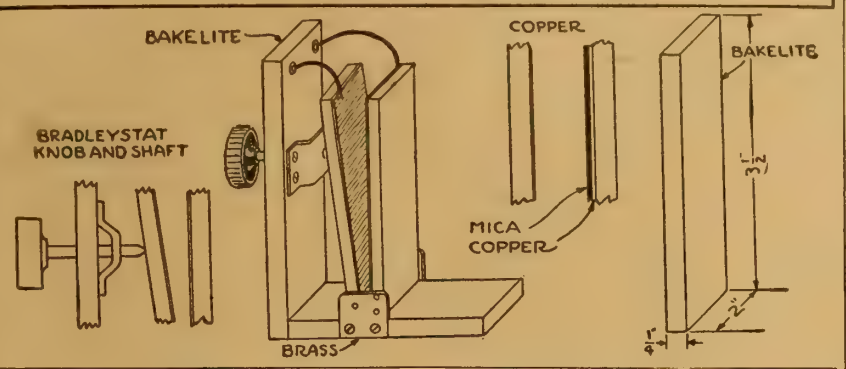
I find that this gives very close adjustment and simplifies the tuning of the illusive stations.—Walter W. Mulcahy, Sparks, Nevada.

SHAFT END MOVES SWINGING PLATE



WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

Drain Pipes Make Aerial Mast

A mast that one person can erect alone may be made of corrugated and galvanized drain pipes. These I have found to make good masts; they are not expensive. Three or four lengths can be joined together and soldered. A wooden plug is driven tightly into the upper end and a screweye turned into the wood to make a place for attaching a pulley. A wooden stake is driven into the ground over which the drain pipe tube is placed. The mast is held rigid in a perpendicular position with guy wires about Number 14 or 16 in size. A mast about 30 or 40 feet is easily raised by one person. It can be placed on top of a building.—F. W. Steffen, Hartley, Iowa.

An audion is more delicate than an ordinary incandescent lamp; treat it accordingly.

Static Disturbances

Atmospheric disturbances, known as static or strays, are the greatest obstacles to perfect Radio reception. The most common type produces a frying or grinding noise in the phones, and for this reason is called "grinder" static. The second type, caused by lightning flashes, gives a sharp click. The third type creates a hissing noise and frequently occurs during a heavy snowstorm. The lightning clicks and hissing static produce little interference with communication because they are generally local and last only a few hours. Static is generally at a minimum at 1:30 a. m. and just after dawn. Its maximum strength is reached from 10 p. m. to midnight.

Megaphone Makes Loud Speaker

You can convert one of your receiving telephones into a loud speaker by placing it against the small end of a megaphone. This will cause the sound to be concentrated and heard all over the room.

A Battery Switch

A closed single circuit jack can be used for an A battery switch; it can be mounted on the panel. If you have such a jack lying in the junk box, mount it in the A battery circuit between the battery and the tubes. Fashion a wooden, rubber or composition rod the size of a plug, with a handle on one end. Insert it in the jack; it breaks the circuit, the plug being of insulating material. Pull the plug out and the circuit is restored. If the plug is kept in a good place, small brothers and sisters won't burn out tubes. —Guy M. Chase, Elizabeth, N. J.

Turn Filament Control Before Removing Tube

Before removing vacuum tubes from their sockets in an amplifier circuit precaution should be taken first to turn the respective filament control rheostats to the "off" position. This is necessary because when one of the tubes is removed from such a circuit, the potential across, which is used to supply several tubes in multiple or parallel, there is an increase in current through the remaining tubes. This sudden increase in current may be sufficient to damage or impair the filaments of the tubes still in the circuit.

Filament control jacks are objectionable for the same reason, unless similar precautions are exercised.—Peter J. M. Clute, Schenectady, N. Y.

GENUINE EDISON ELEMENTS (new) for making "B" Batteries, obtained from U. S. Government. A positive and negative element—6c; glass tube—3c; all other parts at reasonable prices. Postage, etc., 50c extra per order. Free instructions. TODD ELECTRIC COMPANY, 109 West 23rd Street, New York.

Cockaday Coil Set $2.50

Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.

Coils are fully assembled, made exactly as specified by Mr. Cockaday, D coil bank wound. Far more efficient than any home made coils.

Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier rheostat, socket, double jack, dials, switch, contact points, posts, busbar wire, sphagetti, etc. (no tubes or phones).

Complete for $11.65

Postage additional on all shipments
Send No Money. PAY THE POSTMAN
All Goods Shipped Parcel Post C. O. D.

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Radio Bargains for THIS WEEK

Cockaday Coil	$1.98
Filkostat	1.75
DeForest 3 Coil Mtg.	4.45
Howard 40-ohm Rheostat	.98
Hilco Variocoupler	6.28
Ear-Joy Cushions	.89
21 Plate Condenser, .0005	1.43
Na-Ald 199 Socket	.45
Murdock Headset, 2000 ohm	3.90
Erla Reflex Crystal	.89
Spaghetti Tubing, 3' length	.09
Hook-up Wire, No. 14 sq. tinned, 2 ft.	.04

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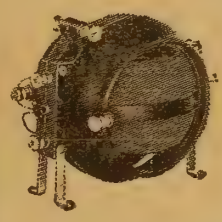
COLUMBIA ALL-CIRCUIT VARIOMETER



With split stators, providing for all present day circuits and permitting most future circuits in which a variometer may be used, this black bakelite moulded, green silk instrument is the one to buy. It is pig-tailed and built for selectivity.

Price $5.50

Ask to see the nationally known **Columbia** line of licensed bakelite apparatus. Known satisfaction. A few more Columbia items:

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Mounted Coils, Coil Plugs, etc.

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Quick service. All tubes repaired by us guaranteed to work as good as new.

Send remittance when you send the tube. We prepay parcel post back to you.

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Brandes	$5.25
N & K German	5.50
Dictograph	5.50

FADA NEUTRODYNE PARTS

List Price	Our Price
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3 Plate Vernier	$0.90
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43 Plate Vernier	2.75
23 Plate Plain	1.50
43 Plate Plain	1.90

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U V 200	Radiotron	$3.95
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U V 199	Radiotron	5.75
W D 11	Radiotron	5.75
W D 12	Radiotron	5.75

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$4.50	Thordarson 6 to 1 Ratio	$3.95
4.00	Thordarson 3½ to 1 Ratio	3.60
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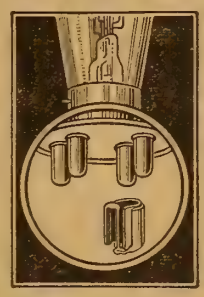

Vacuum Tubes are costly and extremely delicate. B battery or any other excessive current applied for only a fraction of a second to the filament leads will burn out your tubes. You have probably already had this experience and it is apt to happen again at any time. A burnt out tube means money lost—the set out of commission — inconvenience to you.

WHY TAKE THESE CHANCES WHEN

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will absolutely protect your tubes. Applied in an instant to the filament terminals. Will fit any standard tube or go in any standard socket. Fully guaranteed. **50 cents each. Sent Postpaid.** Delay may be costly. Write now. Specify type of tube used.

DEPT. 6

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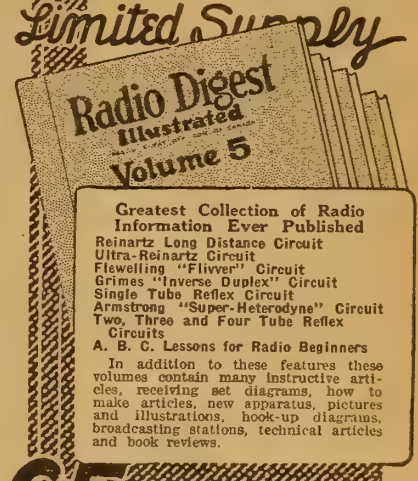

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Ultra-Reinartz Circuit
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Grimes "Inverse Duplex" Circuit
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Armstrong "Super-Heterodyne" Circuit
Two, Three and Four Tube Reflex Circuits
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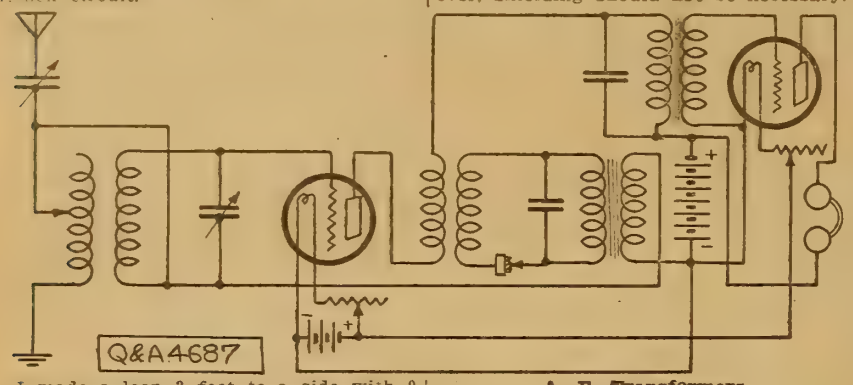
Questions and Answers

Single Tube Reflex

(4687) WHM, Wagstaff, Kans.

Please send a sketch of how to add one stage of A. F. ampere to the single tube Reflex circuit.



I made a loop 3 feet to a side with 9 turns of Number 22 d.s.c. wire spaced 1 inch apart. The description from which this was made said to space wire ½ inch apart but the working drawing showed it spaced 1 inch. The set refuses to work. I would like to know if it is because the spacing or the small wire, or both? Would a loop 2 feet to a side with 14 turns give the same results?

Do you think the Cockaday four-circuit receiver with its inductively coupled stabilizer circuit is superior to the Armstrong two variometer-variocoupler circuit? Would this help relieve static?

I am looking for something that will get by WDAF and WHB, but have not found anything except the Flewelling and your RD-80. There is too much trouble with body capacity in both of them.

A.—Complying with your request we are presenting a diagram showing a method of adding audio frequency amplification to the single tube reflex circuit.

Your described construction of a loop aerial is correct in detail and will work. However, when using a loop aerial tuning will be found quite difficult. In all probability it is largely responsible for the limitations experienced.

The Cockaday circuit is in no particular superior to the Armstrong three-circuit hook-up, and would not eliminate static disturbance. The latter circuit is recommended as more effective in the elimination of local interference. The body capacity effect is not pronounced and can be entirely done away with by shielding the panel and grounding shield. However, shielding should not be necessary.

A. F. Transformers

(4698) CFC, Arcadia, Wis.

In an audio-frequency transformer is the inner or smaller number of windings called the primary or secondary? Does the plate of the amplifying tube connect to the outside layer in the coil of the primary for best results? When using the new tube C 301-A as a detector the manufacturer advises connecting positive A of the tube to the grid return. Please explain this connection.

A.—The primary has the fewest number of turns of wire.

The plate of the amplifying tube is connected to the outside turn of the inside coil.

C 301-A tube is connected with return side of the transformer (inside turn of outside coil, usually marked F) to negative A battery. Follow this method to accomplish a proper connection.

Transformer Data

(4727) HFF, Council Bluffs, Ia.

Where may I procure the silicon steel .018 thick mentioned in Questions and Answers 3694 of August 4, 1923, issue of Radio Digest? Will you please give me the necessary data for constructing a C. W. transformer which will handle four 5-watt tubes, using 750 volts on the plate?

A.—It will be necessary to use two transformers, one for the plates of the tubes and the other for the filaments; if both windings were placed on the same cone the filament voltage would drop when the plate current was being used.

For a plate transformer make 400 turns of number 18 magnet wire on a 1½-inch core for the primary and 3,000 turns of number 28 magnet wire for the secondary.

For the filament transformer make 400 turns of number 18 magnet wire for the primary, the same size core, and 40 turns of number 10 magnet wire for the secondary.

Nacireman Circuit

(4716) HGK, Louisville, Ky.

Kindly answer the following inquiries regarding the Nacireman easy super-hook-up, R. D. 87, June 30, 1923 issue:

Can spider web coils be used in place of the variocoupler or variometer?

Please give the dimensions of the spider web and the size of wire and number of turns on primary and secondary, if they can be used.

A.—Spider web coils may be substituted for variocoupler or variometer. The primary may consist of a 1½-inch core, exact number of slots not material, wound with 40 turns of number 22 wire, secondary wound with 50 turns of number 22 wire.

RADIO SPECIALS—WHY PAY MORE?

UV-201A, UV-199, WD-11, WD-12 Radiotrons	$ 5.49
SIMPLEX 3000-Ohm Guaranteed Phones	3.45
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RHEOSTAT

THE vernier rheostat with a single control—simple in construction, positive in action. Gives the closest control of the filament heating—smooth action—no scraping or jerking; clock spring pig tail connection insures positive contact. Permits of extremely close tuning.

Price, 6 ohms resistance $1.50
20 or 30 ..... 1.75

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For your Radio-frequency circuit. Our circuit developed for the Royal Air Force, gives amazing results on only two tubes. It is easy to build, and easy to operate. Regenerative sets can be converted to the wonder circuit in a few minutes. Here in the Canadian Northwest we hear Raleigh, N. C., Havana and Porto Rico. Atlanta heard on the loud speaker. Now look at the map and see where we are located. Circuit and full constructional details sent prepaid on receipt of a dollar bill. No further charges.

We want a number of radiophans with reliable sets to collect data on static and fading signals. Write today.

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3.50 Fisher, Large, 90°	2.25
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VARIOCOUPLER
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The remarkable features which are making this circuit (4 circuit tuner) more popular each day are its simplicity of construction and control—wonderful selectivity—distance records—clearness and loudness of reception, and the fact that all capacity squealing, interference, etc., are eliminated.

Made as per specifications of Mr. Cockaday, using No. 18 wire with D coil bank-wound.

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Hook-up, directions and material list free.

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By 40 Largest Jobbers

Within the last thirty days forty leading radio jobbers with credit ratings of $100,000 or more, seventeen of them with ratings of $1,000,000, have rushed the Bremer-Tully Vernier Tuner into their catalogs at the last moment.

They recommend and catalog only the best radio equipment.

Here's why they catalog B-T Vernier Tuners:

1. It's the best Reinartz Tuner available.
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Send for one today. Hook it up and you'll understand.

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What About It?

Isn't it about time to stop experimenting with multiple control circuits and build one that, combining ease of assembly and operation, loudness, clarity and selectivity of signals, as well as beautiful appearance, is excelled by none?

THE ELGIN SUPER-REINARTZ
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Embodies all the advantages of the well known Elgin Reinartz (the set which was largely responsible for the popularity of this wonderful circuit) and many others. It is much louder, more selective, requires no storage battery, and can be used with excellent results on a short or loop aerial.

It has brought in California stations two thousand miles from Elgin, clearly and without interference on a loud speaker with only one tube, and that while our powerful local station was broadcasting three miles away.

Could you ask for more?

Write for circular giving one, two and three bulb hook-ups of this remarkable circuit. IT IS FREE.

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The Crystal That Brought Joy to 100,000 Radio Users Last Season.

Sent on approval. Pay us 50 cents when you are satisfied. That's how sure we are that it will please you. Just pass the good news on to a dealer so others may enjoy B-Metals too. Just send us the name of dealer who hasn't heard of B-Metal when remitting. Price 50c

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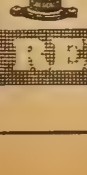
The B-Metal Type C Fixed Detector for Your Reflex Set—Try One and Know

The price is reasonable when you see what it does. Thousands in use. Read one of the many reports.

$2.50



B-Metal Refining Co. St. Louis, Mo., June 25, 1923.

Dear Sirs:—Enclosed find order for $3.00 in payment for type "C" detector shipped me last week and 50 cents for which kindly mail me one B-Metal crystal. Accept thanks for type "C" which is so far ahead of anything I have tried for Reflex work that there is no comparison.

Respectfully, THOS. D. JACKSON,
4280 Penrose Street.

B-METAL REFINING COMPANY
3134 Trumbull Avenue Detroit, Michigan

B-METAL CRYSTAL DETECTOR

Radiophone Broadcasting Stations

Corrected Every Week—Part III

(Note.—The third part of the schedule list appears and is completed below. The fourth part consists of the state, city-station index and will appear next week.)

WJD, Granville, O. 229 meters. 100 mi. Denison Univ. Fri, Sat, 5-6 pm, music, educational lectures. Central.

WJH, Washington, D. C., 273 meters. 200 mi. Wm. P Boyer Co. Daily ex Sun, 3, 4 pm, markets, reports, music. Tues, 7:45-10 pm, concert. Sun, 8 pm, church services. Eastern.

WJX, New York, N. Y. 360 meters. De Forest Radio Telephone & Telegraph Co.

WJY, New York City. 405 meters. 1500 mi. R. C. A. Daily ex Sun, 4-6 pm, entertainment. Tues, Thurs, Fri 7:30-11:30 pm, concert. Sun, 2:30-5 pm, 6-6:30. Eastern Daylight Saving.

WJZ, New York City. 455 meters. 1500 mi. R. C. A. Daily ex Sun, 3-6:30 pm, entertainment; 7:30-11 pm, special program. Sun, 10:30 am-1 pm, church service; 4:30-10:30 pm. Eastern Daylight Saving.

WKAA, Cedar Rapids, Ia. 360 meters 200 mi. H. F. Parr. Daily ex Sun, 12:45 pm reports; 5:30, reports agriculture, 6-7, music. Thurs, 11-12 pm, music. Sun, 4-5 pm, church service. Central.

WKAC, Lincoln, Neb. 275 meters. 400 mi. The Lincoln Star Tues, Fri, 8-9:30 pm, concert, entertainment. Central.

WKAD, East Providence, R. I. 240 meters. Charles Lowell.

WKAF, Wichita Falls, Tex. 360 meters. W. S. Radio Supply Co.

WKAN, Montgomery, Ala. 226 meters. 200 mi. United Battery Service Co. Mon, Wed, Fri, 6:30-7 pm, music, news. Central.

WKAP, Grandston, R. I. 360 meters. Wilcox Flint.

WKAQ, San Juan, Porto Rico. 360 meters. 1,500 mi. Radio Corp. of Porto Rico. Tues, Sat, 11 pm-12:30 am, entertainment. Intercolonial.

WKAR, East Lansing, Mich. 280 meters. Mich. Agri. College.

WKAS, Springfield, Mo. 360 meters. 100 mi. L. E. Lyles Music Co. Slogan, "Queen City of the Ozarks." Mon, Fri Sat, 8-9:15 pm, music. Central.

WKAV, Laconia, N. H. 360 meters. Laconia Radio Club.

WKAW, Beloit, Wis. 242 meters. 100 mi. Turner Cycle Co. Daily 12-12:15 pm. 7-7:30, concert. Central.

WKAX, Bridgeport, Conn. 231 meters. 75 mi. Wm. A. Macfarlane.

WKAY, Gainesville, Ga. 360 meters. 100 mi. Brenau College. No definite schedule. College activities. Thurs, 8:30 pm, concert. Eastern.

WKC, Baltimore, Md. 360 meters. 100 mi. Jos. M. Zamoiski Co. Tues, Thurs, Sat, 7:30-9:30 pm. Eastern Daylight Saving.

WKY, Oklahoma City, Okla. 360 meters. 500 mi. WKY Radio Shop. Daily ex Sun, 7:30 pm, sports; 9-11:30 pm. "Raven Frolic." Central.

WL2, Fairfield, O. 360 meters. U. S. Army.

WLAC, Raleigh, N. C. 360 meters. N. C. State College.

WLAG, Minneapolis and St. Paul, Minn. 417 meters. 1,000 mi. Cutting & Wash. Radio Corp. Slogan, "The Twin City Station in the Land of Ten Thousand Lakes." Club, "Tooth Brush." Daily ex Sun, 9:30, 10:10, 10:30, 10:45, 11:30, 12 m, 12:30 pm, 1:30 pm, 2, 2:30, 4, 4:30, 5, 6, 7:30, 10, reports, lectures, music; 5:30-6 pm, children's program; 8:30, music. Wed, Sat, 10:30 pm-1 am, music. Sun, 10:30, 7:45, church services; 8:30, music. Central.

WLAH, Syracuse, N. Y. 234 meters. 900 mi. Samuel Woodworth. No regular schedule.

WLAJ, Waco, Tex. 360 meters. 1,000 mi. Waco Elec. Supply Co. Daily ex Sun, 9:30 am, 10:30, 2:30 pm, music, reports. Tues, Thur, 7:45-8:45 pm, music. Sun, 3 pm, church service. Central.

WLAK, Bellows Falls, Vt. 360 meters. Vermont Farm Machine Co.

WLAL, Tulsa Radio Co. 360 meters. Tulsa, Okla.

WLAN, Houlton, Me. 283 meters. 500 mi. Putnam Howe Co.

WLAP, Louisville, Ky. 360 meters. W. V. Jordon.

WLAQ, Kalamazoo, Mich. 360 meters. 100 mi. A. E. Schilling. No regular program. Central.

WLAT, Burlington, Ia. 360 meters. Radio and Specialty Co.

WLAV, Pensacola, Fla. 360 meters. 200 mi. Elec. Shop, Inc. Daily ex Sun, 8-9 pm, music, entertainment. Central.

WLAW, New York, N. Y. 360 meters. New York Police Dept.

WLAX, Greencastle, Ind. 231 meters. Greencastle Community Broadcasting Station. (Putnam Elec Co.)

WLAZ, Warren, O. 100 mi. 248 meters. Hutton & Jones Elec. Co. Wed, 8-9:15 pm, classical concert. Sat, 10:30-11:30 pm, music, sports. Sun, 7:30-9 pm, church services. Eastern.

WLW, Cincinnati, O. 2,000 mi. 309 meters. Crosley Mfg. Co. Slogan, "WLW, In the Queen City of the West." Daily ex Sun, 10:30 am, 1:30 pm, 3, 4, reports. Mon, Wed, 8-10 pm, entertainment. Tues, Thurs, 10-12 pm, music. Sat, 2 pm, special. Sun, 9:30 am, S. S. services; 11, church services. Central Daylight Saving.

WMAC, Cazenovia, N. Y. 261 meters. 500 mi. C. B. Meredith. No definite schedule.

WMAF, Dartmouth, Mass. 360 meters. Round Hills Radio Corp. Slogan, "From the Land of the Pilgrim Fathers." Daily ex Sun, 5:30 pm, 7:30-10. Sun, 3:30-5:15 pm, 7:20-10. Eastern Daylight Saving.

WMAH, Lincoln, Neb. 254 meters. 500 mi. General Supply Co. Slogan, "A Call from the Western Plains." Club, "Lincoln Hoot Owls." Daily, 2:15-3 pm, music; 8 pm, entertainment. Sun, 10 am, church services, 3:30-4:30, concert, 8, sermon. Central.

WMAJ, Kansas City, Mo. 275 meters. 600 mi. Kansas City Daily Drovers Telegram. Daily ex Sun, 8:15 am, 9:15, 10:15, 11:15, 12:15 pm, 1:15, 2:15, weather, markets, news. Central.

WMAK, Lockport, N. Y. 360 meters. 1,500 mi. Norton Labs. Tues, 8-9:30 pm, music. Sat, 7:30-8 pm, story; 10:30-11:30, music. Eastern.

WMAL, Trenton, N. J. 256 meters. 100 mi. Trenton Hdwe. Co. Slogan, "The Home of Good Music." Mon, Thur, 7:30-9 pm, music, lecture. Eastern Daylight Saving.

WMAM, Beaumont, Tex. 360 meters. Beaumont Radio Equipment Co.

WMAN, Columbus, O. 236 meters. 50 mi. First Baptist Church. Sun, 10:30-12 m, 7:30-9 pm, church services. Central.

WMAP, Easton, Pa. 246 meters. 400 mi. Utility Battery Service Co. Daily ex Sun, 4-5 pm, 6-6:45. Wed, 8-9:55 pm, entertainment. Eastern.

WMAQ, Chicago, Ill. 448 meters. 1,500 mi. The Chicago Daily News. Daily ex Sun, Mon, 7-8 pm, 9:15-10. Daily ex Sat, Sun, 4:30-5 pm. Central Daylight Saving.

WMAT, Duluth, Minn. 266 meters. 500 mi. Paramount Radio Corp. Daily ex Sun, 11:29 am, 4:20 pm, weather, 6:15-7:30 pm, markets. Tues, Fri, 8-9:30 pm, concert. Central.

WMAV, Auburn, Ala. 1,000 meters. Ala. Polytechnic Institute. Daily ex Sun, 10 am, 12, weather, markets. Tues, Thurs, Sat, 7:30-8:30 pm, music. Central.

WMAY, St. Louis, Mo. 280 meters 1,000 mi. Kingshighway Presbyterian Church. Slogan, "May Every By-Way Hear Kingshighway." Sun, 11 am, 8 pm, Tues, 7-8 pm, church services. Central.

WMAZ, Macon, Ga. 268 meters. 250 mi. Mercer University. Daily ex Sun, 5:30-6 pm, 7-7:30, 8:30-9:30, music. Tues, Wed, Thur, 10:30-11 am, chapel. Eastern.

WMC, Memphis, Tenn. 500 meters. 2,000 mi. The Commercial Appeal. Slogan, "Station WMC. Memphis, "Down in Dixie." Club, "Midnight Frolic." Daily ex Sun, 9:30 am, 12 m, 3 pm, weather, markets; 12:30-2 pm, concert; 8:30, music. Wed night silent. Tues, Fri, 11 pm, Midnight frolic. Central.

WMH, Cincinnati, O. 248 meters. Precision Equipment Co. Temporarily discontinued.

WMU, Washington, D. C. 261 meters. 100 mi. Doubleday-Hill Elec. Co. Daily, 4:30-5:30 pm, concert, sports. Thurs, 8-9, concert. Eastern.

WNAC, Boston, Mass. 278 meters. 200 mi. Shepard Stores. Daily ex Sun, 1-2 pm, 4-5, dance music. Wed, Fri, 6:30-7 pm. Tues, Thur, Fri, 8-10 pm. Wed, Sat, 9-11 pm. Sun, 11-12 am, 2:30-4 pm, 6:30-8:30 pm, church services. Eastern.

WNAD, Norman, Okla. 360 meters. 300 mi. Univ. of Okla. Daily ex Sun, 8-9 pm, news. Central.

WNAL, Omaha, Nebr. R. J. Bockwell. Temporarily off air.

WNAN, Syracuse, N. Y. 286 meters. 1,000 mi. Syracuse Radio Tel. Co. Mon, Wed, Sat, 7:30 pm, concert, agriograms, etc. Eastern.

WNAQ, Charleston, S. C. 360 meters. Charleston Radio Elec. Co.

WNAP, Springfield, O. 360 meters. 200 mi. Wittenberg College.

WNAR, Butler, Mo. 360 meters. 100 mi. C. C. Rhodes.

WNAS, Austin, Tex. Tex. Radio Corp. (Austin Statesman.)

WNAT, Philadelphia, Pa. 360 meters. 500 mi. Lennig Bros. Co. Irregular schedule. Eastern Daylight Saving.

WNAV, Knoxville, Tenn. 360 meters. 1,000 mi. Peoples Tel & Telg Co. Mon, 9-10:30 pm. Tues, Thurs, Sat, 7:30-8:30, Wed, indefinite, Sat, 12:01-1:01, concert. Sun, 2:30-3:30 pm, Fri, silent. Central.

WNAW, Fortress Monroe, Va. 360 meters. Henry Kunzmann.

WNAX, Yankton, S. D. 244 meters. 250 mi. Dakota Radio Apparatus Co. Daily, 11:30 am, reports; 4:30 pm, reports, music. Wed, Sat, 9-10 pm, music. Central.

WNAY, Baltimore, Md. 360 meters. Shipowners Radio Service.

WNJ, Albany, N. Y. 360 meters. 60 mi. Shotton Radio Mfg. Co., Inc. Wed, 8:15 pm, concert. Eastern.

WOAA, Ardmore, Okla. 360 meters. 250 mi. Dr. Walter Hardy.

WOAB, Grand Forks, No. Dak. 280 meters. 50 mi. Valley Radio. Daily ex Sun, 10-11 am, 2-2:30 pm, entertainment, reports. Sun, 3-4 pm, music, church service. Central.

WOAC, Lima, O. 266 meters. Maus Radio Co.

WOAD, Sigourney, Ia. 360 meters. Friday Battery & Elec. Co.

WOAE, Fremont, Nebr. 360 meters. Medland College.

WOAF, Tyler, Tex. 360 meters. 50 mi. The Tyler Commercial College. Daily ex Sat & Sun, 12 m, weather, markets; 8 pm, weather, sports, codes; 10:15, U. S. Navy press. Sun, 11 am, 7:30 pm, church service. Central.

WOAG, Belvidere, Ill. 224 meters. Apollo Theatre.

WOAH, Charleston, S. C. 360 meters. 200 mi. Palmetto Radio Corp. Mon, Thur, Sat, Sun, 10 pm-1 am, music. Eastern.

WOAI, San Antonio, Tex. 385 meters. 1,800 mi. Southern Equip. Co. (Evening News-Express.) Daily ex Sun, 10:30 am, 12:15 pm, 3, 7, news, markets. Tues, Sat, 9:30-10:30 pm, concert. Thurs, 7:30-8:30 pm, concert. Sun, 11 am, church services; 5-6 pm, concert. Central.

WOAJ, Parsons, Kans. 258 meters. 50 mi. C. E. Ervin. Slogan, "Queen City of the Plains." Thurs, 7-8 pm, music, lectures, news. Sun, 3-4:30 pm, Sermon, music, news. Central.

WOAK, Frankfort, Ky. 240 meters. Collins Hardware Co.

WOAL, Webster Groves, Mo. 360 meters. 300 mi. W. E. Woods. Sun, 3-5 pm. Central.

WOAN, Lawrenceburg, Tenn. 360 meters. 1,000 mi. James D. Vaughan. Temporarily discontinued.

WOAO, Mishawaka, Ind. 360 meters. 200 mi. Lyradion Mfg. Co.

WOAP, Kalamazoo, Mich. 360 meters. Kalamazoo College. Mon, Wed, Fri, 6:30-7:30 pm. Eastern.

WOAQ, Portsmouth, Va. 360 meters. Portsmouth Kiwanis Club.

WOAR, Kenosha, Wis. 360 meters. H. P. Lundskow.

WOAT, Wilmington, Del. 360 meters. Boyd Martell Hamp.

WOAV, Erie, Pa. 242 meters. 600 mi. Penna. Nat'l Guard. Tues, Thurs, 8:30-10 pm, music. Fri, 9:15-10:45 pm, music. Sun, 7:45 pm, church services. Eastern.

WOAW, Omaha, Nebr. 526 meters. 1,000 mi. Woodmen of the World. Slogan, "Gateway to the East and West." Mon, Tues, Thurs, Fri, Sat, 9 pm, concert. Sun, 9 am, 9 pm, church services. Central.

WOAX, Trenton, N. J. 240 meters. 300 mi. F. J. Wolff. Intermittent schedule.

WOAZ, Stanford, Tex. 360 meters. Penick Hughes Co.

WOC, Davenport, Ia. 484 meters. 1,000 mi. Palmer School of Chiropractic. Slogan, "Where the West Begins and in the State Where the Tall Corn Grows." Daily ex Sun, Tues night, 9 am, markets; 10:55, time; 11, weather; 12 m, chimes; 1:30 pm, markets; 3:30, talk; 5:45 chimes, ex Wed; 6, 6:30, Sandman, sports; 7, concert; 10 pm, concert, Wed only; 9 pm, concert, Sat only. Mon, Wed, Thurs, Fri, 8 pm, music. Sun, 9 am, chimes; 7, organ; 7:30, sports; 8, church services; 9, concert. Tues, silent. Central.

WOI, Ames, Ia. 360 meters. 200 mi. Iowa State College. Daily ex Sun, 9:45 am, 10:55, 12:15 pm, markets, weather talks; 9:30 pm, music, weather. Last Tues of month, 6:45 pm, music. Central.

WOK, Pine Bluff, Ark. 360 meters. 500 mi. Ark. Light & Power Co. Tues, Fri, 9-10 pm, concert. Central.

WOO, Philadelphia, Pa. 509 meters. 500 mi. John Wanamaker. Daily ex Sun, 11 am, organ recital; 11:00, weather, 12-1 pm, concert; 4:45 pm, organ recital; 10:55, time; 11:02, weather. Mon, Fri, 7:45-11 pm, music, concert. Eastern, Daylight Saving.

WOQ, Kansas City, Mo. 360 meters. 1,000 mi. Western Radio Co. Daily ex Sun, 9-50 am, markets; 10:30-11, music, time signals, 11:50 am-12:50 pm, markets; 2:45-3:15, music; 7-7:20 market. Mon, Wed, Fri, 7:30-8, music. Tues, Thurs, Sat, 8-9:30, music. Sun, 11 am-12:15 pm, 7-7:45, church services. Central.

WOR, Newark, N. J. 405 meters. 2,000 mi. L. Bamberger & Co. Daily ex Sun, 2:30-4 pm, 6:15-7:30, music, talks. Mon, Wed, Sat, 8-11 pm, music, entertainment, lectures. Eastern Daylight Saving.

WOS, Jefferson City, Mo. 441 meters. 1,500 mi. Missouri State Marketing Bureau. Slogan, "Watch Our State." Daily ex Sun, first 15 min. of every hour from 8 am-2 pm, markets. Daily ex Sat, Sun, 5 pm, music, markets. Mon, Wed, Fri, 8-9:30 pm, concert. Central.

WPAB, State College, Pa. 360 meters. Pa. State College.

WPAC, Okmulgee, Okla. 360 meters. Donaldson Radio Co.

WPAD, Chicago, Ill. 360 meters. 500 mi. W. A. Wieboldt & Co. Daily ex Sun, 12:30-1:30 pm, music. Mon, 6:30-7 pm. Tues, Thurs, 8-9 pm, concert. Wed, Fri, 9-10 pm, concert. Sun, 2:30-3:30 pm. Central Daylight Saving.

WPAF, Council Bluffs, Ia. 360 meters. Peterson's Radio Co.

WPAG, Independence, Mo. 360 meters. Central Radio Co., Inc.

WPAH, Waupaca, Wis. 360 meters. 3,000 mi. Wisconsin Dept. of Markets. Daily ex Sun, 9:30 am, 10:30, 11:30, 12:30 pm, 2:30, 4:30, markets, weather, news, etc. Central.

WPAJ, New Haven, Conn. 268 meters. Doolittle Radio Corp.

WPAK, Fargo, N. D. 360 meters. North Dakota Agricultural College.

WPAL, Columbus, O. 286 meters. Superior Radio & Tel. Equip. Co.

WPAM, Topeka, Kans. 360 meters. Awerbach & Guet

WPAQ, Frostburg, Md. 360 meters. General Sales & Engineering Co.

WPAR, Beloit, Kans. 50 mi. 360 meters. R. A. Ward. Sun, 11 am, 8 pm, church services; 3 pm, music, talk. Central.

WPAT, El Paso, Tex. 360 meters. Saint Patrick's Cathedral.

WPAU, Moorhead, Minn. 360 meters. Concordia College.

WPAZ, Charleston, W. Va. 273 meters. Dr. John R. Koch.

WPG, New Lebanon, O. 234 meters. 150 mi. Nusbawg Poultry Farm. Slogan, "The Pulse of Miami Valley." Daily ex Sun, 12-12:15, news; 6-6:30 pm, markets. Mon, Fri, 8-9:45 pm, music, farm program. Central.

WQAA, Parkersburg, Pa. 360 meters. 1,500 mi. Horace A. Beale, Jr. Temporarily discontinued. Eastern.

WQAB, Springfield, Mo. 236 meters. Southwest Missouri State Teachers College.

WQAC, Amarillo, Tex. 360 meters. 200 mi. E. B. Gish.

WQAD, Waterbury, Conn. 242 meters. 30 mi. The Whitall Elec. Co. Mon, Wed, Fri, 5:30-6:45 pm, music, Boy Scout news. Eastern.

WQAE, Springfield, Vt. 275 meters. 300 mi. Moore Radio News Station. Slogan, "Among the Green Hills of Vermont." Daily, 7-7:30 pm. Sun, 2:30-4:30 pm. Eastern.

WQAF, Sandusky, O. 240 meters. Sandusky Register.

WQAH, Lexington, Ky. 254 meters. Brock-Anderson Elect. Eng. Co.

WQAL, Mattoon, Ill. 258 meters. 100 mi. Coles County Tel & Telg. Co. Slogan, "The Buckle on the Corn Belt." Tues, Thurs, 9-11 pm, music, lectures. Central.

WQAM, Miami, Fla. 360 meters. 500 mi. Electrical Equip. Co. Slogan, "It is Always June in Miami." Tues, Thurs, 8 pm, music. Sun, 9-11 pm, music. Eastern.

WQAN, Scranton, Pa. 280 meters. 300 mi. Scranton Times. Slogan, "The Voice of the Anthracite." Daily ex Sun, 12:30-1:30 pm, 4:30-5:30, 7:30-8:30, news, reports, music. Tues, Fri, 8 pm, entertainment. Eastern.

WQAO, New York City, N. Y. 360 meters. 300 mi. Calvary Baptist Church. Sun, 10:30 am, 7:45 pm, church services. Eastern Daylight Saving.

WQAP, Lincoln, Nebr. 360 meters. Am. Radio Co.

WQAQ, Abilene, Tex. 360 meters. 300 mi. Abilene Daily Reporter. Slogan, "The Capital of West Texas." Tues, Thurs, Fri, 8-9 pm. Sun, am, pm, church services. Central.

WQAS, Lowell, Mass. 246 meters. 100 mi. Prince-Walter Co. Daily ex Sun, 10:45-11 am, 2:30-3 pm, music. Mon, Wed, Fri, 6-7 pm, news, concert. Thurs, silent. Eastern.

WQAV, Greenville, S. C. 258 meters. 75 mi. Huntington & Guerry, Inc. Slogan, "The Textile Center of the South." Tues, Thurs, 8-9 pm, music. Sat, 8-8:30 pm, music. Eastern.

WQAW, Washington, D. C. 236 meters. Catholic University of America.

WQAX, Peoria, Ill. 360 meters. Radio Equipment Co.

WQAZ, Greensboro, N. C. 360 meters. Greensboro Daily News.

WRAA, Houston, Tex. 360 meters. 400 mi. Rice Institute. Mon, 8-9 pm, concert, college activities. Sun, 4:30 pm, extension lectures. Central.

WRAB, Savannah, Ga. 360 meters. Savannah Board of Public Education.

WRAD, Marion, Kans. 248 meters. Marion Radio Shop. Daily, 12-12:45 pm, 5:15-5:45, markets, weather. Mon, Thurs, 8 pm, concert. Sun, 5-6 pm. Central.

WRAF, La Porte, Ind. 224 meters. Radio Club, Inc.

WRAH, Providence, R. I. 360 meters. Stanley N. Read.

WRAL, St. Croix Falls, Wis. 248 meters. Northern States Power Co.

WRAO, St. Louis, Mo. 360 meters. St. Louis Radio Service Co. Daily ex Sun, 4:15-5 pm, music, sports. Sun, 3:30-5 pm, music, sports. Central.

WRAR, David City, Nebr. 226 meters. 100 mi. Jacob C. Thomas. Daily, 6:30-7:30 pm. Tues, Fri, 7-9 pm. Central.

WRAS, McLeansboro, Ill. 360 meters. Radio Supply Co.

WRAU, Amarillo, Tex. 360 meters. 50 mi. Amarillo Daily News. Tues, Thurs, 8:00-9:00 pm, music. Central.

WRAV, Yellow Spring, O. 360 meters. Antioch College.

WRAW, Reading, Pa. 238 meters. Horace D. Good.

WRAX, Gloucester City, N. J. 268 meters. Flexon's Garage.

WRAY, Scranton, Pa. 280 meters. 100 mi. Radio Sales Corp. Mon, Wed, Sat, Sun, 9:30-10 pm, concert. Eastern.

WRAZ, Newark, N. J. 233 meters. Radio Shop of Newark.

WRC, Washington, D. C. 469 meters. 1,500 mi. Radio Corp. of America.

WRK, Hamilton, O. 360 meters. 500 mi. Doron Bros. Elec. Co. Slogan, "The Oldest Station in Existence." Fri, 8:15 pm, music, lecture. Sun, 2:15 pm, music. Central.

WRL, Schenectady, N. Y. 360 meters. Union College Radio Club.

WRM, Urbana, Ill. 360 meters. 300 mi. Univ. of Ill. Mon, Thurs, 8:30-8:50 pm, 9-9:30. Univ. news, talks, music. Central.

WRR, Dallas, Tex. 360 meters. 200 mi. City of Dallas. Daily ex Sun, 12-12:30 pm, weather; 3-3:30, sports, markets, news; 7-7:15, police news; 8-8:30, music. Sun, 11 am, church service; 7-8 pm, police news, church service. Central.

WRW, Tarrytown, N. Y. 273 meters. 1,000 mi. Tarrytown Radio Research Laboratory. Slogan, "Everything in Radio." Mon, Wed, Fri, 7:30-11 pm. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAB, Cape Girardeau, Mo. 360 meters. Southeast Mo. State Teachers College.

WSAC, Clemson College, S. C. 360 meters. Clemson Agri. College.

WSAD, Providence, R. I. 261 meters. J. A. Foster Co.

WSAG, St. Petersburg, Fla. 244 meters. Loran V. Davis.

WSAH, Chicago, Ill. 248 meters. A. G. Leonard, Jr. Daily ex Sun, 5:30-6:30 pm. Fri, 8:45-10. Central Daylight Saving.

WSAI, Cincinnati, O. 309 meters. United States Playing Card Co. Tues, Thurs, 8-10 pm. Sat, 10-12 pm. Eastern.

WSAJ, Grove City, Pa. 360 meters. 700 mi. Grove City College. College activities. No definite schedule.

WSAK, Middleport, O. 258 meters. The Daily News.

WSAL, Brookville, Ind. 246 meters. Franklin Elec. Co.

WSAN, Allentown, Pa. 229 meters. Allentown Radio Club.

WSAP, New York, N. Y. 263 meters. Seventh Day Adventist Church. Sat, 10:45-12:45 am. Sun, 7:30-9:30 pm. Eastern Daylight Saving.

WSAR, Fall River, Mass. 254 meters. Doughty & Welch Elect. Co.

WSAT, Plainview, Tex. 268 meters. Plainview Elect. Co.

WSAU, Chesham, N. H. 229 meters. Camp Marienfield.

WSAW, Canandaigua, N. Y. 275 meters. Curtice & McElwee.

WSAX, Chicago, Ill. 268 meters. Chicago Radio Laboratory.

WSB, Atlanta, Ga. 429 meters. 1,500 mi. Atlanta Journal. Slogan, "The Voice of the South." Daily ex Sun, 12-1 pm, music, weather; 2:30, reports; 4-6, baseball; 8-9, concert; 10:45-12, concert. Sun, 10:54-12:15 pm, 5-6 pm, 7:30-9:15, church services. Central.

WSL, Utica, N. Y. 273 meters. 500 mi. J. & M. Elec. Co. Daily ex Sat, Sun, 11-11:30 am, 5-6 pm, music, news. Mon, Wed, Sat, 8-9 pm. Sun, 10:30-12 m, 7:30-9 pm. Church services. Eastern.

WSY, Birmingham, Ala. 360 meters. 2,000 mi. Alabama Power Co. Daily ex Sun, 9:30 am, 3 pm, 3:30, news, weather. Mon, Wed, Fri, 8 pm, music. Sun, 11 am, 8 pm, church services. Central.

WTAB, Fall River, Mass. 248 meters. Fall River Daily Herald.

WTAC, Johnston, Pa. 360 meters. Penn Traffic Co. Daily ex Sun, 10:15 am, 2:15 pm. Tues, Thurs, 7:30 pm. Eastern.

WTAD, Carthage, Ill. 229 meters. Robt. E. Compton.

WTAF, New Orleans, La. 242 meters. 50 mi. Louis J. Gallo. Tues, Sat, 8-9:15 pm, music.

WTAG, Providence, R. I. 258 meters. Kern Music Co.

WTAH, Belvidere, Ill. 236 meters. Carmen Ferro.

WTAJ, Portland, Me. 236 meters. The Radio Shop.

WTAK, Steubenville, O. 266 meters. The Swan-Bower Co.

WTAM, Cleveland, Ohio. 390 meters. 2,000 mi. Willard Storage Battery Co. Wed, Sat, 8 pm, concert. Eastern.

WTAS, Elgin, Ill. 275 meters. Chas. E. Erbstein.

WTAU, Tecumseh, Neb. 360 meters. Ruegy Battery & Elec. Co.

WTAW, College Station, Tex. 254 meters. 200 mi. Agricultural and Mechanical College of Tex. Wed, Thurs, 8-8:30 pm, music, talks. Sun, 11 am, church services. Central.

WTG, Manhattan, Kan. 360 meters. 75 mi. Kan. State Agri. College. Daily ex Sun, 9:55 am, weather (code). Central.

WWAC, Waco, Tex. 360 meters. 1,500 mi. Sanger Bros. Daily ex Sun, 11 am, weather; 1:30 pm, entertainment. Wed, Sat, 8 pm, music, entertainment. Central.

WWAD, Philadelphia, Pa. 360 meters. Wright & Wright, Inc.

WWAX, Laredo, Tex. 360 meters. 150 mi. Wormser Bros. Daily ex Sun, 4:30-5:30 pm, music. Mon, Sat, 8-9 pm, music. Central.

WWB, Canton, O. 263 meters. 300 mi. Daily News Printing Co. Tues, Thurs, 8-9 pm. Eastern.

WWI, Dearborn, Mich. 273 meters. 200 mi. Ford Motor Co. Wed, 8-10 pm, music, lectures. Eastern.

WWJ, Detroit, Mich. 517 meters. 1,500 mi. The Detroit News. Daily ex Sun, 9:30-9:45 am, household hints; 9:45-10:25, health talks; 10:25-10:30, weather; 11:55-12, time; 12:05-12:45 pm, music; 2:30-3:35, weather; 3:35-4:15, markets; 5-6 pm, concert. April 22, and every other week, 8:30-9:30. Sun, 2 pm, Thurs, 11-12 pm, "midnight special." Sun, 2 pm, 7:30, church services. Fill in weeks, 7-8:30 pm, concert; Sun, 11 am, 5:30, church services. Eastern.

WWL, New Orleans, La. 322 meters. Loyola Univ.

6KW, Tuinucu, Cuba. 32[illegible] meters. 1,500 mi. Frank H. Jones. Slogan, "If you hear the koo of the cuckoo you are in time with Tuinucu." Mon, Tues, Thurs, Sun, 9 pm, music. Central.

(Note.—This completes the station schedule list. The fourth part of the directory consists of the state, city-station index, and will appear next week.)

The Reader's View

Long Distance Flewelling

I read with much interest your articles in the Digest every week. It might interest you to know what success I have had with the Flewelling receiver which I built according to the descriptive booklet I received from you. This set is positively "spooky." When I use my large antenna and a UV-201A tube it brings in anything or everything in the air loud enough to be heard 40 feet away. However, I usually use a WD-11 tube, and use the set anywhere I want to sit, using whatever is handy for an antenna. If there is nothing handy around to use for an antenna, well, that does not worry the little Flewelling much. Sometimes I use the bed spring, sometimes a short length of wire with one end twisted around the glass of an electric light bulb. At one time I used a 2-foot length of bus bar wire and heard Pittsburgh. As soon as I took the wire off, however, I heard Schenectady, N. Y., with no other adjustment. The most satisfactory antenna, however, I find to be a 2-foot loop of my own construction. On this I have heard CKW, Tuinucu, Cuba, WLAG at Minneapolis, and a station whose call letters I did not get, at Colorado Springs. These are the farthest. I have, of course, heard many others nearer. Local broadcasters might as well be in China for all they worry me if I do not want to listen to them. My set is an exact reproduction of the picture on the booklet, and with complete equipment cost me less than $45.00.—Douglas Barbour, Atlanta, Ga.

Announcing Weather Conditions

As a constant listener in on the Radio I have often wondered if it would not be a good idea if the broadcast announcers in the various parts of the country would announce the weather conditions in their localities. As an instance: say the weather is clear or it is raining or there is a high wind or it is snowing or it is very cold, giving the temperature and the like. These are only suggestions; if they would meet the approval of the Radio profession the weather would be interesting news for the people if it were announced say about twice in an evening. —B. F. Hessom, Pittsburgh, Pa.,

Drilling Holes in Dry Cell Wax

The more experienced you are as an amateur Radio operator, particularly the more frequently you use your set in the "parlor" where are polished floors and expensive furniture, the closer you should keep a bottle of diluted ammonia solution and an old cloth.

This is especially necessary if you use a storage battery that has a wooden case, since acid is practically certain to be splashed over the sides and soaked into the case or run down on the table or floor. Under such circumstances a quick application of ammonia or baking soda solution will neutralize the acid and prevent stains on the woodwork.

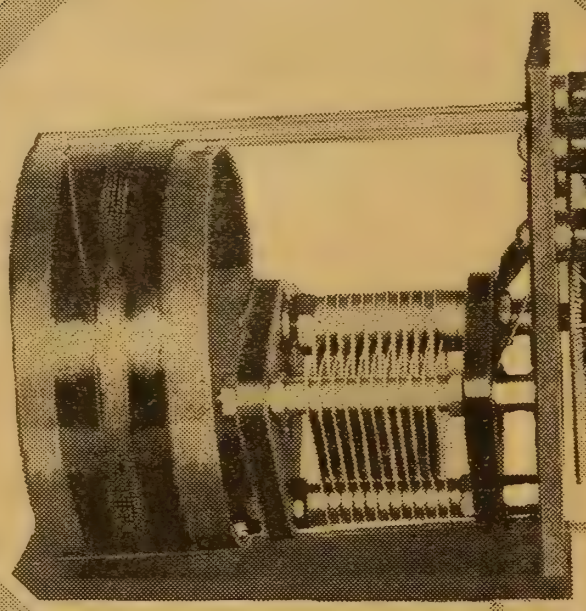
Since summer is here no doubt there are a number of operators of Radio sets that have noticed that the wax to seal dry cells and B batteries has started to blister. This of course is caused by the heat; inasmuch as there is no place for the gas to escape it will be found that the battery current will decrease.

This waste may be stopped simply by taking a small drill and drilling holes in each blister, in other words, making breathers. It will be well to pack absorbent cotton loosely in the holes to keep out the dirt.

Many of the tube noises that have a trying sound are caused by the A or B batteries, or both which is a good indication that they need recharging or replacing.

Radio Illustrated

This Radiophan, Master Fred Alden of Oakland, Me., combines business and pleasure in a clever way to break the tediousness of his farm chores. The cow, too, seems to be interested in the novel arrangement © K. & H.



A new selector or wave trap that uses an absorbing filter coil and variable condenser to aid in eliminating stations not wanted. It is connected in series with the aerial and is claimed to work excellently © K. & H.

Shared joy is double joy, says the old adage. Here is an application of it to Radio. Little Miss Anna Louise Kadel sings the songs or hums the music that she hears to her pet terrier. Maybe it is a lullaby that comes through the air, or more likely the dog's ears, though cocked, are not of the musical kind, for he seems either asleep or unappreciative © K. & H.

OCT -5 1923 ©CLB587390

New Loop Aerial Reflex and Mystery Miloplex

Radio Digest

EVERY WEEK **Illustrated** TEN CENTS

REG. U. S. PAT. OFF. & DOM. OF CANADA

Vol. VI | Copyright, 1923 R. D. P. Co. Inc. | SATURDAY, OCTOBER 6, 1923 | No. 13

'HOT ROASTED PEANUTS'

England Hears Old-Time Songs Sent Out from Troy

Entire Program Picked Up Clearly —in Spite of Static

TROY, N. Y.—Practically the entire Radio program of old-time songs, one of the most popular broadcast from Station WHAZ at the Rensselaer Polytechnic Institute here, was received in Liverpool, England, between the hours of 3 and 4:30 a. m., August 28, according to a letter just received from Arnold P. Hill, B. Eng., of Mayfield Road, Wallasey, Liverpool.

"Despite the fact that the static was fearful all through the night and that it began to get daylight soon after 4 a. m. the program was clear in the headphones throughout and at times was almst up to loud talker strength," according to the correspondent. "The [illegible] for strength, purity and consistency makes the finest reception I have yet had of telephony from U. S. A.

POPULAR SONG HAS BIG SALE WHEN BROADCAST

Test Proves Use of Music by Stations Makes Hits—Broadcasters Should Not Pay

By Marvin W. Thompson

NEW YORK.—Does Radio broadcasting help or hinder the sale of popular music? *It helps!* Doubters can no longer say that sales are hurt by ether publicity, when the fair test given here recently is considered. Composers of music, and particularly the Society of Authors, Composers and Music Publishers may well look up to the advantages of getting their compositions on the air!

Rather than attempt to collect a fee from broadcasters for the use of their music, the latter society some day may even be charged a fee for the privilege of having its pieces played or sung before the microphone. But, of course, broadcasters cannot accept payment now for such publicity, as the latter would then become direct advertising, which, under the existing Radio laws, is prohibited on the air. But should broadcasters pay? The test song answers, "No."

Write Test Song to Prove Argument

It has been the contention of the Society of Authors, Composers and Music Publishers that broadcasting of popular song hits would ruin the sale of sheet music. The broadcasters have maintained that instead of hurting the sales, broadcasting was the greatest publicity medium and force for popularizing song hits that has ever been offered the publishers.

Early in August a verbal battle raged one night in a New York restaurant over this question. Louis Breau and Charles Tobias, writers and publishers of many song hits, felt from their experience that the broadcasters were right. They had in mind a

(Continued on page 5)

R. C. A. PUTS OUT NEW SUIT FOR FALL

Latest Court Action Based upon Charge of Patent Infringement by Fada

NEW YORK.—Recent developments in the Radio industry in this city indicate that clothing is likely to be a "side line." Early in 1923 A. H. Grebe and Company announced a new spring suit brought to its attention in relation to litigation instituted by the Radio Corporation of America. Now comes F. A. D. Andrea, Inc., with the announcement that a new fall suit has been presented it by the same plaintiff.

The latter suit charges infringements of the Rice and Hartley patents through the manufacture and sale of Radio receivers embodying the Hazeltine Neutrodyne circuit.

The defendant is to be aided by the Independent Radio Manufacturers, Inc., of which the Andrea concern is a member, which organization took part in the litigation last year involving the crystal patent.

FLAPPERS AND MONEY FLOCK TO THIS BANK

WHITEHOUSE, N. J.—Hear ye bankers! The First National Bank here has found a new attraction to bring the fair sex and their money to its vaults. A Radio receiving set and loud speaker were installed in a new, comfortably furnished ladies' reception room. The ladies were then invited. Results show the loud speaker was irresistible.

The Fleming Trio (left at top) was featured on the opening program of the new studio of Station WEAF, New York, and has appeared before the microphone there several times since. Not alone do they excel on the cello, piano and violin, but they are very easy on the eyes. Miss Louise Kelly (circle) is a lyric soprano often heard over WEAF and other metropolitan area broadcasters. At the right is Dorothy Bell, a well-known harpist who delights KYW, Westinghouse, Chicago listeners with her solos. Miss Bell's harp registers very cleanly on the microphone. She was a pupil of Tramonti, the famous harpist of the Chicago Symphony, and is a member of the Chicago Civic orchestra

TIMES CHANGE? YEP, BOYS LIKE SCHOOL

LADS ARE NO LONGER LIKE SNAILS—RADIO DOES IT

Reports Show Radio Digest's Parts Offer Stimulates Interest in Three R's, Etcetera

SPECIAL REWARD OFFER
Coupon Number 19

This Special Reward Coupon appears each issue in Radio Digest until further notice. When sent in, accompanied by necessary remittance, according to the rules governing same, apparatus can be secured. See apparatus list and rules of offer below.

Save Me—I Am Valuable

No longer does the boy, in one of the seven ages of man, creep like snail to school. In these days of instruction as to Radio, in these days of opportunities to make "small change," the regular lad is eager to go to school, for on the way he may be paid for running an errand or two and once in the school may learn much from his teacher and his mates about the assembly of a Radio receiver.

According to reports from all over the United States interest in Radio has been increased by the opening of the public and parochial schools. Most of the compositions or essays dealing with miscellaneous subjects are based on experiences with Radio.

The following instructions as to the parts offer of Radio Digest should be heeded so that purchasers may receive efficient service:

Rules to Remember

One point must be emphasized to those contemplating taking advantage of the special offer; that is, that the coupons turned in for any item must be numbered consecutively, as for example, 1, 2, 3, and 4 or 3, 4, 5 and 6. The number of coupons necessary and the cash remittance, of course, depend on the item sought by the reader. There is no limit to the number of series turned in by any one reader.

Another point to remember is that cash, checks and money orders but no postage stamps will be accepted.

To make selection more simple the items have been divided into eight classes, each class depending on the number of consecutive coupons and amount of cash remittance necessary. The eight classes of items follow:

Class A Articles

For two consecutively numbered coupons and thirty cents ($0.30) any one of the following articles will be sent: 1 Carter Imp Jack and Plug; 1 Carter 15-Ohm Resistance Unit; 1 Schindler .00025 mfd. Build-up Mica Condenser; 1 Schindler .0005 mfd. Build-up Mica Condenser; 1 Schindler .001 mfd. Build-Up Mica Condenser; 1 Schindler .002 mfd. Build-Up Mica Condenser; 1 Schindler .0025 mfd. Build-Up Mica Condenser; 1 Martin-Copeland Sta Put Plug; Walnart Standard Tube Socket; Walnart UV-199 Socket; Dubilier Micadons Type 601 (.0001, .00025, .0005, .001, .002, .0025, .003 or .004 mfd.); Premier Grid Condenser (.00025 or .0005 mfd.); Premier Variable Resistance; 1 Carter 25-ohm Resistance Unit; Standard Socket Adapter for Delta Midget Tube; Electrad Grid Leak (1, 1.5 and 2 megohms, with clips); Amsco 3-inch Dial; Amsco Inductance Switch; Freshman Micon Condensers, (.00005, .00025, .00035, .0005, .001, .0015, .002, .0025, or .003 mfd.); Teleradio V. T. Socket; B Metal Mounted Crystal; Aerovox Lightning Switch; Aerovox Series Parallel Switch; Aerovox Contact Lever; Na-Ald Small Space Socket; Se-Ar-De Vernier Adjuster; 3" Radion Dial, black; 2¼" Radion Dial, black; 3"x1" Radion knob with shafts, 3/16" or ¼", black, 3" Radion Dial, ribbed surface.

Class B Articles

For four consecutively numbered coupons and sixty cents ($0.60) any one of the following articles will be sent: 1 Carter .04 mfd. Special Fixed Condenser; 1 Carter Jack Switch; 1 Carter Hold-Tite Jack, One Spring Open Circuit; 1 Carter Hold-Tite Jack, Two Spring Closed Circuit; 1 Carter Hold-Tite Jack, Three Spring Filament Control; 1 Carter Hold-Tite Jack, Four Spring Closed Circuit; 1 Carter Hold-Tite Jack, Five Spring Filament Control; 1 Federal Universal Phone Plug; 1 Federal Open Circuit Jack; 1 Federal Closed Circuit Jack, 1 Federal Double Circuit Jack; 1 Martin-Copeland Shur Grip Plug; 1 Martin-Copeland WD-11 Socket; 1 Martin-Copeland WD-11 Adapter; 1 Martin-Copeland UV-199 Socket; 1 Martin-Copeland UV-199 Adapter 1 Martin-Copeland Pull Switch; 1 Martin-Copeland 5-point Inductance Switch; 1 Martin-Copeland Variable Grid Leak; 1 Martin-Copeland SPST Knife Switch 1 Martin-Copeland SPDT Knife Switch; 1 Martin-Copeland DPST Knife Switch; 1 Martin-Copeland DPDT Knife Switch; Walnart Variable Grid Leak; Walnart Inductance Switch; Dubilier Micadons Type 600 (.0001, .00025, .0005, .001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadons Type 610 (.001, .002, .0025, .003, .004, or .005 mfd.); Dubilier Micadon Type 601 (.006 mfd.); Dubilier By-Pass Condenser (.1, .25, or .5 mfd.); Premier Universal Tube Socket; Premier Radio Dial (3/16, ¼, or 5/16 in. black or white face); Premier Universal Radio Jack, Open Circuit; Premier Universal Radio Jack, Two-Circuit Three Spring; Premier Universal Radio Jack, Two-Circuit Four Spring; Premier Universal Radio Jack, Filament Control Three Spring; Premier Switch Lever and 10 Points; Turney Spider Web Coil (SW-10 with .038 millhenry inductance, SW-15 with .066 MH., or SW-20 with .300 MH.); Amsco 6-Ohm Rheostat; Freshman Fix-O Grid Leak and Condenser; Freshman Variable Resistance Leak (with or without condenser); Freshman Micon Condensers (.006 or .005 mfd.); Teleradio 6-Ohm Rheostat; Teleradio 30-Ohm Rheostat; Teleradio Lightning Arrester; B-Metal Crystal Tube Detector Type A; B-Metal Adjustable Detector Type D; Aerovox Rheostat; Se-Ar-De Vacuum Tube Socket; Basco Crystal Detector Assembly; Basco Rheostat, 3-ohm or 6-ohm; 3¼" Radion Dial, black; 4" Radion Dial, black; 4" Radion Dial, black, ribbed surface.

Class C Articles

For six consecutively numbered coupons and ninety cents ($0.90) any one of the following articles will be sent: 1 Carter 6-Ohm Vernier Control Rheostat; 1 Carter "Tu-Way" Plug; 1 Federal Panel Mount Socket; 1 Federal 6-Ohm Rheostat; 1 Federal 3-Ohm (Power) Rheostat, 1 Amperite Automatic Filament Control (with mounting); 1 Martin-Copeland Marco Rheostat; 1 Martin-Copeland Series Parallel Switch; 1 Martin-Copeland DPDT Panel Switch; 1 Martin-Copeland 7-Point Inductance Switch; 1 Martin-Copeland 9-Point Inductance Switch; 1 Martin-Copeland 11-Point Inductance Switch; Walnart Variable Grid Leak with .00025 mfd. Condenser; Walnart Variable Condenser (3-plate .00006 mfd.); Dubilier Ducon; Dubilier Micadon Type 600 (.006 mfd.); Dubilier Micadon Type 610 (.01 or .02 mfd.); Dubilier By-Pass Condenser (1 mfd.), Premier Universal Radio Jack Filament Control Five Spring; CRL Variable Grid Leak, without condenser; Premier No. 230 Variable Resistance, panel mounting; Thordarson Vernier Rheostat; Ritter Loop Aerial; Martin Copeland Variable Grid Leak; Amsco Multiple Point Inductance Switch; Amsco 20-Ohm Rheostat; Amsco 50-Ohm Rheostat; Freshman Antenella; Freshman Micon Condenser, .01 mfd.; Teleradio Variable Condensers, (3-plate or 11-plate); Set "Read 'EM" Binding Posts (9); B-Metal Crystal Tube Detector Type B; Illinois Cushion Resilient Socket; Aerovox Antenna Plug; Aerovox Potentiometer; Aerovox Crystal Detector; Se-Ar-De Adjustable Vernier Condenser; Radion Panel 7"x7"x9", black or mahoganite; Radion Panel 7"x7"x12, black.

Class D Articles

For eight consecutive coupons and one dollar and twenty cents ($1.20) any one of the following articles will be sent: 1 Carter 20-Ohm Vernier Control Rheostat; 1 Schindler Radio Frequency Transformer; 1 Martin-Copeland 13-Point Inductance Switch; 1 Martin-Copeland 15-Point Inductance Switch; 1 Martin-Copeland 19-Point Inductance Switch; Walnart Variable Condenser (5-Plate .0001 mfd.); Electrad Variohm, with mica condenser; Dubilier By-Pass Condenser (2 mfd.); CRL Variable Grid Leak with Condenser; Resistometer (Type A or 2A); Thordarson Variable Condenser, .00025 mfd.; Amsco 300-Ohm Potentiometer; Freshman Micon Condenser, .015 mfd.; Teleradio Variable Condenser, 23-plate; Aerovox Crystal Detector and Condenser, mounted; Se-Ar-De Variable Grid Leak, with condenser mounting; Fil-Ko-Stat; R. S. C. Vernier Condenser, 3-plate; Radion Panel 7"x7"x12", mahoganite; Radion Panel 7"x7"x18", black; Radion Panel 7"x9"x14", black; Radion Panel 7"x10"x12", black.

Class E Articles

For ten consecutively numbered coupons and one dollar and fifty cents ($1.50) any one of the following articles will be sent: 1 Carter 6-Ohm Automatic Control Rheostat; 1 Carter 20 Ohm Automatic Control Rheostat; 1 Demcal 3-Plate Variable Condenser; Walnart Variable Condenser (13-Plate .0002$ mfd.); Turney Genuine Reinartz Coil; Dubilier Variodon (.0004 or .0006 mfd.); Resistometer (Type B); Delta Midget Tube and Socket; Thordarson Variable Condenser, .0005 mfd.; Freshman Micon Condenser, .02 mfd.; B-Metal Crystal Tube Detector Type C; Aerovox 3-Gang Socket; Aerovox Double Slide Tuning Coil; Na-Ald 3-Plate Vernier Condenser, with dial; Radion Panel 7"x7"x18" mahoganite; Radion Panel 7"x7"x21", black.

Class F Articles

For twelve consecutively numbered coupons and one dollar and eighty cents ($1.80), any one of the following articles will be sent: 1 Acme Pot-Rheo (potentiometer and rheostat); Walnart Variable Condenser (23-Plate .0005 mfd.); Dubilier By-Pass Condenser (3 mfd.); Premier Variable Condenser without dial (.00039 mfd.); Thordarson Variable Condenser, .001 mfd.; Amsco Compensating Grid Condenser; Freshman Micon Condenser, 0.25 mfd.; Teleradio Variable Condenser, 43-plate; Se-Ar-De 3-Plate Condenser; Radion Panel 7"x7"x21", mahoganite; Radion Panel 7"x7"x24", black; Radion Panel ½"x10"x12", black; Radion Panel 9"x9"x14", mahoganite; Radion Panel 10"x10"x12", mahoganite.

Class G Articles

For fourteen consecutively numbered coupons and two dollars and forty cents ($2.40) any one of the following articles will be sent: 1 Federal 7-Plate Variable Condenser; 1 Federal 11-Plate Variable Condenser; 1 Federal 21-Plate Variable Condenser; 1 Federal Anti-capacity Switch; 1 Demcal Variable Condenser 11-Plate Walnart Variable Condenser (43-Plate .001 mfd.); Dubilier Variadon (.001 mfd.); Dubilier By-Pass Condenser (4 mfd.); Premier Variable Condenser with dial (.00078 mfd.); Premier Hegehog A. F. Transformer, 4 to 1 Ratio; Thordason A. F. Transformer, 3.5 to 1 Ratio; Thordason Variable Condenser, with vernier, knob and dial (.0005 mfd.); Thordason Variable Condenser, with vernier, knob and dial (.00025 mfd.); Ritter Grand Crystal Set; Amsco Double H. C. Coil Mounting; Na-Ald 13-Plate Precision Condenser, with dial (.000297 mfd.); Na-Ald 23-Plate Precision Condenser, with dial (.000523 mfd.); Se-Ar-De 9-Plate Condenser; Se-Ar-De 17-Plate Condenser; R. S. C. Variable Condenser, 23-plate; Radion Panel 7"x7"x24", mahoganite; Radion Panel ½"x10"x12", mahoganite; Radion Panel 12"x12"x21", black; Radion Panel 14"x14"x18", black.

Class H Articles

For sixteen consecutively numbered coupons and three dollars ($3.40) any one of the following articles will be sent: 1 Federal Audio Frequency Transformer No 22W; 1 Demcal 23-Plate Variable Condenser; 1 Acme Audio Frequency Transformer; 1 Acme Radio Frequency Transformer (R-2, R-3, or R-4); Walnart Variable Condenser (13-Plate vernier; Dubilier Duratran (R. F. transformer; Premier Micrometer Variocoupler with dial; Premier Variable Condenser with dial (.0015 mfd.); Premier Variable Condenser with vernier (.0004 mfd.); Premier Hegehog A. F. Transformer, 10 to 1 Ratio; Premier Hegehog A. F. Transformer, Tube Socket Type, 4 to 1 Ratio; Thordarson A. F. Transformer, 6 to 1 Ratio. Thordarson Variable Condenser, with vernier, knob and dial (.001 mfd.); T. B. H. Radio Head Set, 2,000 ohms; Tulip Loud Speaker, 15-inch, white; Teleradio Vernier Condenser 23-plate; Teleradio 2,000-Ohm Head Set; Na-Ald Tuned R. F. Transformer, one stage; Na-Ald 43-Plate Precision Condenser with dial (.001 mfd.); Se-Ar-De 35-Plate Condenser; R. S. C. Variable Condenser, 43-plate; Radion Panel 12"x12"x21", mahoganite; Radion Panel 14"x14"x18", mahoganite.

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Radio Digest, Illustrated, Volume VI, Number 13, published Chicago, Illinois, October 6, 1923. Published weekly by Radio Digest Publishing Company, 123 West Madison Street, Chicago, Illinois. Subscription rates, yearly, Five Dollars; Foreign Postage One Dollar additional; single copies, Ten Cents. Entered as second-class matter at the postoffice at Chicago, Illinois, under the Act of March 3, 1879.

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Looking Ahead

Miloplex I Receiver Details—by H. J. Marx next issue. Mr. Marx will give the information necessary in the making of this popular little set. The article will be based on the actual construction of the set that will be on display at the Digest booth at the New York Radio Show. No great changes will be necessary to convert this circuit over into Miloplex II (described this week) or Miloplex III, to be told about soon by the mysterious inventor.

How the Waves Are Rectified—and what is necessary to make the simplest type of receiving set; the topic of Marvin W. Thompson next week. Beginners and even old timers are finding Mr. Thompson's series abundant with ideas and principles worth knowing.

Benson Conclusion—Some real kinks next for improving your circuit, and some data of considerable value to the fan that likes to build his own sets.

How to Make—An article next issue on how four hair combs can be used to make a self-supporting single layer coil. Lots of other good kinks, too.

One of Our Readers Has Had Some Very Unusual Results—His is a three honeycomb coil circuit with an untuned aperiodic primary. It's nothing new but you're always safe in making up a circuit of this type, so look up Hook-up Diagram R.D.-101 in the October 13 Digest.

Newsstands Don't Always Have One Left

WHEN YOU WANT

Radio Digest

YOU WANT IT!

BE SURE OF YOUR WEEKLY COPY BY SUBSCRIBING NOW

SEND IN THE BLANK TODAY

Publisher Radio Digest,
123 West Madison St.,
Chicago, Illinois.

Please find enclosed check M. O. for Five Dollars (Six, Foreign) for One Year's Subscription to Radio Digest, Illustrated.

Name .....

Address .....

City..... State.....

AND HAPPILY THEY LIVED EVER AFTER

SOME SHORT STORIES IN COURSE MAY END THUS

Westinghouse Broadcast Station Retains Noted Critic to Teach Those Inclined to Letters

SPRINGFIELD, MASS.—Believing that a great part of the public either write or think that they can write as well as the authors of some of the stories they read in current magazines, Westinghouse station, WBZ, here, has arranged with Dr. J. Berg Esenwein, probably the most widely-known short story critic, to give a course of ten lectures as to short-story writing. The course will cover the elements of writing plot interest, climaxes and the like. The course is now in progress.

At the end of the course each of the students will be permitted to submit a short story; the best will be awarded a prize of $25. Second and third prizes of $15 and $10 will be given the next best stories.

When Course Is On Air

The course began on Thursday, September 13, at 7:40 p. m., eastern time. The succeeding nine lectures are being given on Thursday of each week at the same time. The introduction of this course of study by WBZ marks a departure from its broadcasts. Heretofore, miscellaneous talks have been given of more or less interest to the Radiophan. It is the belief of WBZ that this kind of address has served its purpose and that the time has come when definite things should be done. Therefore, for the fall and winter, it has been planned to make every broadcast specific as to purpose.

Dr. Eisenwein holds degrees from Albright, Lafayette, and Richmond colleges and the University of Omaha. Most of his life has been given to educational and literary work.

"Plug-in" for Hospital Beds

FALL RIVER, MASS.—The hospital trustees here have appointed a committee to investigate the advisability and practicability of installing Radio equipment at all the municipal hospitals. If it is done there will be a plug and connection at each bed, so that the patients may suit their convenience.

"Abroad at Home"

Where Shall We Go Tonight?

To New York, Cuba, Atlanta, San Francisco or perhaps Honolulu? Far distant stations are continually being brought in clearly and distinctly with a Crosley Model X-J. Unsolicited letters from users, telling of new distance records are received daily. You, too, at a very small cost, can enjoy the many pleasures and conveniences that this new Crosley Model affords.

CROSLEY MODEL X-J $65

A 4-tube radio frequency set, incorporating one stage of Tuned Radio Frequency Amplification, Detector and two stages of Audio Frequency Amplification, with jack to plug in on three tubes for head phones; new Crosley multistats, universal rheostats for all makes of tubes; new condenser with molded plates; filament switch and other refinements of detail. This receiver is exceptionally efficient in long range reception. It will bring in stations at almost unbelievable distances clearly and distinctly.

We unhesitatingly claim the Model X-J is the best radio receiver ever offered, regardless of price.

The Crossey Model X-J, together with the complete Crosley line of receivers, ranging in price from $26 to $150, are for sale by best dealers everywhere.

Crosley Better-Costless Radio Products

List prices on our equipment west of the Rockies 10% higher. In Canada add duty.

Write for Free Catalog

CROSLEY MANUFACTURING COMPANY

Powel Crosley, Jr., President

10491-2-3-4 Alfred St. Cincinnati, Ohio

NEW "ROLLS ROYCE" SET RANKED FINEST

CAPABLE OF TUNING FROM 200-700 METERS

Sam Curtis, Ex-Operator at WNAC, Completes His Outfit De Luxe

BOSTON, MASS.—Sam Curtis, Radio expert of the C. C. Harvey Co., former announcer and Radio operator of the WNAC broadcasting station, has built a receiving set of the "Rolls-Royce" type, meaning a set de luxe, using seven dry cell tubes, with a loop, and embodying all the principles of the super-heterodyne and neutrodyne combined.

With his experience at WNAC, and with the Radio Corporation and in various naval Radio positions, Curtis has been able to design what is perhaps the finest receiving set obtainable at the present time.

It is capable of tuning from 200 to 700 meters, and has an intermediate frequency of 48,000 cycles. The principal features are the combination of all batteries inside the cabinet which is of American walnut, polished and made five-sided, like the official French naval receivers.

Parts and Construction of Set

One rheostat controls the seven UV-199 tubes, which are used in the following order: 1, oscillator; 2, first detector; 3, 4 and 5, intermediate frequency amplifiers; 6, second detector, and 7, states of audio frequency. Three long wave transformers have been supplied for the Radio frequency amplification. The set of tubes is mounted on a strip having rubber cushion supports, the sockets laid flush with the wood. These supports are encased in a holder of solid brass, while the cabinet and panel are lined with sheet copper.

A high efficiency is obtained by the use of two .001 mfd. low loss variable condensers, these constituting the only two adjustments except for one filament rheostat.

Differences in Hook-Up

In the following details, the circuit differs from the general super-heterodyne circuit: single control for all tube filaments; batteries all located inside the cabinet; embodiment of the neutrodyne principle in stabilizing; use of a loop with the center of its winding grounded, thus minimizing the antenna effect and allowing for much sharper directional tuning.

Mr. Curtis spent two months designing and constructing this set, which also includes plate volt meters inlaid into the panel and filament meter, showing at all times the exact amount of plate and filament voltage in the batteries. With a two foot loop, Curtis and Henry Clapp, who assisted him in the construction, picked up twenty-two broadcasting stations in one evening, including WBZ, WEAF, WSAI, KOP, WWJ, KDKA, WEAN, WLAG, PWX, WJAR and WJAZ. There was very little static noticed.

"BUGS" AID OFFICIALS RELAYING MESSAGES

Springfield, Mass., Amateurs Give Services Voluntarily

SPRINGFIELD, MASS.—Radio amateurs residing in this city are giving their services voluntarily in the first naval district by relaying official messages, requiring prompt attention, between the reserve division here and the brigade headquarters at Boston. Commander J. T. Nelson in a recent letter addressed to Ensign H. F. Johnson of Springfield commended this work in these terms:

"The work of your division in training men for Radio operators is greatly appreciated and your division is the only unit where training of this nature is being carried on. It is the brigade commander's wish that you continue this work and expand this Radio department if it can be done without detracting from the general training of your division."

RADIO AS TRAIN GUIDE ATTEMPT BY EXPERTS

CHICAGO.—The possibility of directing fast trains by Radio without interrupting their speed will be demonstrated soon on the Rock Island's Rocky Mountain Limited train by experts from all the big roads of the country. Riding in special coaches, they expect to keep in constant touch with stations here, WOC at Davenport and WOAW at Omaha, and later with Denver stations.

WCAE FINDS ROAMING LAD 30 MILES AWAY

PITTSBURGH, PA.—WCAE, Pittsburgh Press, probably broke the record recently as an air sleuth. The mother of Tommy Moran, 14, reported to WCAE that the police had failed to find her son who had been lost for twenty-four hours. Twenty-one minutes after the report was broadcast the boy was found by a policeman who had heard WCAE, thirty miles away, announce the quest.

YOUNG FAN HAS SET LIKE BOOK

Little Miss Stella Pogany of Philadelphia listening in on the unusual booklike receiving set her father has made for her. Another view of the instrument is given on the back page. The "book" is entitled "My Set"

KGB Broadcasts Twenty Voice Two-Act College Operetta

TACOMA, WASH.—An entire operetta in two acts, with the original cast of twenty voices, was presented recently at KGB, The Tacoma Ledger station here. The operetta was "The Pennant," a tuneful college comedy, which met with much favor. It took two hours to broadcast.

Open Meeting of Trade Chiefs at Gotham Palace

NEW YORK.—L. A. Nixon, secretary of the Radio Trade Association, has announced an open meeting for the Radio trade conducted under the auspices of this association for October 9 at 3:00 p. m. at Grand Central Palace in this city.

AIR COMPASS CITED AS MARINE SAVIOR

NAVY VESSELS DISREGARD BEARINGS AND GROUND

New Englander Declares Cable in New York Harbor Would Have Averted Destroyer Disaster

SAN DIEGO, CALIF.—Disregard of the course indicated unerringly by the Radio compass at Point Arguello station, on the California coast, was the direct cause of the recent loss of twenty-three enlisted men and the destruction of seven destroyers, valued at $10,000,000, when they ran on the rocks off Point Honda during a fog. This was the gist of the evidence presented to the naval court of inquiry here.

Had the commander of the squadron and the navigating officers of each destroyer heeded the warnings of the Radio signals, had they believed that Radio was efficient, the wreck could have been avoided. According to the statement of E. C. Hanson, of Reading, Mass., inventor of the Radio pilot cable, the latter device also, if installed, would have prevented the wreck.

Cable Sixteen Miles Long

As an instance of the reliability of the Radio pilot cable, Mr. Hanson cited its achievements in Ambrose channel, New York harbor. The cable, as operated by the Navy department, has guided hundreds of vessels to safety. It is sixteen miles long, energized by a 500-cycle low frequency current from the shore. The current establishes a powerful magnetic field whose characteristics are readily recognized by an observer aboard ship.

A vessel equipped in accordance with the requirements of the Radio pilot system bears on each side "pickup" coils which are affected by or sensitized to the magnetic field. When the ship passes directly over the cable the coils are affected equally, that is, cause like response in any pair of earphones worn by the watch aboard the ship. The coils are connected with the earphones by an ordinary two-step amplifier.

Sound Intensities Guide Ship

When the craft deviates from the course set by the cable a dissimilar response is registered by the earphones. The side of the ship nearer the cable produces the louder sound or response in the earphones. The navigating officer thus is enabled to right his course. He is also assisted by a mechanical visible indicator which forms part of the steering apparatus.

In the opinion of Mr. Hanson, the Atlantic coast from Maine to Florida and the Pacific littoral from Canada to Mexico, when equipped with his Radio pilot, would be virtually free from shipwrecks caused by fogs. The cost of operating the Radio pilot, he said, is about ten cents an hour.

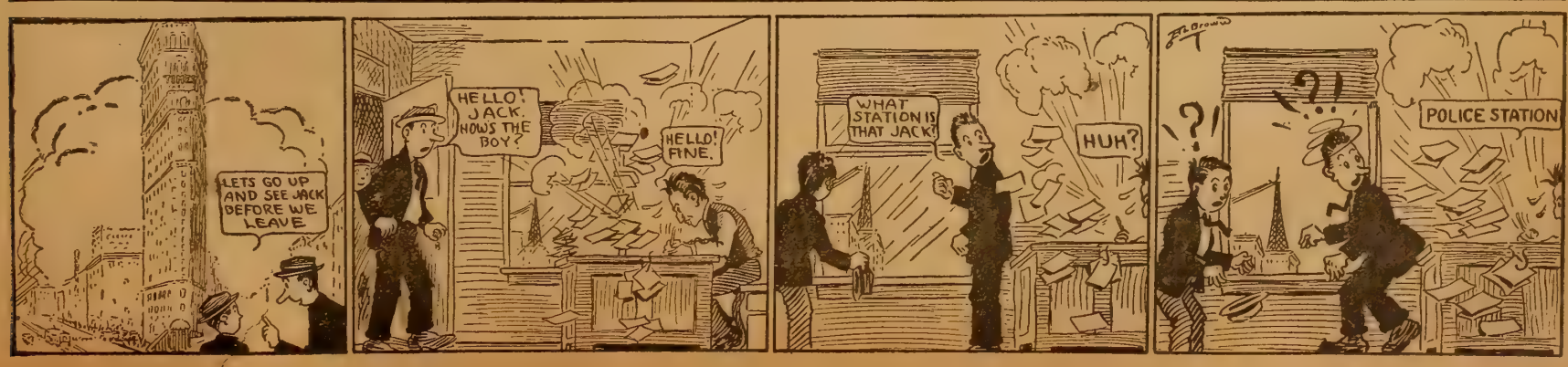
Picks Up Broadcasts Deep in Grand Canyon

Prediction of Experts Prove to Be Incorrect

DENVER, COL.—The Geological Survey party carrying a Radio set on a trip through the Grand Canyon of the Colorado, has arrived safely at Bright Angel trail. Notwithstanding the predictions of experts that it would be impossible to receive Radio messages while in the bottom of Grand Canyon, Colonel Birdseye reports that he is in daily receipt of messages broadcast from Los Angeles, Salt Lake, and Chicago. He received the news of President Harding's death within forty-five minutes after it occurred. Reports of his progress will be sent out for broadcasting when he reached Basstrail about September 10, Supai Creek, September 20, and Diamond Creek, October 15.

It is a violation of a city ordinance of Newark, N. J., to erect an antenna without a permit.

THE ANTENNA BROTHERS — Spir L. and Lew P. — Note: Jack Sells Ads in N. Y.



GERMAN RADIO HEAD DENIES 'FEAT' TALES

BRANDS MAGNETO STORIES "PURELY MYTHICAL"

Discredits Report That Planes, Autos Were Halted and Wrecked —Not Even Possible

By Carl H. Butman

WASHINGTON.—Public antipathy against Germany's war plans of the future should not be increased by the report from Berlin that the German Government can stop and render powerless automobiles, airplanes or other motor vehicles by Radio. Herr Prostrat Hermann Thurn, an administrative head of the German Radio service, dismissed the stories as "so much nonsense," in a recent interview sent officially to Washington.

Radio Digest, it will be remembered, some time ago interviewed German engineers and was first to brand the story as false.

Herr Thurn further stated that the correspondent who sent dispatches to papers in the United States to the effect that in June, a number of automobiles en route to Hamburg were halted when their magnetos were stopped by powerful Radio waves from Nauen, was the victim of unscrupulous persons. "No such achievement has yet been anywhere reached," the German engineer asserted, adding that even if it had been attained by Germany, "it would have most certainly been kept a secret and not bruited about by anybody connected with Nauen."

Denies Plane Crippling Stories

This official information also discredits the stories that airplanes of France flying over Bavaria were stopped and forced down by Radio waves from German stations.

Both stories of Radio magneto control are impossible, according to the German expert, who pointed out that:

Magnetos are enclosed in iron or steel jackets and could not be influenced by Radio waves; no matter how powerful, Radio waves cannot be directed with precision so as to affect the magneto of a vehicle or vessel at any distance from the directing station, particularly when the vehicle is in motion; and that as definite or precise directing cannot be achieved, every vehicle or vessel within the zone of influence of the electrical wave would be similarly affected. This would stop, bring down or sink the vehicles or ships of the operating agency as well as those of the enemy.

Some skeptics may believe that the Herr Administrator would have denied the statements in an effort to protect Germany's secret Radio control, but the official forwarding the dispatches believes implicitly in this Radio engineer whom he knows personally and professionally, and, he feels that his negations and criticisms should be taken without reservation.

"Stories of a Reporter" at WJZ

NEW YORK.—A feature which has already proved more than popular with WJZ audiences here has become a weekly event on the program, for William H. Crawford, the noted journalist, author, war correspondent, and reporter, has agreed to give one of his delightful "Reminiscences of a Reporter" every Sunday evening for an indefinite period. A naturally charming speaker, Mr. Crawford has so many interesting anecdotes about the famous men of this country and Europe that his talks are a veritable revelation of the characters of those personages in a peculiarly fascinating manner.

BIRTH OF THIS BABY AIDED BY BROADCAST

"The Radio Baby of WLAG" is learning to walk. It is nearly a year since she was born during a Caesarian operation while her mother listened to the special program broadcast from WLAG in lieu of an anesthetic. The baby is Lucille Eleanor Cartwright, daughter of Mr. and Mrs. Guy A. Cartwright, 4105 Elliot Ave., Minneapolis, and scarcely a day passes that she does not listen in to the Twin City Station

Safety Congress Hears Broadcast Addresses

Experts Give Air Talks on Radio Hazards

BUFFALO, N. Y.—One of the biggest broadcasting demonstrations ever staged for a convention was to be put on by Station WGR during the week beginning October 1 when the National Safety Council was to hold its twelfth annual congress here. Three thousand delegates of the various sections of the council met to make America safe for Americans. Because of the great general interest in the subject of safety this convention was to be put on the air on a large scale.

Of direct interest to fans were two addresses applying particularly to Radio. One was an address by H. J. Burton of the Consumers' Power Company, Jackson, Mich., on "Hazards of Improper Radio Installation," and the other was "Safety in Playing the Public's New Scientific Game —Radio." The latter was given by S. E. Whiting, chairman of the Radio Hazards Committee, Public Safety Section, National Safety Council.

Akron Youths Form Society

AKRON, O.—A new Radio club having for members young men interested in the popular science was recently organized in South Akron and has held several meetings at members' homes. The officers for the new club are Lloyd Miller president, E. W. Heister secretary, and Ivan Stripe treasurer. Communications should be directed to Mr. Miller at 663 Yale Street or to the secretary Mr. E. W. Heister, 700 May Street.

TRADE COMMISSION FINISHES INQUIRY

Next Congress to Act on Anti-Trust Investigation of Radio Industries

WASHINGTON, D. C.—The field work in connection with the Radio investigation which is being made by the Federal Trade Commission in response to House Resolution 548 is practically complete, acording to officials of the Federal Trade Commission. No details of the investigation will be made public until the report is made to Congress, which report will be prepared in the very near future, so that it can be submitted to Congress when it convenes early in December.

The investigation in accordance with the resolution passed by the House of Representatives includes a report on the ownership of patents covering Radio apparatus, the contracts and leases, together with the manufacture, sale and resale of Radio apparatus. The purpose of the resolution is to "aid the House of Representatives in determining whether there has been a violation of the anti-trust statutes."

AIR SIGNALS GREATLY AID MILITARY FLYING

Applications Much Diversified and Increased at Canal Zone

WASHINGTON.—Radio, the latest "wonder of the world," is materially aiding the development and efficiency of military and naval aviation. War time flying in its many phases would little avail the commanders in chief if instantaneous communication between the bases and the air fleets was not constant. Radio telegraphy and telephony establishes direct liason between the air and the ground or sea, thus combining these arms of the service.

Peace time tests and maneuvers between the aerial forces and those of the land and sea, aided by Radio, are carried on regularly by both the Army and Navy; their scope and frequency are being extended each year.

A recent Army Air Service report from France Field, Canal Zone, states that during the past fiscal year 261 Radio flights, embracing aerial Radio tests, voice-controlled formations, Coast and Field Artillery reglages or gun-fire observations, tactical maneuvers, reconnaissances and coast patrol work. This was an average of a Radio flight each working day. The diversity as well as the volume of Radio communication accomplished in the Canal Zone was in excess of any previous year but will be extended next year, the report states. France Field pilots had never before attempted tactical maneuvers, coast patrol, field artillery spotting or voice control formation flying, yet the report indicates successful results in all lines where Radio was used.

France to Build Plants for Soviets

WASHINGTON, D. C.—The Russian authorities have ratified a five year contract between the French Compagnie Générale de Telegraphie sans Fil and the Russian Trust Radio Electric for the installation of stations and the manufacture of apparatus in Russia. This is the first concession accorded by the Soviet government to any French company.

A license is necessary to operate regenerative receiving sets in England.

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1/8"	THICK	1 1/2¢	PER SQ. INCH
3/16"	THICK	2¢	PER SQ. INCH
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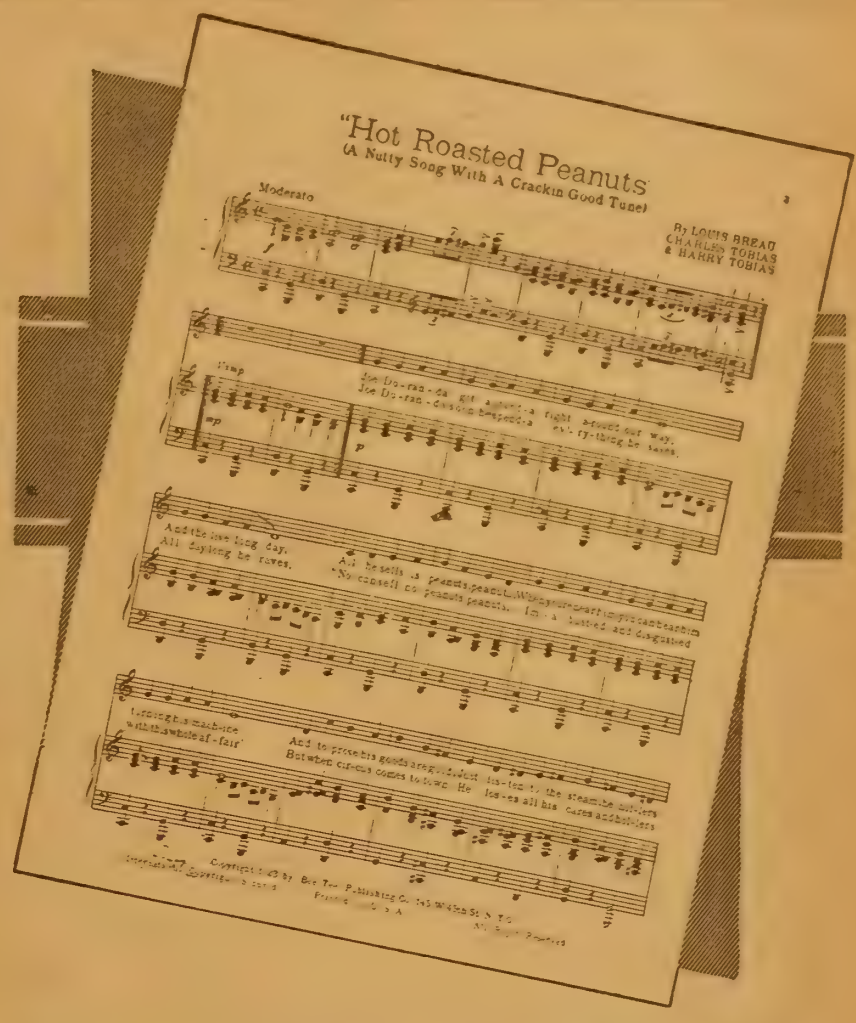
PROOF OF ETHER "PLUG" IN SALES



Louis Breau (left) and Charles Tobias, composers of "Hot Roasted Peanuts," the sale of which, following its broadcast at several stations, has proved the Radiophone is a real service for music publishers. One group of music publishers, which has sought to collect fees for the broadcasting of their compositions, will have a hard time disputing the argument presented by this test

New Song Has No Other Publicity Yet Rivals "Bananas" in Popularity

(Continued from page 1)

"nut" song which is the type of popular music now in demand and they decided to experiment with it.

When sure their song was right and contained all the elements to make for success, they approached Station WJZ, the Radio Corporation plant here, and made arrangements to sing not only their new number, "Hot Roasted Peanuts," but also some of their other successes, "Grand Daddy" and "Underneath the Mulberry Tree." They put all they had into their renditions because they were gambling with the cost of publishng 2,000 copies of the song.

WJZ's phones began to ring immediately with requests for the boys to repeat "Hot Roasted Peanuts," so they gave an encore. The following night they appeared at WHN and put over the same numbers with even greater success, two encores being necessary.

Radio Alone Sells Out Song

Within a week, without any other publicity or advertising than that given "Hot Roasted Peanuts" by Radio, the 2,000 copies were sold and the printers were running off 10,000 more. Already 35,000 copies have been sold and peanuts are vieing with bananas for popularity. The song has been made on both records and piano rolls and is selling fast.

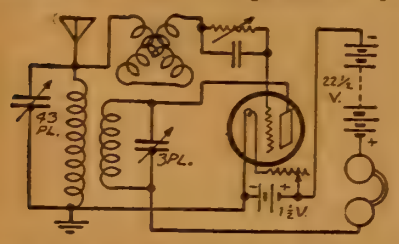
Breau and Tobias have been broadcasting since 1921 and Radio is now well repaying them for their frequent efforts to entertain and amuse the listening in public. However, the Society of Authors, Composers and Music Publishers have not yet admitted defeat, or that they are convinced by this time that Radio can be their greatest aid and that their attitude toward broadcasting has been all wrong.

RECEIVING RECORDS? SEND 'EM IN—

(The following items are based on letters from Radiophans, who have been doing good distance work. Readers submitting letters for publication must diagram their sets.—DX Record Editor.)

Coast to Coast on One Tube

Coast to coast on one tube is the record established by "E. S. S.," 117 West Alexandrine, Detroit, Mich. His results are attributed by him to the efficient hook-up he used in making his set. As is shown herewith, the set uses a variocoupler for a tuning unit, the primary tuning the antenna circuit, and the secondary serving as a tuned tickler coil feedback. Additional control over the regeneration is provided in the grid circuit by a variometer. The use of a variable grid leak helps to bring in the distant stations clearly.



WWJ and WCX of Detroit can be tuned out and WGY heard while the former are on the air, the builder of the set declares. He adds that his aerial is 100 feet long and 35 feet high with a 10-foot lead-in. A gas pipe serves as a ground. The WD-12 tube, used in the set, is lighted with a dry cell and controlled by a 30-ohm rheostat.

Fans Hear Church Wedding

FORT WORTH, TEX.—Radiophans who tuned in to WBAP at high noon recently were treated to a surprise program in the form of a Radio wedding, the contracting parties being Miss Mary Rose Foster, sister of Will Foster, popular microphone artist and organist of the church in which the wedding took place, and C. G. Hutchings of Winston-Salem, N. C. The ceremony took place in the First Methodist Church and the microphones in the auditorium picked up every word of the ceremony. The ritual as voiced by the minister, with the replies by the bride and groom were distinctly audible.

A four-year course in Radio has been established at the Massachusetts Institute of Technology.

AN EVENING AT HOME WITH THE LISTENER IN

Station and City	Met	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
CFCA Toronto, Ont.	400	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	7:00- 8:00	5:45- 6:45
CFCN, Calgary Alta.	440	10:00-11:00				11:30- 1:30	11:00- 1:00	
CKAC, Montreal, Que.	430		6:00- 8:00		6:00- 8:00			
KDKA, E Pittsburgh, Pa.	326	4:00- 8:00	4:00- 8:00	4:00- 8:00	4:00- 8:00	4:00- 8:00	4:00- 8:00	6:30- 7:30
KDZE, Seattle, Wash.	455	9:00-10:00		10:00-11:00		9:00-10:00		
KFAF, Denver Colo.	360	9:00-10:00	9:00-10:00		8:30- 9:00	9:00-10:00		
KFI, Los Angeles, Calif.	469	8:45- 1:00	8:45- 1:00	8:45- 2:00	8:45- 1:00	8:45- 2:00	8:45- 2:00	10:00- 1:00
KGW, Portland, Ore.	492	9:00- 2:00	12:00- 1:00	10:00-11:00	12:00- 1:00	9:00- 2:00	12:00- 1:00	9:00-10:00
KHJ, Los Angeles, Calif.	395	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	8:45-12:00	10:00-12:00
KPO, San Francisco, Calif.	423	10:00-12:00	10:00-12:00		10:00-12:00		10:00- 2:00	10:00-12:00
KSD, St. Louis, Mo.	546	8:00-10:00	8:00-10:00	8:00-10:00		8:00-10:00	8:00-10:00	
KYW, Chicago, Ill.	536		7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	7:00- 9:00	
NAA, Radio, Va.	435	5:45- 7:20	6:05- 7:20	6:25- 8:40	5:45- 7:40	7:00- 7:40		
PWX, Havana, Cuba	400			8:00-10:30			8:00-10:30	
WBAP, Fort Worth, Texas	476	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	9:30-10:30	7:00- 7:30	6:30- 8:00
WBAV, Columbus, O.	390	7:00- 9:00						
WBZ, Springfield, Mass.	337	5:00- 8:00	5:30- 7:00	4:00- 7:00	5:30- 7:00	4:00- 7:00	5:00- 7:00	7:30- 8:30
WCAP, Washington, D. C.	469		5:30- 6:30		8:45-11:00		5:30-11:00	5:20- 8:00
WCBD, Zion, Ill.	345	8:00-10:00				8:00-10:00		5:30- 6:30
WCX, Detroit, Mich.	517	7:30- 9:00	7:30-11:00	7:30- 9:00	7:30- 9:00	7:30- 9:00		6:15- 7:15
WDAF, Kansas City, Mo.	411	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	4:00- 5:00
WDAJ, College Park, Ga.	258	7:30-11:30	7:30-11:30	10:30-11:30	7:30-11:30	7:30-11:30	7:30- 1:30	7:30-11:30
WDAP, Chicago, Ill.	360		6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	6:00- 1:00	8:00-11:00
WDAR, Philadelphia, Pa.	395	6:30- 9:55	6:30- 9:55	6:30-10:00	6:30- 7:00	6:30-12:00	6:30- 7:00	
WDT, New York, N. Y.	405			6:30- 7:30		10:00-11:00		
WEAF, New York, N. Y.	492		6:30- 9:00	6:30- 9:00	6:30- 9:00	6:30- 9:00		6:30- 9:00
WFAA, Dallas, Tex.	476	8:30- 9:30	8:30-12:00		8:30- 9:30	6:30- 9:30	8:30-12:00	9:30-11:00
WFI, Philadelphia, Pa.	395	5:30- 6:30	5:30- 8:00	5:30- 6:30	5:30- 8:00	5:30- 6:30	5:30- 6:30	6:30- 7:00
WGI, Medford, Mass.	360		6:00- 7:30	6:30- 8:00	6:00- 7:30	6:30- 8:00	6:30- 8:00	7:30- 9:00
WGR, Buffalo, N. Y.	319	5:30- 9:00	5:30- 7:45	5:30- 9:00	5:30- 7:45	5:30- 9:00	5:30- 7:45	
WGY, Schenectady, N. Y.	380	6:45- 9:00	6:45- 9:00		6:45- 9:00	6:45-10:30		5:30- 6:30
WHA, Madison, Wis.	360	7:30- 8:30		7:30- 8:30		7:30- 8:30		
WHAS, Louisville, Ky.	400		7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	7:30- 9:00	
WHAZ, Troy, N. Y.	380	8:00- 9:30						
WHB, Kansas City, Mo.	411		8:00-10:00		8:00-10:00			8:00-10:00
WHK, Cleveland, O.	360	5:00- 5:30	5:00- 5:30	7:00- 8:55	5:00- 5:30	5:00- 5:30	5:00- 5:30	7:00- 8:55
WHN, Brooklyn, N. Y.	360	6:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00	8:30-11:00	6:30-11:00	8:30-11:00
WIP, Philadelphia, Pa.	509	5:00- 6:30	5:00-11:00	5:00- 6:30	5:00-10:00	5:00- 6:30	5:00-11:00	
WJAX, Cleveland, O.	390		6:30- 8:30		7:00- 9:30			
WJAZ, Chicago, Ill.	448		10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	10:00- 2:00	6:00- 9:00
WJY, New York, N. Y.	405		6:30-10:30		6:30-10:30	6:30-10:00		5:00- 5:30
WJZ, New York, N. Y.	455	6:30-10:00	6:30-10:00	6:00-10:00	6:30-10:30	6:30-10:30	6:30-10:30	7:30- 9:30
WKAQ, San Juan, P. R.	360		7:00- 8:30	6:00- 7:00		7:00- 8:30		
WLAG, Minneapolis, Minn.	417	7:30-10:00	7:30-10:00	7:30- 1:00	7:30-10:00	7:30-10:00	7:30- 1:00	7:45- 8:45
WLW, Cincinnati, O.	309	8:00-10:00	10:00-12:00	8:00-10:00	10:00-12:00			
WMAQ, Chicago, Ill.	448		7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	7:00-10:00	
WMC, Memphis, Tenn.	500	8:30- 9:30	8:30-12:00		5:30- 9:30	5:30-12:00	8:30- 9:30	
WNAC, Boston, Mass.	278		7:00- 9:00	8:00-10:00	7:00- 9:00	7:00- 9:00	8:00-10:00	5:30- 7:30
WOAI, San Antonio, Texas	385		9:30-10:30		7:30- 8:30		9:30-10:30	5:00- 6:00
WOAW, Omaha, Neb.	526	9:00-10:00	9:00-10:00		9:00-10:00	9:00-10:00	9:00-10:00	9:00-10:00
WOC, Davenport, Ia.	484	8:00- 9:00		10:00-11:00	9:00- 9:00	8:00- 9:00	9:00-10:00	7:00-10:00
WOO, Philadelphia, Pa.	509	6:45-10:00				6:45-10:00		
WOR, Newark, N. J.	405	5:15-10:00	5:15- 6:30	5:15-10:00	5:15- 6:30	5:15- 6:30	5:15-10:00	
WOS, Jefferson City, Mo.	441	8:00- 9:30		8:00- 9:30		8:00- 9:30		
WSAI, Cincinnati, O.	309		7:00- 9:00		7:00- 9:00		9:00-11:00	
WSB, Atlanta, Ga.	429	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	8:00-12:00	7:30- 9:15
WSY, Birmingham, Ala.	360	5:00- 8:45		8:00- 8:45		8:00- 8:45		8:00- 9:00
WWJ, Detroit, Mich.	517	7:30- 9:00	7:30- 9:00	7:30- 9:00	6:00- 7:30	7:30-11:00		3:00- 4:00

Instructions for Use.—All the hours above are given in Central Standard Time. If your city uses Eastern Time, add one hour to each of the periods stated; if your city uses Mountain Time, subtract one hour; if your city uses Pacific Time, subtract two hours.

FIRPO-LAND HEARS FIGHT BY AIRPHONE

GETS BLOW-BY-BLOW STORY IN 15 SECONDS

Argentine Boxing Fans, 6,000 Miles from Ring, Get Detailed Account from Broadcaster

NEW YORK.—The 85,000 spectators at the ringside who saw Dempsey knock Firpo to the canvas for ten counts, constituted an infinitesimal part of the audience that enjoyed one of the liveliest clashes in a twenty-foot ring. Far from the scene of the battle, to be specific, more than 6,000 miles from the ringside in New York, some of the most eager fight fans listened tensely to a blow-by-blow description of the supreme fistic engagement of the year.

And this invisible audience was Firpo's own, those who had inspired him to enter the ring against Dempsey, confident that their giant brother would trot back to the Pampas with the world's heavyweight championship title. Disappointed as they are, nevertheless theirs is the satisfaction of knowing that the challenger fought bravely although defeated, and this fact was made known to them by Radio over their receiving sets through the intermediary of the most powerful station in the world, Radio Central, located at Rocky Point, Long Island.

Chart Shows Scheme Used

The manner in which the transmission of this information was carried out during the many stages of its progress over telephone wires, telegraph circuits, and the many transformations of voice and telegraph signals, is represented schematically in the chart shown. Only fifteen seconds was consumed in the entire relaying operation.

In this chart, Dempsey and Firpo clash in the ring shown at A. While the battle rages, J. A. White, the announcer stationed at the ringside at B, describes the blows exchanged. Each movement within the ring is translated into a word picture by White which is transmitted over the line through the microphone at B.

This land line connects with the Radio Corporation Station WJZ, located several miles from the scene of the engagement within the Polo Grounds. From the antenna of Station WJZ, shown at C, Radio waves are hurled outward at the speed of light to be picked up by thousands of receiving sets scattered throughout the United States.

Turns Words into Code

A few miles from WJZ, the antenna shown at D receives a minute portion of the energy from C which is received by the broadcast receiving apparatus E. After sufficient amplification at this point the blow-by-blow description of the bout is projected into the transmitting room of Radio Central's office by means of the loudspeaker F. An operator intercepts White's word messages and transcribes the words received into dot-dash language which is recorded upon a tape by means of the perforating machine G. The tape is then instantly fed into an automatic high speed transmitting machine connected directly in the control line extending to the giant Radio telegraph transmitting station at Rocky Point, Long Island.

This line, represented at I, links New York City with the three-mile multiple-tuned antenna and two Alexanderson alternators which deliver 700 amperes to the antenna K. Thus White's voice messages are converted into telegraph characters, and the waves radiating from K on 17,500 meters are an amplified telegraphic repetition of the short wave length Radiophone broadcast from the antenna C at WJZ.

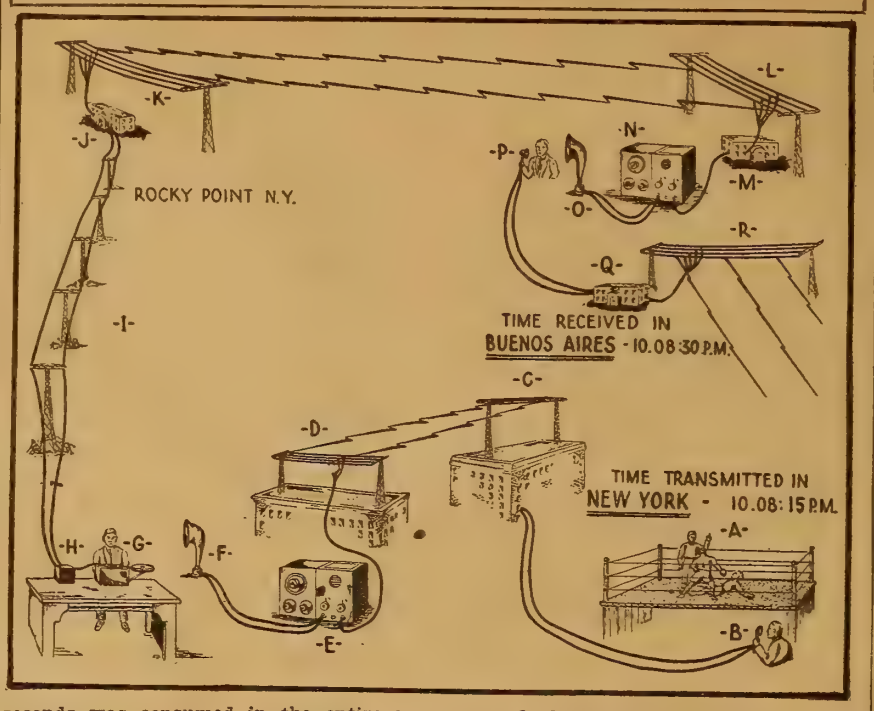
Translated Again at Buenos Aires

At Buenos Aires, 6,000 miles away, the powerful wave energy flung from the antenna R registers at the receiving set N through the Monte Grande antenna represented at L. Over great expanses of water and long stretches of land, the news of the big bout journeys to the native land of Firpo.

But the circuit is not yet complete. The telegraph signals issuing from the loud speaker at O must be converted back from that staccato language into the very words originally delivered to the microphone at the ringside. This is carried out by a telegraph operator-announcer. He is stationed in the studio of the Radio Corporation broadcasting station in Buenos Aires shown at O, where he translates dots and dashes into a word description. The antenna at R flashes his announcements to eager South American listeners sitting beside their short wave receiving sets.

But the wonder of it all is that from the moment the referee reached his tenth count while Firpo lay upon the canvas after a blow delivered by his opponent, only fifteen seconds were consumed in transferring the news from New York City to the countries in South America.

HOW BUENOS AIRES HEARD FIGHT



Moffett Follows ZR-1 Test Flight by Radio

Giant Zeppelin's Transmitting Set Works Perfectly

WASHINGTON.—The chief purpose of the American-built ZR-1 as an aerial naval scout was demonstrated during the recent test flights. Practically every move of the giant Zeppelin was sent to Admiral Moffett by Radio. This great helium airship is to be used for scouting and reporting to her base what she sees, a naval expert explained recently, adding that her Radio installation worked perfectly for both short and long distances.

On the day of the initial flight over her home at Lakehurst, Commander McCrary sent the first Radio message to Admiral Moffett, chief of naval aeronautics, who was on the ground far below the great airship. The message was picked up in the field station and delivered to the admiral within a few moments. On the recent trip to New York and return, Admiral Moffett, then at his desk in the navy building in Washington, was advised periodically by Radio of her progress.

"It is of special interest," Secretary Denby said in an interview, "that the Navy Department was in constant communication with the ZR-1 by Radio." Her position was accurately reported at frequent intervals and full information was given of operating conditions aboard.

In this connection, it is of further interest to realize what this will mean when she journeys farther afield on exploration work. Admiral Moffett has reiterated the program planned after her trials are completed, including a flight to the North Pole, if practical. This it is now hoped can be undertaken by next spring.

JUGO-SLAVIA BUILDING LARGE RADIO STATION

Will Be First High Power Plant in Balkans

BELGRADE, JUGO-SLAVIA. — Work has been started on a new 100-kilowatt station at Rakovica about 2½ miles from here and on a receiving station at Laudon Trench, a suburb. The station is being built by the French Wireless Telegraph Company and the total expense is estimated at $400,000. On its completion the entire installation will be taken over by the state and the operating personnel will become employees of the Department of Fosts and Telegraphs, the company maintaining one engineer as a technical adviser.

This particular station will be the first high power Radio installation in the Balkans. Because of the greatly increased facilities it will afford for the dissemination of news and the rapid dispatch of information, it should soon become well known internationally.

An amateur operator's license costs $10 a year in Australia.

Positive Radio Helps

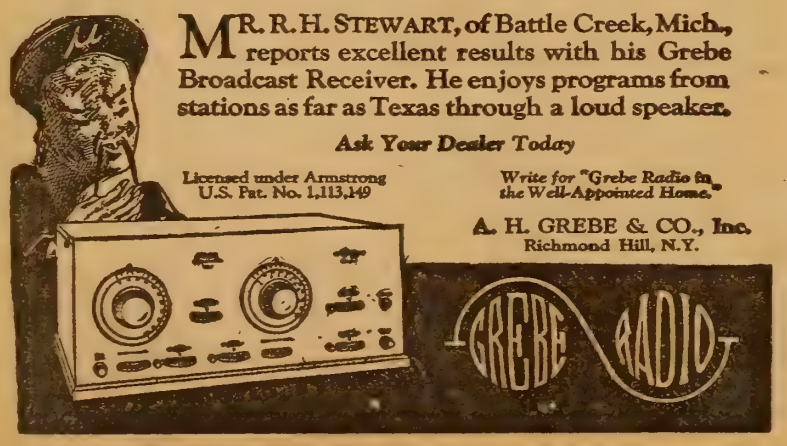
For Storage Battery Tubes Use *Eveready Storage "A" Batteries.*

For Dry Cell Tubes Use *Eveready Dry Cell Radio "A" Batteries.*

For all Vacuum Tubes Use *Eveready "B" Batteries.*

EVEREADY Radio Batteries *—they last longer*

The New Grebe Broadcast Receiver



MR. R. H. STEWART, of Battle Creek, Mich., reports excellent results with his Grebe Broadcast Receiver. He enjoys programs from stations as far as Texas through a loud speaker.

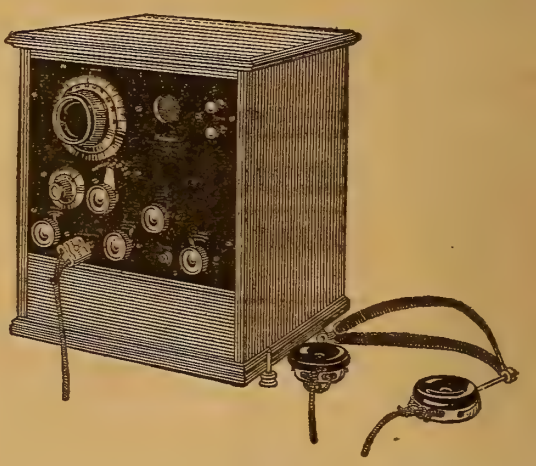
Ask Your Dealer Today

Licensed under Armstrong U.S. Pat. No. 1,113,149

Write for "Grebe Radio in the Well-Appointed Home."

A. H. GREBE & CO., Inc.
Richmond Hill, N.Y.

Tune Out Interference and Bring in DX Stations



HERE is a new DX dry cell receiving set that will bring in local stations clear and strong and tune out interference when you want to receive DX.

Tampa, Florida, is easily tuned in at New York City, in spite of powerful local stations.

This set, using Radio and Audio Frequency, equipped with Federal standard headphones, is reasonably priced at $87.00, without tubes or batteries—a value made possible only by the tremendous volume of Federal production.

130 Federal Standard Radio parts offer the radio enthusiast a complete line of guaranteed parts of one quality—the best.

Federal Radio Equipment

Federal Telephone and Telegraph Company

Factory: Buffalo, New York

Boston · New York · Philadelphia · Chicago · San Francisco · Pittsburgh · Bridgeburg, Canada · London, England

A YOUNG ARMY OF WGY ANNOUNCERS

Announcers at WGY broadcasting station of the General Electric Company at Schnectady. From right to left they are as follows, the initials they use when announcing being in parenthesis: Carl Jester (C. J.), Mrs. William J. Cramb (Mrs.. W. J. C.), Kolin Hager (K. H.) in charge of WGY studio and chief announcer, Robert Weidaw (R. W.), Asa O. Coggeshall (A. O. C.), Edward H. Smith (E. H. S.), director WGY Players

FLEWELLING ANSWERS TO QUERIES

By E. T. Flewelling

(Editor's Note.—This department is written by Mr. Flewelling, the inventor of the famous super circuit. From the questions sent him each week care of Radio Digest, he picks the one considered most informative for all and answers it in this column.)

Purpose of Special Plate Lead

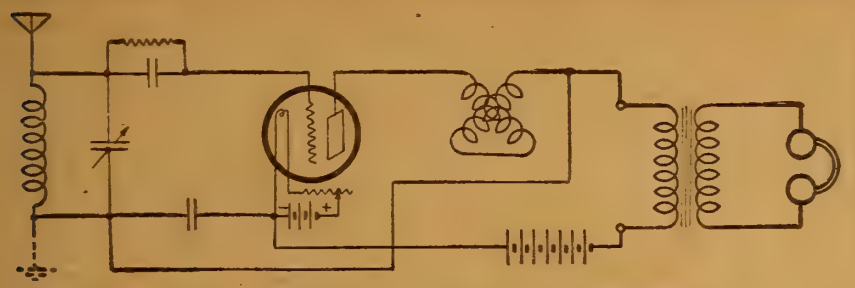
(Submitted by R. W. C., Fort Worth, Tex.)

Question. Is there any method by which I can reduce the terrific capacity effects present in the Flewelling circuit?

Answer. Body capacity effects with the Flewelling super seem to be quite a "bugbear" to a great many of the fans, and I often wonder if they take the same precautions to prevent body capacity effects with the Flewelling set that they do with the average Radio set, such as shielding the panel, properly connecting the plates of the tuning condenser, etc. The Flewelling set properly constructed has no more body capacity effect than any other circuit; in fact, it can be so constructed simply by the use of up-to-date instruments that it has even less. A method that will greatly reduce the capacity effects without any other change in the circuit is to connect an audio frequency transformer in place of the phones and then connect the phones to the other side of the audio frequency transformer. Sometimes it is best to connect the phones to the secondary of the transformer, and at other times it is best to reverse the usual condition and connect the secondary of the transformer to the super circuit and the phones to the primary circuit.

The diagram herewith has been published several times but is repeated here for the benefit of those who have not seen it.

I myself prefer to handle body capacity effects by the use of apparatus so designed that such effects are automatically wiped out, without the use of any panel shielding or transformer. If your coils are so mounted that your hand will readily come in close touch with them, then you will get body capacity effects regardless of the type of set you use; therefore, these coils should preferably be mounted back from the panel out of the way.



It is very much worth while to go to some little trouble in order to secure the elimination of capacity effects because no real long distance work or sharp tuning can be done while these effects are present, and this, too, applies to any type of set.

Boasts Best Harbor Radio

SEATTLE, WASH.—The harbor department of the city of Seattle has recently installed apparatus which makes its Radio outfit one of the most complete in the harbor service anywhere in the United States. The new equipment consists of two two-kilowatt navy standard spark sets with aerials 750 feet long, suspended on masts 165 feet above the level of Puget Sound. The range is about 4,500 miles.

News of Harding's Demise Heard at Bottom of Canyon

SALT LAKE CITY, UTAH.—The wonders of Radio were never better illustrated than in a letter just received from tourists at the Utah State Capitol. The party, according to the writer, was camped on the Lower Grand Canyon of the Colorado where they set up their receiving set during president Harding's illness, and were advised the same night of his death long before newspapers penetrated to their camp. They learned of the President's death, in fact, forty-five minutes after it occurred. When the funeral cortège left San Francisco, they were also advised by Radio.

THE 1923 RADIO SENSATION

Never before in the history of Radio has a set of the quality and performance of the Michigan Midget been offered at anything like the price.

No longer is it necessary to buy parts and build your own set and save money. Michigan "Midget" has done that for you. It puts a long range, high-grade radio receiving set within the reach of everybody's pocketbook.

It is extremely selective—easy to adjust—tunes sharply, receiving all broadcasting wave lengths up to 600 meters. Works equally as well with dry cell tubes as with standard six volt tubes. Its light weight (weighs only 6 pounds) makes it ideal for touring, camping, etc.

The cabinet is mahogany finish, made in Grand Rapids, the world's greatest furniture center.

PRICE $27.00

Also ask about the Michigan "Midget" Two Stage Amplifier $30.00 *and our exclusive line of Condensers, Variocouplers, Variometers, Rheostats, etc. When you send for circular, give us the name of your favorite radio dealer.*

MICHIGAN RADIO CORPORATION

GRAND RAPIDS, MICHIGAN

FIRST SALES STUDIO OPENS IN CHICAGO

DEMONSTRATION IN STORE INCREASES CUSTOMERS

Shop Owner Disproves Theory That Steel Structures Interfere with Clarity of Reception

CHICAGO.—What was said to be the first studio in the United States for the public demonstration of standard Radio receiving sets was opened here recently in the downtown district by the Electric Service products company of Chicago, of which P. C. Moore is president.

Unlike other Radio studios it is operated primarily to stimulate interest on the part of the consumer in the ready-made set. A survey under the direction of Mr. Moore had shown, he said, that only five to eight percent of the sets sold in Chicago last year were the product of manufacturers; the others were assembled by buyers of devices.

"Since the opening of the studio our sales have been doubled," said Mr. Moore.

Studio on Balcony

On a balcony in the rear of the sales room a number of popular receiving sets are displayed. For the comfort of audiences there are divans and easy chairs. The other appointments are in keeping with the purpose of the studio.

"From eight o'clock in the morning until 9:30 o'clock at night we keep 'open house,'" Mr. Moore said. "When the programs of the various broadcasting stations are put on the air we tune in, using loud speakers. In a few minutes the studio is crowded by persons attracted from the street. Almost every one is a Radiophan. Twenty-five of every 100 thus drawn are potential buyers of receiving sets."

Steel Buildings Do Not Interfere

Perhaps the most important phase of the Radio studio in relation to the technique of operation is its dissipation of the theory that tall buildings of steel construction elevated train structures and other placements of metal necessarily offer interference to selection or reception. "By exercising care and patience we have overcome the usual obstacles to clear reception," Mr. Moore declared. "We received distinctly the returns of the recent Dempsey-Firpo bout. Stations in Jefferson City, Troy, N. Y., Detroit, Davenport, Ia., Omaha and Minneapolis are heard by our studio audiences almost every night."

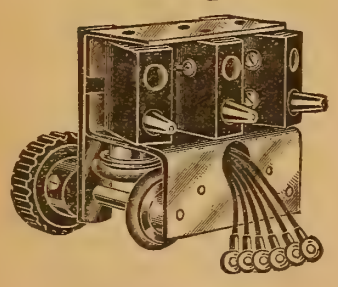
The aerial which serves the studio is stretched the length of the sales room to the glass front where it emerges at the top and is strung to the top of the building and is attached to a water tank. A four-foot spreader is used to swing the aerial away from the building. The length of the aerial is about 100 feet.

Mormon Messages to Reach Ends of World, Smoot Says

SALT LAKE CITY, UTAH.—"The time is not far distant when leading men of this church will be able to stand in this pulpit and by means of Radio have their message carried to the ends of the earth," declared U. S. Senator Reed Smoot in an address in the Mormon Tabernacle here on Sunday afternoon. It was the greatest tribute to the possibilities ever paid here by a man of national prominence. When at home Senator Smoot is an apostle of the Mormon or Latter-day Saint Church.

The Radio filter problem of separating the signals of one station from those of other stations is being studied by a University of Wisconsin professor.

Another Columbia Scoop



A Geared Coil Mounting for Inside Panel Mounting, made of moulded Bakelite and mirror nickeled brass—for those who prefer their bulky coils on the inside of the cabinet hidden from view.

Ask your dealer for it.
All good dealers stock it.

Price $6.00

COLUMBIA RADIO CORP.
157 NO. UNION ST. CHICAGO

DAVID GRIMES PAID BIG PRICE FOR IDEA

David Grimes, twenty-six years old, blond and rather shy, is the inventor of the Inverse Duplex set for which he has been paid a record price. The exact amount is not yet disclosed. The idea was conceived by Grimes in 1917 when a lieutenant in the United States Air Service

Bandit Hunters Are Misled by Tangled Air Message

CHICAGO.—Radio failed as a thief catcher recently when several bandits, driving a gray touring car, held up the Purple Grackle, a roadhouse east of Elgin, owned by Attorney Charles E. Erbstein. The alarm was broadcast by Mr. Erbstein's Radio station, WTAS, was caught at Hinsdale, and relayed in such manner as to give police authorities an impression a Hinsdale bank had been robbed. So they watched the roads from Hinsdale instead of from Elgin.

WALNART INDUCTANCE SWITCH

Why drill ten holes in your panel—not only a difficult thing to do, but if you ever make a change in your hook-up, your panel is marred—when by drilling only one hole you can use a Walnart Inductance Switch.

Positive contact; attractive Bakelite knob and pointer make a much more attractive panel, and simpler adjustment. And the price is no more than switch points with pointer lever would cost.

Ask your dealer for Walnart Inductance Switch; if he cannot supply, write us. Catalog of Walnart radio accessories and parts on request.

WALNART ELECTRIC MFG. CO.
Dept. 403, 1251 W. Van Buren St.,
CHICAGO, ILL.

Review of Books

An Introduction to Radio. A real book for the amateur. This treatise comes in two volumes. 96 pages in each volume, fully illustrated with flexible leather covers. Price two volumes, $1.

How to Retail Radio. A new book telling of tested plans and methods and policies for the dealer in Radio. Financing, location, store equipment and arrangement. Price, $2.00.

Vacuum Tube Receivers. By O. F. Heslar. A book that tells how to make a simple set. How to make the cabinet. It includes a 27 by 36-inch layout blueprint. Price, 75 cents.

The Armstrong Super-Regenerative Circuit. By George J. Eltz, Jr., E. E. This is a De Luxe edition of this famous circuit. Profusely illustrated and fully explained. Fifty-two pages. Price, $1.00.

Home Radio—How to Make It. By A. Hyatt Verrill. This book is particularly adapted for the amateur who desires to know how to make Radiophones. Twelve full page illustrations and diagrams. Price, 75 cents.

Elements of Radiotelegraphy. By Elery W. Stone. The text was written for the guidance and instruction of Radio students in the communication service of the Navy. It is an instruction book for Radio schools. Price, $2.50.

Radio Reception. By Harry J. Marx, Technical Editor Radio Digest Illustrated, and Adrian Van Muffling. A simple treatise on Radio reception. Beginning with the elementary principles of electricity it carries the reader on into the essentials of Radio telephony. The most successful methods of Radio reception are explained and special reference given to practical tuning. Price, $2.00.

The book department of the Radio Digest is prepared to send you any of the books on Radio published, whether listed in our Book Review or not. Let us know what book you want, send us your check and we will see that the book is mailed to you. Postage stamps in payment for books not accepted. Send money order or check. Radio Book Department, Radio Digest, 123 W. Madison St., Chicago, Ill.

B-T VERNIER TUNER

ADOPTED—RECOMMENDED

By 40 Largest Jobbers

Within the last thirty days forty leading radio jobbers with credit ratings of $100,000 or more, seventeen of them with ratings of $1,000,000, have rushed the Bremer-Tully Vernier Tuner into their catalogs at the last moment.

They recommend and catalog only the best radio equipment.

Here's why they catalog B-T Vernier Tuners:

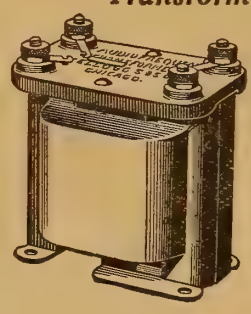
1. It's the best Reinartz Tuner available.
2. It gives better control and maximum results on any single circuit regenerative, any of the ultra-audions or practically any of the reflex circuits, including Hazletine.
3. It's easy to change—ideal for "try-outs." Liberal discounts to jobbers and their dealers. Price $5.00 Postpaid. (But ask your dealer first.)

Send for one today. Hook it up and you'll understand.

BREMER-TULLY MFG. CO.
532 South Canal Street, CHICAGO, ILL.

Kellogg Radio Equipment For Better Results

Transformers



Kellogg transformers are designed to overcome defects of existing types and to furnish distortionless amplification of all audio frequencies. Built complete by the Kellogg Company, using highest grade wire, maroon enameled metal case, and molded Bakelite top. The primary and secondary binding posts are accessibly placed on top of the transformer.

These binding posts are plainly marked, so that there need be no error in assembling. Every Kellogg transformer is thoroughly tested before leaving the plant, and we guarantee the purchaser a product of exceptional efficiency.

No. 501 Ratio 4½ to 1.....$4.50
No. 502 Ratio 3 to 1..... 4.50

KELLOGG SWITCHBOARD & SUPPLY COMPANY
1066 West Adams Street, Chicago, Illinois

The Reader's View

Purpose of the Variocoupler

Just a few lines to let you know that I have read your latest Radio Digest and am writing this letter as a flare-back to that of C. S. Wymore, Nebraska, under variocoupler winding.

I wish to say for his benefit and others like him who read and misinterpret articles that they want to be sure they are right before they "holler."

In 1921, I was one of many interested but "dumb" Radiophans. Then I took Radio Digest.

At present, after 1 year and 6 months, by following the advice of the editor and his staff I can build and have built most all the circuits published in Radio Digest.

Perhaps Mr. Wymore does not really know the purpose of the variocoupler. He would not mention the Flewelling and 3 circuit in the same breath if he did.—Joseph G. Gormley, Philadelphia.

Experience with Nacireman

E. P. Parker's article on the Nacireman hook-up in Radio Digest, August 11, was read with interest. I will give you my experience with the hook-up, using a variocoupler with 48 turns on the stator, tapped every 8 turns, 52 turns on the rotor, a Cunningham 301-A tube with 67½ volts on the plate, aerial 100 feet total with lead-in. (I live 30 miles east of St. Louis.)

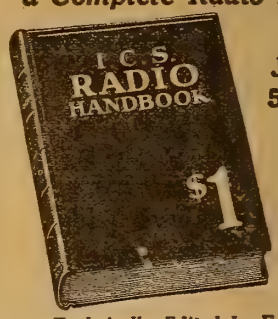
The first station tuned in was WGY, 820 miles away; it came in as strong as the smaller St. Louis station. Next came WPAD, WHAS, WLAG, WSB, WWAY, WSAI, WWJ, WMC, WDAP, WFAA, WOAW, WBAP, WJAZ and WDAF; all were heard in one evening.

The secondary variable condenser plays a very important part in DX work. However, local stations may be tuned in without it.— Otto Steffens, Trenton, Ill.

Radiophone installation and use are taught by correspondence by the University of Wisconsin Extension division.

Every Question ANSWERED for only $1

At last you have under one cover a Complete Radio Handbook



JUST OUT
562 PAGES

Compiled by
HARRY F. DART, B.S.E.E.

Formerly with the Western Electric Co., and U. S. Army Instructor of Radio.

Technically Edited by F. H. DOANE

NO more need you turn from book to book, hoping to find what you want. It is all here, in 562 pages crammed full of every possible radio detail. Written in plain language, by engineers for laymen. Clears up the mysteries, tells you what you want to know. A complete index puts everything within your reach in a few seconds.

IT EXPLAINS: Electrical terms and circuits, antennas, batteries, generators and motors, electron (vacuum) tubes, every receiving hook-up, radio and audio frequency amplification, broadcast and commercial transmitters and receivers, super-regeneration, codes, license rules. Many other features.

Under one cover. Yes, it is all in one volume of 562 pages of clear type with hundreds of diagrams and illustrations. Takes the place of eleven or more specialized texts, each costing from two to ten times the dollar you pay for this single book. Belongs in every radio-equipped home, on every amateur's table.

Send $1 to-day and get this 562-page I. C. S. Radio Handbook—the biggest value in radio to-day. Money back if not satisfied.

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Box 8277 B, Scranton, Penna.

I enclose One Dollar. Please send me—postpaid—the 562-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name.....

Address.....

MAPS NEW LEADER IN HOTEL STATIONS

CLEVELAND FIRM SEEKS "SOMETHING UNUSUAL"

Hollenden Hostelry to Make Definite Steps toward Establishing Set Soon

CLEVELAND.—Convinced that Radio is not only an educator of the widest scope but conducive to commercial welfare, Herman Mack, head of the company which recently assumed control of the Hollenden hotel of this city, head of the concern which operates the Lexington hotel in Chicago, said here recently that plans were under consideration for the establishment of a broadcasting station in the Hollenden. Decisive steps are expected soon.

"We have discussed the necessity of such a station," Mr. Mack said, "in relation to the operation of a first class hotel. We have seen that many if not most of the finest hostelries in the United States are thus equipped."

Must Be Different

But the ordinary transmitting set, rather the usual program, will not conform with Mr. Mack's purpose. "The Hollenden plant," he declared, "when it is established, will lead all other hotel sets. And the Hollenden programs must be new and unusual else we will not operate. We are determined to make our broadcasting so interesting that people all over the country will remain awake until late at night to hear the Hollenden."

The Hollenden is one of the best hotels in Cleveland. It is among the widest known in the central west.

Cuban Amateurs Recognized by President of the Island

HAVANA, CUBA.—A presidential decree now allots amateurs here a wave length of twenty meters and a power of one-half kilowatt. This decree will continue in effect, pending passage of a law to cover the use of Radio.

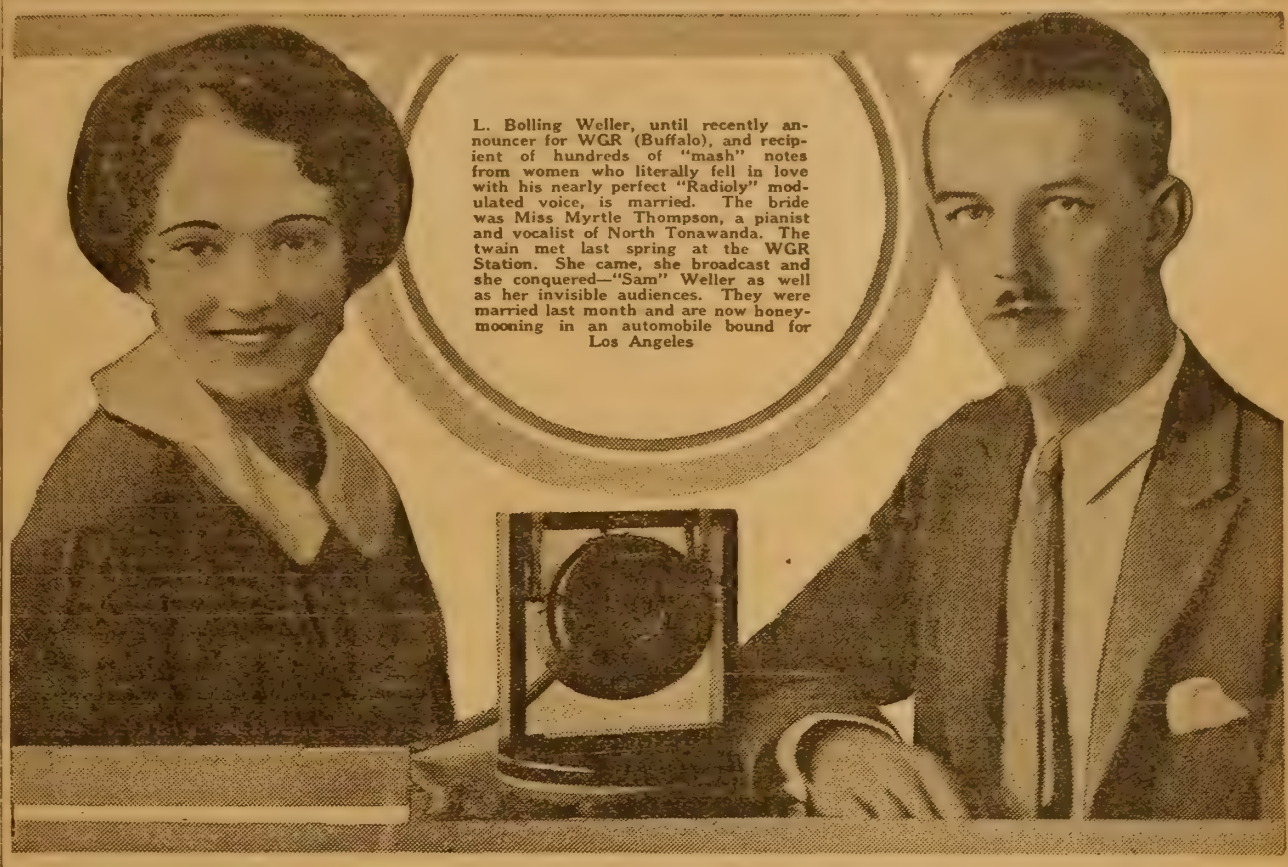
If this gives the expected impetus to amateur Radio, it should not be long before Cuban operators will communicate regularly with amateurs in this country.

The first Cuban amateur station heard in this country is 6XJ at Tuinucu, operated by Frank H. Jones, member of the America Radio Relay League.

Jewish New Year Observers Hear Broadcast in Hebrew

BOSTON, MASS.—The first Hebrew musical service to be sent by Radio from Boston was broadcast by Station WNAC recently. It consisted of solos by Cantor I. G. Glickstein and choir of Temple Mishkan Tefila of Roxbury, Mass. There was also a short address by Rabbi H. Rubinovitz of the Temple. This service was in keeping with the Jewish New Year being observed at the time, and was for the benefit of the many Radiophans of Jewish faith who listen in on WNAC.

MRS., THE CAUSE AND MR. L. BOLLING WELLER



L. Bolling Weller, until recently announcer for WGR (Buffalo), and recipient of hundreds of "mash" notes from women who literally fell in love with his nearly perfect "Radioly" modulated voice, is married. The bride was Miss Myrtle Thompson, a pianist and vocalist of North Tonawanda. The twain met last spring at the WGR Station. She came, she broadcast and she conquered—"Sam" Weller as well as her invisible audiences. They were married last month and are now honeymooning in an automobile bound for Los Angeles

MAYOR ADVOCATES MUNICIPAL PLANT

Police Now Uses Private Station and Park Bands Have No Radio Outlet

PHILADELPHIA.—That activities of a municipal Radio broadcasting station for this city need not be confined to the broadcasting of police reports, was pointed out by Mayor J. Hempton Moore when he referred to the concerts given by the Philadelphia Municipal Band, Philadelphia Plaza Band, Fairmount Park Band and the Fairmount Park Symphony Orchestra, made possible by appropriations from the city.

Mayor Moore stated that "a municipally owned and operated broadcasting station would appear to be a future requirement of every large city."

"The Radio of the future," he said, "will unquestionably enter into the official municipal activity, and will no doubt in a relatively short time take its place among all progressive discoveries and inventions in its service to the citizen."

There are many indications, from present discussions, that this city will soon have a municipal broadcasting station, as the city hall is now equipped with receiving stations, and many of the officials are vitally interested in Radio. Police reports at this time are broadcast from Station WOO, and reports of missing persons are broadcast from practically all the 500-watt stations in this city.

There are approximately 25,000 receiving sets in Argentina, as compared with 100 a year ago.

Ask your Dealer about "HEGEHOG"

(Trade Mark)

AUDIO TRANSFORMER $3.50

This little wonder is the surprise and talk of Radio Engineers everywhere. Fix in your mind's eye an AUDIO Transformer about the size of an English walnut and you have the "HEGEHOG" for size. Then recall the best Radio amplification you ever heard, and you have the "HEGEHOG" for volume and tone quality. Our new patented design and construction (100% shielded) makes this possible. It's a real bit of engineering, and we would like to have YOU try one.

Ratios 1 to 3, 1 to 4 and 1 to 5.....$3.50
1 to 10..... 4.50

Premier Electric Company
3810 Ravenswood Avenue, CHICAGO, ILL.

The Condenser Sensation of Modern Radio

FRESHMAN
NOISELESS
TESTED MICA
CONDENSER
MFG. BY
CHAS. FRESHMAN CO. Inc.
NEW YORK CITY

Through the accuracy and dependability of Freshman Condensers, hook-ups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

These little Storers of energy and rectifiers of Radio Current are the very heart of a well-built radio set.

The proper fixed condenser will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	$ .35	.002	$ .40
.00015	.35	.0025	.50
.00025	.35	.003	.60
.0002	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.008	1.00
.0006	.40	.01	1.00
.0008	.40	.015	1.50
.001	.40	.02	2.00
.0015	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

At your dealers, otherwise send purchase price and you will be supplied without further charge.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue New York

THE
TRADE MARK
AUDIOPHONE
REG. U. S. PAT. OFFICE

Quality of reproduction such as only the original itself can equal. Speech that is so distinct that the voice heard is the actual voice of the speaker. Music that requires no tolerant imagination to be recognized as music of the finest type.

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Further Details of the Famous Miloplex Hook-Up

Part II—Introducing King Miloplex II

By the Mystery Man

WE INTRODUCED you to the Miloplex last week. How many have tried out this simple, economical, and efficient circuit? If you've built it, don't quit reading the series. There are several tricks to be told. However, the improvements will not mean junking the old apparatus. All the old and a few new parts will be used.

BEFORE I start smoothing up a few of the sore eardrums the Miloplex passed you on its initial bow, let me put you "hep" to a secret.

When an editor wants to fire his crack office boy he mails him a blue envelope, when he needs a new star reporter, well when he needs one—I don't know the dope—but I do know that I recently purchased a new "Now I lay me down to sleep." One of those dollar down, balance as you sleep; and I figure I don't owe a cent on it, certainly I don't sleep. Clever fellow (the editor) bought me a cover charge lunch and said, "Why all you will have to do is just give us a rough sketch of your circuit with a short synopsis and we'll do the rest. Sounds easy, eh! He'll do the rest. Do you know what he meant; well, listen, he really truly meant that he would see that I was busier than a one arm man with the prickly heat. I'm sore, my wife is sore, and his office boy confidentially told me his grandma was going to stop carrying letters to me for a day, and rest up. Still, while it's true that I built the "Plexy" in 30 minutes, yet it took nine long experimental months to get ready, so why kick about writing 40 or 50,000 words about it. Here goes—yet let me first truly thank the many who have said so many nice things about the "Plex." Naturally one cannot answer all in person, nor the specific questions asked. Yet as the articles continue, I am hoping the final one will have produced for you a three tube receiver that you will prize, as I shall then have been well repaid for your patience.

The most asked or inferred question is "Where is the trick?" "Will it amplify?" "Can I build it so and so?"

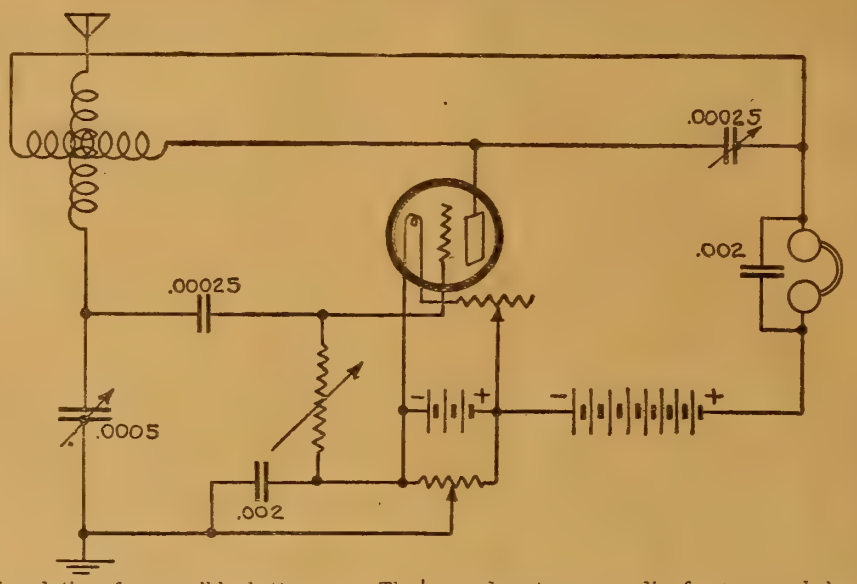
As to "where is the trick," the answer is "There hain't none." As a bundle of parts it's nothing; properly built it works and works wonderfully well. You know it's a good deal like the small boy's father who wasn't worth a cent, but in Colorado he was worth $10,000—dead or alive.

The inside story of it is really two stories, one based upon the fact that, after all is said and done, there is nothing more to any finished receiving set than a combination of capacity and inductance as the dominating factors.

He who can best make these two factors each subservient to the whims of the other profits most. I didn't think I could say the above and make it mean much, but friend wife marked it 93 percent.

Further . . . now close your eyes and think. The manufacturers of tubes tell you they possess capacity, also mutual inductance; all right, but is it not also true that it has within itself more than one capacity. The cross sectional area capacity between filament and grid surely is less than that of filament and plate. Look at the plate area and answer "YES." But just a minute, we're getting technical; let's back up and get out of this traffic jam by leaving you to think what would happen if one could reconcile these varied capacities.

In other words, the Miloplex as you have seen it must be the beginning—the



foundation for possible betterness. The first step for marked efficiency, naturally falls to the tuning unit, and while no elaboration was made upon "dead end" losses from tapped coils, yet we touched a couple of its high spots just to prove to you that we did not care to dissipate any voltage secured or have a section of our primary crying just at the time the wedding bells were ringing . . . but more on this later.

One very sincere experimentor in Snaky, Ariz., (sure that's the snake capital) wrote me he had the secret; that all I had was an untuned primary, while the rotor with the condenser across it was nothing more than a wave trap, and I'm not so cocksure but that he is right. Think it over in the morning between coffee and "donots." Then another fellow writes "the impedance of your phones in the plate, not being bypassed, act as a radio frequency choke, thus establishing a varying frequency or super-effect." Not so good. Another chap (and he knows his C.W.) tells me I don't need the potentiometer; all right, Bill, but they won't let me return it, so let's leave it there, it may come in handy.

What do you know about head telephones? So do I, but most manufacturers tell me that the positive tip should go to positive B, and generally this tip cord has a re-marking; try this, do this, you'll get better results.

One more word about tubes. Strange how many fellows slap 22 volts on a detector and kiss it goodbye, yet every tube I have talked with, very frankly told me it worked best on from 14 to 22. If you haven't done so, make it your next big job to try out different voltage taps on the B with the tube in the "Plex"; it's a big help and gives the set a chance. Whether you can do this will be answered later; also it is quite possible that we will add a stage or two just for fun. Yes, we may even go so far as to show the little fellow with a wire or two changed. Anyway it is strictly up to you fellows; tell the editor you want more and what you want. As I said in the beginning, "He'll do the rest—and I the work. (Let's make him work!—Ed.)

(TO BE CONTINUED.)

Plans are on foot to form a British Radio Relay League. In the formation of such a club the approval of the Post-office Department is necessary, and as this has been secured, British amateurs are sincerely hoping for the league's success.

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Simple Explanation of Radio for Everybody

Chapter II—Electrical and Radio Terms

By M. W. Thompson

THE following article is the first of a series for Radio beginners, written by Marvin W. Thompson, well known in airphone circles for his understandable style of approaching his subject, and his ability as a Radio engineer. Mr. Thompson is now an associate editor on the staff of Radio Digest. A preliminary outline of the Chapters to follow is:

Chapter III—Rectification and Receiver Essentials.
Chapter IV—Inductances—Fixed and Variable.
Chapter V — Condensers — Fixed and Variable.
Chapter VI—Vacuum Tubes.
Chapter VII—Antennas and Grounds.
Chapter VIII—Regeneration.
Chapter IX—Audio Frequency Amplification.
Chapter X—Loud Speakers.

IN THE first chapter we discussed Radio transmission as it affects the atmosphere and that great conducting medium, the ether. Now we can consider Radio when it is in the form of electrical currents in the wires and apparatus of transmitting and receiving equipment. Since Radio is a branch of electrical engineering and is merely the utilization of electricity in smaller quantities and with slightly different characteristics than electricity as used for power and light, it is but natural that Radio science should use electrical terms and similar symbols in the drawing of diagrams.

Electrical and Radio Engineering

From electrical engineering, Radio has borrowed four terms with which every fan and experimenter should be more or less familiar—volts, amperes, ohms and watts. To force any liquid or substance through an opening or tube, pressure is required and since "electrical pressure" is necessary to force current through wires we must have some unit of measurement of this pressure. This unit is termed a volt. Pressure must drive something—in this case, current—through something else, and to measure the quantity of current involved, we need another unit, the ampere. The pressure, or voltage, is necessary because the wires or other conducting mediums offer opposition to the passage of current, and as we must have some

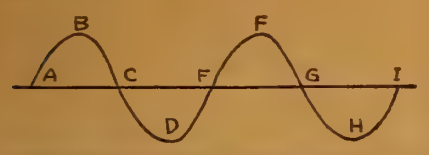

Figure 3—Here we have a diagrammatic representation of two cycles of alternating current

means of measuring and expressing this opposition or resistance we use the term ohm.

Ohm's Law

These three factors always have a definite relation to one another which is expressed by Ohm's law. To write this formula we designate the voltage by the letter E, the current by I and the resistance in ohms by R. Then we say that

$$I = \frac{E}{R}.$$

To determine the amount of current that will flow in a circuit we must divide the voltage available by the resistance of the units in the circuit. If, on the other hand, we know the current flowing in a circuit and the voltage but wish to know the resistance, we consider the law in this form:

$$R = \frac{E}{I}.$$

Dividing the pressure in volts by the current as expressed in amperes we learn the resistance in ohms. The third variation of this formula is, of course, when it is used to determine the voltage, and the resistance and current are known—E = I xR.

A UV-199 Radiotron should have 3 volts' pressure at the pins leading to the filament; it is rated at .06 ampere; we would like to know the resistance of its filament. Using the second form of Ohm's law, we divide 3 by .06, and the result is 50. The resistance of the filament of a UV-199 Radiotron is 50 ohms.

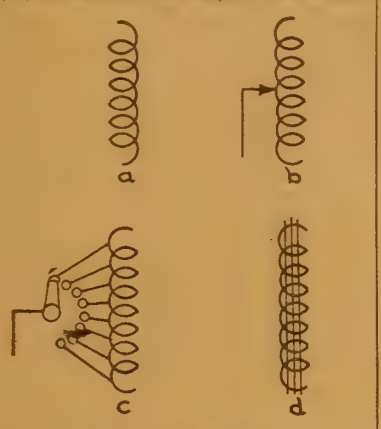

Figure 4—Four types of inductance as used in Radio receiving circuits

The term watt is used to designate the unit of electrical power provided by one ampere of current with a pressure of one volt behind it, and the power in a circuit is always determined by multiplying volts by amperes. The filament of the UV-199 Radiotron, drawing .06 ampere with 3 volts' pressure, may be said to require .18 watt.

D. C., A. C. and Frequency

Let us now consider the three terms—direct current, alternating current and frequency. The term direct current designates the flow of current in a circuit when the pressure is always in one direction and the current flows into the circuit at one end and out of it at the other. Such a current is supplied by a dry cell, a storage battery, and frequently in power and electric light lines.

Alternating current differs in that the pressure alternates in direction and the current flows, momentarily, from the end we will call A to the end B, and then reverses and flows from B to A. Such a current cannot be obtained from a battery but is supplied in many power lines. Radio transmitters change direct current into alternating current to produce Radio waves in the ether.

We speak of the number of times the current changes its direction of flow per second as the frequency (see Figure 3). Here, we represent one second of time by the distance A to E and of another second by the distance E to I. At point A, the current begins to flow in one direction, reaches its greatest strength in one quarter of a second (point B), then begins to weaken until at the one-half second point (C) there is no current flowing. Then it begins to flow in the opposite direction until at point D it is as strong as when at B, then it weakens until the one second point (E) is reached and it is ready to flow again in the original direction. The current is said to have completed one cycle and the frequency is 1. This would be one-cycle alternating current. If, however, we take the distance A to I as one second and the current flows twice in each direction in that time, and completes two cycles we have two-cycle current. In power lines, the frequency is usually 60 cycles.

In Radio transmission, we use alternations or frequencies of from 15,000 to 4,000,000, and frequencies within this range, usually termed band, are spoken of as Radio frequencies to distinguish them from others. So, when you see Radio frequency (R. F.) transformers advertised, it means that these units are designed to handle small currents whose frequencies are within these limits.

Audio Frequency

There is one use of the term frequency in Radio, which does not meet the above definition, although perfectly correct. Before being put into the head telephone receivers, Radio signals are changed from their alternating current form into direct current which, while it flows in one direction only, does so in pulsations and not steadily as does electricity from a battery. We then use the term frequency to give the number of the pulsations per second. Since these produce sounds in the head phones that are audible, we speak of this current as audio frequency current and the transformers which handle it as audio frequency transformers. Audio frequencies are those within the band 8 to 12,000, which are those commonly used in music, although the human ear can hear sounds consisting of as many as 30,000 vibrations per second.

Inductance and Capacity

We now come to the terms inductance and capacity. A straight piece of wire is said to have a certain amount of inductance, which is a property essential in a circuit to the reception of Radio signals. This property is greatly increased by winding the wire into a coil, either of several layers or of a single layer on a tube.

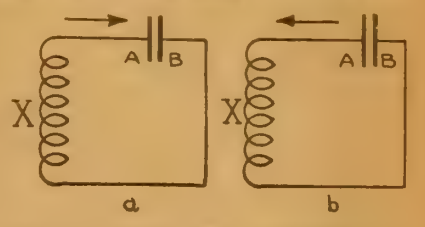

Figure 5—A diagrammatic representation of oscillating circuit which explains condenser action

It is not necessary for the average experimenter to fully understand inductance; the knowledge that it is the property of a coil of wire and is measured in henries and millihenries being sufficient. Another method of increasing the inductance of a piece of wire is to insert an iron core after winding the wire into a coil.

In Figure 4 are shown four ways of designating inductance in a diagram: 4a is an inductance which does not contain an iron core, but is of the "air-core" type; it is not variable and all of the turns of wire are always in use; 4b shows another

(Continued on page 20)

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POPULAR STARS ON THIS WEEK'S PR

The Week's Headliners on the Air

MANY unusual programs are offered this week. Amrad Women's club meeting Tuesday afternoon at WGI is worth while. WJZ broadcasts "Broadway." "Three Live Ghosts," given by the WGY Players promises to be hair raising (not hair restoring), and KSD mysteriously features the carnival, parade and ball of the Veiled Prophet. All this to happen on Tuesday evening.

"Big Smoke" meets the Camp Fire Girls at WGI, Wednesday evening. Llewellyn Jones reviews the latest books at KYW. While Congressman Holton W. Summers is fronting the microphone at WFAA, KSD will broadcast the presentation of trophies to the winners of International Air Races.

Thursday is Spanish night at WLW. KYW announces the return of Rev. C. J. Pernin in his Twenty Minutes of Good Reading, and the broadcasting of the Edison Symphony Orchestra. Two amusing farces will be presented by the Amrad Players of WGI.

"Broken Wing" will be broadcast direct from the theater by KSD Friday evening. WHAS is producing a Columbus Day Pageant.

Football season opens in earnest at KDKA Saturday afternoon and the 103d birthday of Jenny Lind, and Irish Night at WJZ distinguish Saturday night. Chicago presents Mayor Dever at WMAQ.

Sunday evening the Daughters of the American Revolution, Saratoga Springs, N. Y., will present a program at WGY. How about Monday? Easy—let's "go" to the Barnum and Bailey Circus Monday night via WBAP.

Above, Bob Cougle, and right, Fred Agard, of the team of Agard and Cougle, a remarkable pair, heard every Tuesday night at WDAP, the Drake Hotel—Board of Trade, Chicago

George Albert Bouchard (cir- in center), organist, who can be heard every day on the Wurlitzer at WGR, Federal Telephone and Telegraph Company, Buffalo

Rose Cohn (left leading lady WGY Players, nectady, who sent, "Three Ghosts," Thu night, October Cohn takes the Rose Gordon in tertaining co Frank Oliver character man WGY Players, fun to the ske Jimmie Gubbins. in for thi

Tuesday, October 2

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor Records, S. Hamilton Company; Piano and player rolls, C. C. Mellor Company; 6:15, Dinner concert, Orchestra at the Pittsburgh Athletic Club; 7:45, "Mother Nature's Wonders," by "Lady from the Deep Woods"; 8:45, Concert, Carlson Brothers' Saxophone Quartet; Laura Statska, soprano; Mrs. M. E. Good, pianist.

KGW, Portland, Ore. (Pacific, 492), 10:00 p. m., Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert features; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, De Luxe program, courtesy of G. Allison Phelps, of the Suburban Estates Company, assisted by the Powers Film Studio; William F. Alder, lecturer.

KSD, St. Louis, Mo. (Central, 546), 7:00 p. m., Music, Street carnival and parade of Veiled Prophet; 9:30, Music, Veiled Prophet Ball.

KYW, Chicago, Ill. (Central, 536), 1:35 p. m., Studio program; 4:00, News of the day; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Herbie Mintz, pianist; A. W. "Sen" Kaney, specialty act; Alice Cronin, pianist; 8:28, Program, American Farm Bureau Federation.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Fort Worth artists; 9:30-10:45, Broadway Baptist Church.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Twilight Tales for the Kiddies; 8:00, Concert, Harriet Ely, pianist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, Frederick W. Agard, tenor; Bob Cougle, pianist; Jack Chapman and his dance orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert and song recital, Arcadia Cafe Concert Orchestra; 4:30-5:55, Piano recital, Edna Finestone; 7:30-7:45, Dream Daddy with boys and girls; 7:45-8:00, Dramatic Review, Walter Greenough.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., "Our Sister, Ain't That Hot," "Mama Going to Cut You Down," Rubey Cowan, soloist; Songs, Bernie Grossman; "Pretty Buddy," "Wonder," Brooks and Ross; "I Want to Call You Mine," Helen C. Willsing; Songs, Mrs. Earl Fully; Piano solos, Willy White.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:30 p. m., Address, DeWitt McMurray, editor Semi-Weekly Farm News; 8:30-9:30, Dramatic program, Council of Jewish Juniors; 11:00-12:00, Harris Brothers' Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories, Cousin Sue; 8:00, Boy Scouts Radio Corps; 8:30, Dance music; 9:15, Song recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick & Chickering-Ampico; 3:00, Amrad Women's Club, "Hospitality Talk," Ida Bailey Allen; Selections on the Chickering-Ampico & Brunswick; "Public Health Talks"; 5:00, "Twilight Tales," Eunice L. Randall; 7:00, Evening program to be announced.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00 Digest of the day's news; Topics of scientific interest.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and reading, "The Posy Ring," Mrs. John Day; 7:45, Musical Program; Soprano Solos, with violin obligato; "By the Waters of Minnetonka," "For You Alone," "Birthday," "The Moon Behind the Cottonwood," "Life." "Whisper and I Shall Hear," Grace H. Held, soprano; Regina L. Held, violinist; Mr. Herbert Robinson, accompanist; "Concerto Romantique." "Adoration," "Romance," Regina L. Held, violinist; "La Fileuse," "Autumn," Mrs. Herbert Robinson, pianist; Reading, "Jim's Brothers," "The Forests," Guinivere Rifenburg.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Mary Anderson Theater Orchestra; Ollie Jones, conductor; "Just Among Home Folks," daily column running in the Courier-Journal; Strand Theater Orchestra; Harry S. Currie, conductor; 7:30-9:00, Concert, Ray Pfaff and his orchestra; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Artist recital; 6:00, Dinner music, Dick Regan and his WIP Little Symphony Orchestra; 7:00, Bedtime stories and roll call, Uncle WIP; 8:00, Short talk; 8:15, Concert; 9:00, Song recital.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Program, Cleveland News-Leader; Bedtime story, E. G. Johnson; Concert, Cleveland Grotto Band.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "The Road," "Mother of Mine," "In the Dark and the Dew," James Funk, baritone; Cello solos, Geryl Allen; "Love and Music, These I Live For," "The Young Beauty," Jennie M. Navigato, soprano; "The Gondoliers," "Serenade," Amanda Clausius Burhop, pianist; "Mandalay," "Invictus," "The Last Hour," James Funk; "My Heart at Thy Sweet Voice," "Violets," Jennie Navigato; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Wanamaker Auditorium Concert; 4:05, Concert, Music Students' League; 5:00, "The Home Beautiful," Dorothy Ethel Walsh; 5:15, Recital, Bertha Butler, soprano; 6:05, Bedtime story, MacMillan Company; 7:35, The Belgenland Orchestra, courtesy of the Red Star Line; 7:45, A University of the Air talk, A. Withington Taylor; 8:00, "Broadcasting Broadway," review of current plays and players; 8:15, Concert, Belgenland Orchestra; 8:50, "Etiquette," Doubleday Page talk; 9:00, Musical program; 10:00, Dance program, Hotel Astor Roof Orchestra.

WLW, Cincinnati, Ohio (Eastern, 309), 10:00 p. m., Selections, Circle Orchestra; "The Lord Is My Light," Josephine Smith, soloist; Marian Heintz, accompanist; Piano solo, Claire Harkness; "Life and Happiness," May C. Stoiber; "A Cute Little Love Nest," "The Sunshine of Virginia," Harry Burkhart, baritone; "There Is a Garden," Josephine Smith, soloist; "She's Got That, Too," "Sun Kist Rose," "Fo-tu San," "The Electric Girl," "I'm Drifting Back to Dreamland," I'm Steerin' for Erin," Circle Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Gunn School of Music; 8:00, Program, University of Chicago; 9:00, Dance Music, Blue Fountain Room, Hotel La Salle, E. E. Sheetz, Jr., and his "Californians"; 9:15, Weekly program, Lyon & Healy.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational Program, A. G. Hinrichs; Music; 5:45, Chimes concert.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wannamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 9:45 a. m., "Ironing Day," program, Fred Shaw, pianist; Margery Richmond, pianist; 12:00 m., The Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Vocal selections, pupils of Madame Homo Dubard's.

Wednesday, October 3

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor Records, S. Hamilton Company; Piano and player rolls, C. C. Motor Company; 6:15, Dinner concert, KDKA Little symphony Orchestra; 7:30, Literary program, Marjory Stewart; 7:45, "Fables for the Little Folks," Dreamtime Lady; 8:45, March and procession from "The Queen of Sheba," "Serenade," "Dragon Fly," "Butterfly," "Swan," "Bee," "Berceuse, Excerpts from "Lucia de Lammermoor," "Down South," "Sari," KDKA Little Symphony Orchestra; "She Has Flown," "My Pretty Turtle Dove," "Margaret at the Spinning Wheel," "Prayer from Freishutz," "Still as the Night," "Songs My Mother Taught Me," Marie Keller Kennedy, soprano; Mrs. Arthur Brandt, accompanist.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Musical program for children, Laura Van Houton, child pianist; Franconia stories, Aunt Nell; 8:00, Concert, Rybka String orchestra; 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert, 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, Program, Woman's Club and Oak Glen Lodge of Yucaipa; Old Time Dance.

KSD, St. Louis, Mo. (Central, 546), 6:30 p. m., Music and speeches, presentation of trophies to winners of International Air Races; 9:30, Vocal and instrumental specialties, orchestra and organ music, Grand Central Theater.

KYW, Chicago, Ill. (Central, 536), 1:00 p. m., "Talks Chicago Association of Commerce luncheon at the Hotel La Salle; 4:00, News of the day; 5:50, Children's bedtime story; 7:00-7:58, Musical program, Sherwood School of Music; Harry Geise, pianist; Mary Lee, soprano; 8:05, Book Reviews, Llewellyn Jones.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Mrs. Pearl Calhoun Davis; 9:30-10:45, Texas Hotel Orchesta.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., "Serenade," "Wiener Blut," "Entr' Acte Gavotte," "Angel's Serenade," "Men of Sparta," "Blue Bells," Dinner concert by the WBZ Trio; 7:00, "The Background of Radio," Edward H. Goodrich; 7:30, Twilight Tales for the Kiddies; 8:00, Concert, Mrs. Lilla W. Ladd, contralto; Mrs. La Zazzera, accompanist; WBZ Trio; 9:00, Bedtime story for grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, John Stamford, tenor; Joan Young, soprano; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital from Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert and piano solos, Arcadia Cafe Concert Orchestra; Edna Finestone; 4:30-5:55, Short talks and song recital; 7:30-8:00, Dream Daddy with boys and girls; 8:00, Talk on Philadelphia's Industries; song recital; Features from Stanley Theater; Dance music, Howard Lanin and his Arcadia Cafe Dance Orchestra.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., "Not Here, Not There," "Who's Sorry Now," Tommy Mallie, soloist; Frank Bessenger, soloist; "It's Not the First Time You Left Me," "Waiting for the Evening Mail," Harry Hock, "My Sweetie Went Away," "Where the Sacramento River Flows," Sam Levy; "Hawaiian Nightingale," "Susan," Tommy Mallie; "Indiana Moon," "Beale Street Mamma," Frank Bessenger.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "How to Study Political Problems," Congressman Hatton W. Sumners.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Orchestra; 3:00, Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 5:00, "Twilight Tales," Eunice L. Randall; 6:45, "Camp Fire Girls," by "Big Smoke"; 7:30, "Science Up to Date," "This Week's Judge," Program of vocal and instrumental numbers.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, City Mission, Direction of E. C. Clark.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Strand Theater Orchestra; Harry S. Currie, conductor; "Just Among Home Folks"; Selections, Rialto Theater Organ; 7:30-9:00, Concert Jane Webster Murrel Studio; Strand Theater Orchestra; Harry S. Currie, conductor; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Program of popular songs, Remick Trio; 6:02, Dinner dance music, Jordan-Lewis Dance Orchestra; Bob Lewis, director; 7:00-7:30, Bedtime stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Exaltation," "She Rested by the Broken Brook," Louise Le Moine, soprano; Clarinet solos, E. E. Harder; "Teach Me to Pray," "An Old Fashioned Town," Sylvester Muldowney, baritone; "Baby," "At Dawning," Louise Le Moine; "Waltz in C Sharp Minor," "March of the Dwarfs," Dean Remick, pianist; "Inclusion," "Evening," "Thou Art Me," Sylvester Muldowney; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Italian modern recital, Edouard Dino Anghinelli, Italian pianist; 4:05, Tea music, Hotel Commodore Orchestra; 6:05, "The Adventures of Peter," Florence S. Vincent; 7:35, Joint recital, F. Gehlert, tenor, O. A. Karcher, baritone; 7:45, "The Progress of the World," Review of Reviews talk; 8:00, F. Gehlert, tenor; O. A. Karcher, baritone; 8:15, "What Engineering Is and What It Is Not," E. J. Mehren; 8:30, Musical score, "Little Jessie James," Nan Halpern and the James' Boys Orchestra.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Crosley Forum; Piano solos, William Schmitt; 8:00, Program, Cincinnati College of Music; Elmer Aichele Novelty Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Cosmopolitan School of Music; 7:00, Children's stories, Georgene Faulkner, the Story Lady; 7:30, First of a series of speakers from Northwestern University; 8:00, Chicago Women's Club, Congress of Women; 9:00, Dance music, Blue Fountain room, Hotel La Salle; 9:15, Musical program, Mr. and Mrs. W. A. Fricke; Marion Roberts; Stella Roberts.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, Clyde G. Kern; Music; 6:30, Sandman's visit; 8:00, Pipe organ recital, Erwin Swindell; May Chambers, soprano; 10:00, Artist Musical Program, Erwin Swindell, director; Concert, Franklin Grove Band.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program by the WTAM Orchestra and solo numbers.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier; Vocal selections, pupils of George Carr's.

Thursday, October 4

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor records, S. Hamilton Co.; Piano and player rolls, C. C. Mellor Co.; 6:15 Dinner concert, Grand Symphony Orchestra; 7:45, Uncle Remus, himself, children's period; 8:05, Farm program, Frank E. Mullen; 8:45, Esther C. McGuire, dramatic reader; English Coster Songs, "In the Garden by the Sea," "I Love the Sea," "Lend Me Your Aid," Evan Lloyd, baritone.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Woman's program, child training; 8:45, Dramatic program, "Within the Law," Mrs. Herbert Garr Reed; 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert program; 2:30-3:30 p. m., matinee musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, Program, Clifford Lott, basso; Rev. Thomas Lutman, lecturer.

KYW, Chicago, Ill. (Central, 536), 1:35 p. m., Studio program; 4:00, News of the day; 5:50, Children's bedtime story; 7:00-7:58, Herbie Mintz, pianist; A. W. "Sen" Kaney, specialty act; "The Diplomat," "The Swinging Lanterns," Edison Symphony Orchestra; "Columbia," A. N. Brabrook, cornetist; "Finlandia," "Caravan," "To a Mummy," "Katebet," "Waltz from Serenade," Edison Symphony Orchestra; "Kashmiri Song," "Sweet Little Woman o' Mine," John Stamford, tenor; "The Red Mill," Edison Symphony Orchestra; 8:05, Twenty Minutes of Good Reading, Rev. C. J. Pernin.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Fort Worth artists; 9:30-10:45, The Euterpean Club.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Twilight Tales for the Kiddies; "How Plots Are Built," Dr. J. Berg Esenwein; 8:00, Concert, James Morton, tenor; Grayce Bradley O'Connell, soprano; Eleanor McCormick, pianist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, Program, Lyceum Arts Conservatory; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Program of popular selections, Arcadia Cafe Concert Orchestra; 4:30-5:55, Song recital and piano solos; 7:30-8:00, Dream Daddy with boys and girls.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Piano solos, Jack Stanley; Solos, Fred Whitehouse; 7:00, Stage and Screen, Charles R. Jones; Vaughn De Leath Orchestra; Violin solos, Elise de Grode; Madame Lundow.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "Books and Their Use," Dr. J. H. McGinnis; 8:30-9:30, Emmett B. Peck, violinist.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano solos, Loretta Kerk; Song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories; Cousin Sue; 8:00, Song recital; 8:30, Dance music, Jack Le Roy and his Manhattan Melody Men from Cathay Tea Gardens.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 5:00, "Twilight Tales," Eunice L. Randall; 7:00, "Bits of Wisdom," Geo. Brinton Beal; Musical program, two pianos, Miss Drew and Mr. Emery; "Nonsense School," farce, Amrad Players; "His Wife's Father-in-Law," play by Amrad Players.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news, Boy Scout Radiograms, "The American Boy," Employment Bulletin; 8:45, Address, Twelfth Annual Congress, American Safety Council.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, "The Object and Meaning of Federation," Mrs. E. P. Pressey; 7:45, Instrumental selection, "Medley of Popular British War Songs," WGY Instrumental Quartet; Radio drama, "Three Live Ghosts," cast, Mrs. Gubbins, as "Old Sweetheart," Helen Campbell; Peggy Woofer, Lola Sommers; Bolton, the American detective, Harold Sundae; Jimmie Gubbins, Frank Oliver; William Foster, alias Wm. Jones, Edward H. Smith; Spoofy, Edward St. Louis; Rose Gordon, Rose Cohn; Birggs, of Scotland Yard, Jerome Loveheim; Benson, John Loftus; Lad Leicester, Margaret V. Smith; Act I, the home of "Old Sweetheart," in London, time 1917; Act II, same as act I, the following morning; Act III, same as II, a few minutes later.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., "Just Among Home Folks"; Selections, Strand Theater Orchestra; Harry S. Currie, conductor; 7:30-9:00, Concert, auspices of The Kentucky Committee on Public Utility Information.

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Song recital; 6:02, Dinner music; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, "Where to Go and How to Get There," Eugene E. Hogle, secretary of the Automobile Club of Philadelphia; 8:15, Dance music, Ace Brigode and His Ten Virginians from Hotel

GRAMS WILL DELIGHT LISTENERS IN

John M. Kuhn (right), heard last week on the Indian program of the Chicago Daily News, WMAQ. Mr. Kuhn is a member of Isham Jones Orchestra, which is broadcast five nights of every week by KYW

Edna Finestone (above), the charming piano soloist who will be heard Tuesday, Wednesday, Friday and Saturday before the microphone of WDAR, Philadelphia. Miss Finestone entertains there regularly

Walton Roof; 9:00, Organ recital, Karl Bonawitz, from Germantown Theater.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program: Madrigal Male Quartette; Roy A. Lewis, pianist; Gyp Gins, violinist; John L. Mainwaring, first tenor; Val Saurwein, second tenor; Roberts, baritone; Lowell W. Dilts, bass.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Song of the Volga Boatman," "Vision Fugative," Mary Withaius Sparrow, soprano; "To You," "When You and I Were Young, Maggie," Bert Graham, tuba player; "A Voice in the Wilderness," "My Hope Is in the Everlasting," Mary W. Sparrow; Violin solos, Glen Halik; "Love Is the Wind," "Will of the Wisp," Mary W. Sparrow; "Just a Wearying for You," "I Love You Truly," Bert Graham; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Auditorium Concert; 4:05, Recital, pupils of Harold Land; 5:00, Concert, Norma Gradstein; 6:05, "Jack Rabbit Stories," David Cory; 7:35, World's Work; 7:45, Popular songs, Jimmy Moore, tenor; 8:00, "The Waddington Cipher," a radio detective serial story; William Johnston; 8:15, Organ recital, J. Thurston Noe.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Classical piano selections, Adelaide Apfel; 10:00, Spanish night: Spanish dance, Cincinnati Conservatory of Music Ensemble; A group of Spanish songs, Leah Fred, soloist; Thomie Williams, pianist; "Spanish Dance," Sam Morganstern, pianist; The toreador song from "Carmen," Everett Marshall, baritone; "A Sunny Morning," one-act play, Crosley Radarians, Dona Laura, Helen Schuster Martin; Petra, Emma Helen Haswell; Don Gonzalo, Verne Fitzpatrick; Juanito, Maynard Babbs; Descriptionist, Julia Lee Applegate; Spanish dance, Ensemble; 11:15, Popular entertainment, Eastern Hills Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program to be announced; 7:00, Weekly talk, Rockwell R. Stephens; Weekly talk to Boy Scouts; 8:00, Chicago Association of Commerce; 9:00, Dance music, Hotel La Salle; 9:15, Program, Chicago Musical College.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, Karl G. Stephan; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Musical program, P. S. C. Orchestra; V. B. Rochte, baritone.

WOO, Philadelphia, Pa. (Eastern, Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier; Antonio, tenor; Albertine Schmidtke, soprano; Mildred L. Williams, contralto.

Friday, October 5

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor records, S. Hamilton Co.; Piano and player rolls, C. C. Mellor Co.; 6:15, Organ recital, Howard R. Webb; 7:45, "Come Sing With Me," Jane Peckham Alexander, conductor; 8:05, Boy Scouts program; Richard Victor, scout master; 8:45, "Fiddle and I," "My Mother Bids Me Bind My Hair," "Pirate Dreams," Happy Days," "Deep in a Rose's Glowing Heart," "Il Baccio," "Angel's Serenade," Mrs. F. L. France, soprano; Mrs. Pauline Denny, pianist; Tenor solos, Elmer Ablett; Violin solos, Leo Kruczek.

KGW, Portland, Oregon (Pacific, 492), 3:30 p. m., Woman's program; 8:00, Vocal solos; 8:15, Studio program of dance music, George Olsen; 9:00, "Oregon Resources," lecture by University of Oregon extension division; 10:30, Hoot Owls with Pantages frolic.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Music; 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, Program, Choir of the Memorial Baptist Church.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., "The Broken Wing," direct from Empress Theater.

KYW, Chicago, Ill. (Central, 536), 4:00 p. m., News of the day; 5:50, Children's bedtime story; 9:00-10:30, Musical program, Herbie Mintz, pianist; Harry Geise, pianist; Mary Lee, soprano; A. W. Kaney, specialty act.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Texas Christian University; 9:30-10:45, Knights of Pythias Girls' Orchestra.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Selection, "Aida," "Valse Poudree," March, "Elegie and Consolation," "Scarf Dance," "Marionette," Andante from "La Source," "Zallah," "Flower Song," "Spirit of America," WBZ Trio; 7:30, Twilight tales for the kiddies; Current book review, R. A. McDonald; 8:00, Concert, Demetrius Zades, tenor; Mrs. Francis Regal, accompanist; WBZ Trio; 9:00, Bedtime story for grownups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, George R. Hill, Jr., baritone; Rosemary Hughes, soprano; Jack Chapman's orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert and song recital, Arcadia Cafe Concert Orchestra; 4:30-5:55, Short talk and dance music; 7:30-8:00, Dream Daddy with boys and girls; 8:00, Book review, Doris Hyde; Piano solos; Edna Finestone; Radio drama by Walter Greenough's players; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra; Special for the "Morning Glory Club."

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Talk on astrology, Dr. Arthur Brooks; Songs, Dorothy Adrian; Anne Greenleaf; "In a Tent," "Where the Sacramento River Flows," "Maggie," Vaughan De Leath's Orchestra; Songs, Ross Fowler; Selections, Orchestra; Saxophone selections, Mr. Kensler; Songs, Ross Fowler; Selections, Vaughn De Leath's Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Abraham, a Blessing to the Whole World," Dr. Robert Stewart Hyer; 8:30-9:30, Mrs. Albert Smith, soloist.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Recital, John Owens, tenor; John Vandersloot, bass; Caroline Hoffman, pianist; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories, Cousin Sue.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 3:00, Amrad Women's Club, "Talks," Mrs. D. H. Goodwin; Selections on Chickering-Ampico and Brunswick; "Public Health Talks"; 7:30, Musical, Rupert Edward Blatchford, vocal instructor; Harry Norton, organist, Washington Theater, Boston; "Girl of My Heart," "Old Fashion Songs," sung by Mr. Blatchford; Talk on "The Art of Singing," Mr. Blatchford; Old time songs, Blatchford and Norton.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 2:30, Piano selections; Olive Roetling, (11 years old); 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, direction of J. P. Quinn.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, "Money, Early Barter and Exchange," Mrs. Katherine V. Steers; 7:45, Songs of the South, WGY Orchestra; Sure cure for the blues, Georgia Minstrel Boys; "Who Built de Ark?," "Way Up Yonder," Radio Four, Male Quartet; "Rocked in the Cradle of the Deep," Rollin Thunder, bass, assisted by the Georgia Minstrel Boys; "Laughing Gas," Georgia Minstrel Boys; "Twilight in Alabama," WGY Orchestra; "Smoky Mam," orchestra; Darky-isms, Georgia Minstrel Boys; "Cornfield Medley," "Swanee River," "Old Black Joe," Radio Four; "A Handful of Burnt Cork," Georgia Minstrel Boys; "Jonah," comedy duet, Bones and Tambo; 10:30, The Flag of Victory, Dolgeville High School Orchestra, Carl Dannhauser, director; Overture, "Fra Diavolo," "Soldier's Life," "Mill in the Black Forest," "Tannhauser," "Zampa," "Here They Come," "Under the Double Eagle," orchestra; "It was the Time of Lilacs," "Just Like Your Eyes," Mrs. Albert Van Denburg, soprano; "Legende," Mrs. Ethel Gorman-Kostader, violinist; "Valse de Concert," pianist; "The Enchanted Glade," Mildred Hayward, soprano.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks," selections, Rialto Theater Organ; 7:30-9:00, Columbus Day Pageant, auspices of the Knights of Columbus; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Standard, 509), 3:00 p. m., Program of popular dance music; 6:45, "Radio Baseball Dope," Monte Cross, old-time player; 7:00, Bedtime stories and roll call by Uncle Wip.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Ave Marie," "Sweet Little Woman of Mine," Hugh B. Marshall, baritone; "Caprice," "To a Wild Rose," Florence Demming, violinist; Selections, Oriole Orchestra; "Chante Paroles," "Serenade in D," Florence Demming; "Duna," "Until," Hugh B. Marshall; "Etude in F Major," Gale Hubbell, pianist; "Orchestra," "Guitarre," "Hejr Kati," Florence Demming; Estelle Sargent, soprano; Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Organ recital, Leo Riggs; 4:05, Fashion developments, women's wear; 4:10, Piano recital, Adaline Fisher; 6:05, Bedtime story for the kiddies; 7:35, "Putting Thought in the Children's Lunch-Box," Anne Lewis Pierce; 7:45, Looseleaf current topics; 8:00, Popular songs, Jack Oliver; 8:15, "The Cheerful Philosopher," Burr McIntosh; Recital, Mabel Ash, soprano.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Bush Conservatory of Music; 7:00, Weekly "Wide Awake Club," Mrs. Frances Ford, director; 7:30, Weekly musical lecture, Mrs. Marx E. Obendorffer; 8:00, Music and choral work, William L. Tomlins; 9:00, Dance music, Hotel La Salle; 9:15, Program, Cosmopolitan School of Music.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, C. C. Flannigan; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Musical program, Erwin Swindell, director; Arthur McNeil, baritone; Lois McDermand, pianist; Lillian O'Mara, reader; Hugo Schroeder, tenor.

WOO, Philadelphia, Pa. (Eastern Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30, Piano and song recital; 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra; 11:10, A continuation of dance music, Hotel Adelphia Roof Garden Orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier; Anne Campbell, News Poet; Mrs. Ivy Sweet, soprano; Herbert C. Lamb, baritone; Frederick J. Homberger, tenor.

Saturday, October 6

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor records, S. Hamilton Co.; Piano and player rolls, C. C. Mellor Co.; 3:00, Concert, Grand Symphony Orchestra; 3:15, Football game, University of Pittsburgh vs. Lafayette College; 6:15, Dinner concert, Westinghouse Band; 7:45, "Let's Make Something," Dreamtime Lady; 8:05, Humor from "Judge"; 8:15, Tribute to George Westinghouse, his 77th Anniversary; 8:30, "Stradella," "Babillage," "Silver Threads Among the Gold," Peer Gynt Suite, "Flower Song," "Adoration," "Jolly Robbers," "The Dance of the Serpent," Westinghouse Band.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's program; 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert; 2:30-3:30, Program, Maurice Keltz, violinist; Helen Nagin, pianist; Carl Nordbloom, cellist; 6:45-7:30, Chidren's program, "Uncle John"; 8:00-10:00, Program, Isabel Block.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Orchestra concert, organ recital, vocal and instrumental specialties, direct from Missouri Theater.

KYW, Chicago, Ill. (Central, 536), 4:00 p. m., News of the day; 5:50, Children's bedtime story; 7:00-7:58, Musical program, W. W. Kimball Co.; 8:05, Under the Evening Lamp, by the Youth's Companion.

WBZ, Springfield, Mass. (Eastern, 337), 7:00, Dinner concert, Hotel Kimball Trio; 7:30, Twilight tales for the kiddies; "This Week's Judge"; 8:00, Concert, Paul Clark, violinist; Russell Day, pianist; 9:00, Bedtime story for the grownups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, Harmony Girls; Betty Holmes, soprano; Melodians Quartette; Fred Rose, pianist, composer; Bob Brown and his ukelele; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Song recital; Popular program, Arcadia Cafe Concert Orchestra; 4:30-5:55, Dance music; 7:30-8:00, Dream Daddy with the boys and girls.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Tinkerman and the Winged Taxi, Edith J. Craine; Selections, Fletcher Henderson's Happy Harmonists; Songs, Billy Newsome; Songs, Maude Mills; "That Old Gang of Mine," "Indiana Moon," Jackie Harrol; "Say It," "Taint Nobody's Business," Rosa Henderson; Selections, Fletcher Henderson's Happy Harmonists.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, Prof. J. Preston Comer; 8:30-9:30, Leland Johnston, pianist; 11:00-12:00, Paul Ashley's Texas Cowboy's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano solos, Loretta Kerk; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 8:00, Short talks and song recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 7:30 p. m., Concert of popular and college songs, Brown Blue Orchestra of Tufts College.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., "Just Among Home Folks," column of the Courier-Journal; Selections, Strand Theater Orchestra; Harry S. Currie, conductor; 7:30-9:00, Concert, auspices of Mrs. Harriet Kuersteiner, pianist; Karl O. Kuersteiner, first violinist; Dorothy Kuersteiner, second violinist; Theodore Kuersteiner, cellist; Emil Kuersteiner, saxophonist; Walter Kuersteiner, flutist; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern Standard, 509), 3:00 p. m., Dance music, Jordan-Lewis Dance Orchestra, direction of Bob Lewis; 7:00, Bedtime stories, Uncle Wip; 8:15, Artist recital and Dick Regan's Concert Orchestra in popular selections.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., "An April Day," "In Memorium," Helen Louise Schaffer, soprano; "Cortege," "Ballet," Mourine Clapp, pianist; "Minuet," "Peer Gynt Suite," Louise Misher, violinist; "Paddy," "Baby," Helen Schaffer; Cello solos, Hugo Sansone; "Largo," "Bouree," Louise Misher; Bessie B. Sonnen, contralto; William Balhatchet, tenor; Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Fashion developments, Women's wear; 3:05, Recital, Edith Ebert, soprano; 3:15, Dance program, Mel-O-Dy Eight Dance Orchestra; 4:05, Piano recital, Madalaine Miller, Jeannette Tisnee, Hedwig Schacht, pupils of Mary Wilderman; 5:00, Dance program, Mel-O-Dy Eight Dance Orchestra; 5:15, Concert, Blanche Winogram, pianist; 6:05, "Uncle Wiggily Stories," Howard Garis; 7:30, "Jenny Lind Evening," 103rd Anniversary of her birthday, Mr. Eschenberg, director; 8:15, "The Larger Aspects of World Affairs," Frederick Dixon; 8:30, Recital, Elsie DeVoe, pianist; 9:00, Concert, Carl Albert, violinist; 9:30, "Irish Night," Thomas Hannon.

WMAQ, Chicago, Ill. (Central, 447), 8:00-10:00 p. m., Mayor William E. Dever; Music, Blue Fountain Room, Hotel La Salle; Ted Brown Musical Company; Bryant String Quartet; Chicago Theater.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, C. C. Hall; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 9:00-10:00, Dance program, P. S. C. Orchestra; V. B. Rochte, baritone.

WOO, Philadelphia, Pa. (Eastern Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt;; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Band concert and organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Program of popular dance music, WTAM six-piece orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra.

Sunday, October 7

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Sacred service; 10:30, Organ recital from First Methodist Episcopal Church, Prof. Arthur Blakely, organist; 7:00-7:30 p. m., organ recital from First Methodist Episcopal Church, Prof. Arthur Blakely, organist.

KYW, Chicago, Ill. (Central, 536), 10:00 a. m., Church services, Orchestra Hall; Dr. F. F. Shannon, pastor; 6:00 p. m., Chicago Sunday Evening Club services; Choir, Edgar Nelson, conductor.

WBZ, Springfield, Mass. (Eastern, 337), 6:45 p. m., Sunday vespers, Springfield Municipal Chimes; Ernest Newton Bagg, chime ringer.

WDAP, Chicago, Ill. (Central, 360), 9:15 p. m., Drake Concert Ensemble; Other artists furnished by Alexander Nakutin.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra; 4:30-5:55, Piano solos, Edna Finestone; 7:30-7:45, Dream Daddy with boys and girls; 7:45-8:00, Moving picture review, James A. Nasson; 8:00-10:00, Talk on Philadelphia's industries; Song recital, WDAR Trio; Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFAA, Dallas, Texas (Central, 476), 2:30-3:30 p. m., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church; 4:00-5:00, Grand concert of the Palace Theater; Don Albert, conductor; Emil Velazco, organist; 9:30-10:00, Choir singers, Central Presbyterian Church; J. Wesley Hubbell, director; 10:00-11:00, Jimmy Allen's Orchestra, Southern Methodist University boys.

WFI, Philadelphia, Pa. (Eastern, 395), 10:45 a. m., Church service from Arch Street Presbyterian Church; Sermon, organ recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program; "Adventure Hour," conducted by Youth's Companion; Concert program, Edison Laboratory Phonograph; Stories, Arturo; 8:30, "World Unity," under auspices of American Federation of Churches; Evening concert program to be announced.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 3:00 p. m., Vesper service.

WGY, Schenectady, N. Y. (Eastern, 380), 10:30 a. m., Church service, First Reformed Church, Schenectady, N. Y., Rev. Clayton J. Potter, pastor; 8:00 p. m., Orchestra selection, "Large"; "America," vocal selection, Bethesda Male Quartet; Perry Gaylor, Howard Balch, James Long; "America, the Beautiful," "Our God, Our Country and Our Flag," "Unfurling the Flag," "Star Spangled Banner," Bethesda Male Quartet; Scripture reading, Judges 7:1-21, Rev. Irving G. Rouillard; Address, "The Battle That Made Us a Nation," Rev. Alfred H. Boutwell; "Traumerei," "The Flight of the Ages," "Airs of Our Country," "Evening Chimes," Orchestra, Rice Quartet.

WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music; 10:00, Church services, Fourth Avenue Presbyterian Church; Rev. Dr. Charles W. Welch, pastor; 4:00-5:00 p. m., Sacred concert, auspices of The Crescent Hill Presbyterian Church Choir, Farris A. Wilson, director; Melva Husak, soprano; Lavenna Gosnell, contralto; George K. Harmon, tenor; Arthur Findling, baritone.

WHK, Cleveland, Ohio (Eastern, 360), 8:00 p. m., Concert program, the WHK Trio.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra, "Melody in G Flat," "Dance of the Reed Pipes," "Valse in A Flat," Clarence Loomis, pianist; "La Partida," "Inclusions," Ethel Heide, contralto; "Hungarian Dance," "La Paloma," Rena G. Callow, violinist; "To Show That I Was True," "I'll Have You Love," James Fiske, baritone; "Polonaise in A Major," "Nocturne in A Flat Major," "The Flatterer," Helen Rauh, pianist; "Emmel," "You," Ethel Heide, contralto; Selections, Oriole Orchestra.

Monday, October 8

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Guy Pitner & Brooks Morris; 9:30-10:45, Barnum and Bailey Circus.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Song recital, piano solos, Loretta Kerk, pianist; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories, Cousin Sue.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Mixed program, Wheat Ice Cream Co., direction of P. Arlow Mathews.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, Dr. Florence A. Shuman; 7:45, Musical program; "Gone," "Panama Twilight," "Jonah," "Marcheta," "Aloha," "Medley of Old Time Songs," Elias Brody, pianist; "Forgotten," "My Virginia Home," "Mavis," Ernest Morris, tenor; Address, Steel Mills, J. E. N. Humes.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks"; Selections, Rialto Theatre organ.

WHAZ, Troy, N. Y. (Eastern, 380), 9:00 p. m., Concert, Christ Episcopal Church Choir; Jared S. Horton, director; 12:00, midnight, R. P. I. Radio Owls.

WIP, Philadelphia, Pa. (Eastern Standard, 509), 3:00 p. m., Artist recital; 6:45, "Radio Baseball Dope," by Monte Cross, old-time player; 7:00-7:30, Bedtime stories by Uncle Wip.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Special music, Jennie Kehrt; 8:00, "Rustle of Spring," Adelaide Apfel; "Souvenir," Earl Derbie, violinist; Adelaide Apfel; "My Mother's Rosary," "Is There Room for Me," "Give Me the Moonlight," "Good Night, My Love," Price Hill Four, Jack Powers, first tenor, James Powers, second tenor; Norman Nagele, baritone; Mike Powers, lead; Harry Grubor, pianist; "Hungarian," Adelaide Apfel; "Nocturne," Earl Derbes, violinist; "The Master Soul," "The Joy of a Rose," Norma Reiss, soloist, William Epperhart, accompanist; Roger Hill Dance Orchestra.

WOO, Philadelphia, Pa. (Eastern Standard, 509, 11:00-11:30, a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt; 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30, Song recital and concert, WOO Orchestra, Robert Golden, director; 9:30, Organ recital, Mary E. Vogt; 11:00, Dance music, Hotel Adelphia Dance Orchestra.

OPULAR STARS ON THIS WEE

The Week's Headliners on the Air

MANY unusual programs are offered this week. Amrad Women's club meeting Tuesday fternoon at WGI is worth hile. WJZ broadcasts "Broaday," "Three Live Ghosts," iven by the WGY Players promses to be hair raising (not hair estoring), and KSD mysteiously features the carnival, arade and ball of the Prophet. All this to happen on uesday evening.

"Big Smoke" meets the Camp ire Girls at WGI, Wednesday vening. Llewellyn Jones reiews the latest books at KYW. hile Congressman Holton W. ummers is fronting the microhone at WFAA, KSD will broadast the presentation of trophies o the winners of International ir Races.

Thursday is Spanish night at LW. KYW announces the reurn of Rev. C. J. Pernin in his wenty Minutes of Good Read-g, and the broadcasting of the dison Symphony Orchestra. wo amusing farces will be preented by the Amrad Players of GI.

"Broken Wing" will be broadast direct from the theater by SD Friday evening. WHAS is roducing a Columbus Day ageant.

Football season opens in earnst at KDKA Saturday afternoon nd the 103d birthday of Jenny ind, and Irish Night at WJZ stinguish Saturday night. Chiago presents Mayor Dever at MAQ.

Sunday evening the Daughters f the American Revolution, aratoga Springs, N. Y., will resent a program at WGY. How bout Monday? Easy—let's "go" o the Barnum and Bailey Circus onday night via WBAP.

George Albert Bouchard (circle in center), organist, who can be heard every day on the Wurlitzer at WGR, Federal Telephone and Telegraph Company, Buffalo

Tuesday, October 2

E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., 12:30 p. m., Victrola and Victor Records, S. on Company; Piano and player rolls, C. C. Company; **6:15,** Dinner concert, Orchestra at ttsburgh Athletic Club; **7:45,** "Mother Nature's rs," by "Lady from the Deep Woods"; **8:45,** t, Carlson Brothers' Saxophone Quartet; Laura , soprano; Mrs. M. E. Good, pianist.

ortland, Ore. (Pacific, 492), 10:00 p. m., Dance by George Olsen and his orchestra.

os Angeles, Calif. (Pacific, 395), 12:30-1:15 Concert features; **2:30-3:30,** Matinee musicale; :30, Children's program, "Uncle John"; **8:00-** De Luxe program, courtesy of G. Allison Phelps, Suburban Estates Company, assisted by the Film Studio; William F. Alder, lecturer.

. Louis, Mo. (Central, 546), 7:00 p. m., Music, carnival and parade of Veiled Prophet; **9:30,** Veiled Prophet Ball.

hicago, Ill. (Central, 536), 1:35 p. m., Studio n; **4:00,** News of the day; **5:50,** Children's bedory; **7:00-7:58,** Musical program, Herbie Mintz, ; A. W. "Sen" Kaney, specialty act; Alice pianist; **8:28,** Program, American Farm Bufederation.

Fort Worth, Tex. (Central, 476), 7:30-8:30 Fort Worth artists; **9:30-10:45,** Broadway Church.

pringfield, Mass. (Eastern, 337), 7:30 p. m., t Tales for the Kiddies; **8:00,** Concert, Harriet ianist; **9:00,** Bedtime story for Grown-ups, S. Marden.

Chicago, Ill. (Central, 360), 1:35 p. m., Drake Ensemble; Blackstone String Quintet; **7:00,** Concert Ensemble; Blackstone String Quintet; Frederick W. Agard, tenor; Bob Cougle, pianist; hapman and his dance orchestra.

Philadelphia, Pa. (Eastern, 395), 12:00-12:54 Organ recital, Stanley Theater; Dinner music, a Cafe Concert Orchestra; **2:00-3:00,** Concert ng recital, Arcadia Cafe Concert Orchestra; 55, Piano recital, Edna Finestone; **7:30-7:45,** Daddy with boys and girls; **7:45-8:00,** Dra-Review, Walter Greenough.

ew York, N. Y. (Eastern, 405), 12:00-12:50 "Our Sister, Ain't That Hot," "Mama Going You Down," Rubey Cowan, soloist; Songs, Grossman; "Pretty Buddy," "Wonder," and Ross; "I Want to Call You Mine," Helen lsing; Songs, Mrs. Earl Fully; Piano solos, White.

Dallas, Tex. (Central, 476), 12:30-1:30 p. m., , DeWitt McMurray, editor Semi-Weekly Farm **3:30-9:30,** Dramatic program, Council of Jewish ; **11:00-12:00,** Harris Brothers' Orchestra.

hiladelphia, Pa. (Eastern, 395), 1:00 p. m., music, Meyer Davis Bellevue Stratford Concert ra; **3:00,** Concert; **6:30,** Dinner music, Meyer Bellevue Stratford Orchestra; **7:00,** Bedtime Cousin Sue; **8:00,** Boy Scouts Radio Corps; Dance music; **9:15,** song recital.

edford Hillside, Mass. (Eastern, 360), 12:00 Selections on Edison, Brunswick & Chickering-; **3:00,** Amrad Women's Club, "Hospitality Ida Bailey Allen; Selections on the Chickering- & Brunswick; "Public Health Talks"; **5:00,** ht Tales," Eunice L. Randall; **7:00,** Evening to be announced.

ffalo, N. Y. (Eastern, Daylight Saving, 360), :00 p. m., George Albert Bouchard, organist; 00, George Albert Bouchard, organist; **7:00** of the day's news; Topics of scientific interest.

henectady, N. Y. (Eastern, 380), 2:00 p. m., nd reading, "The Posy Ring," Mrs. John Day; usical Program; Soprano Solos, with violin ; "By the Waters of Minnetonka," "For You "Birthday," "The Moon Behind the Cotton- "Life," "Whisper and I Shall Hear," Grace ld, soprano; Regina L. Held, violinist; Mr. Robinson, accompanist; "Concerto Roman- "Adoration," "Romance," Regina L. Held, ; "La Fileuse," "Autumn," Mrs. Herbert n, pianist; Reading, "Jim's Brothers," "The Guinivere Rifenburg.

Louisville, Ky. (Central, 400), 4:00-5:00 p. m.,

Kns, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert, **2:30-3:30,** Matinee musicale; **6:45-7:30,** Children's program, "Uncle John"; **8:00-10:00,** Program, Woman's Club and Oak Glen Lodge of Yucaipa; Old Time Dance.

KSD, St. Louis, Mo. (Central, 546), 6:30 p. m., Music and speeches, presentation of trophies to winners of International Air Races; **9:30,** Vocal and instrumental specialties, orchestra and organ music, Grand Central Theater.

KYW, Chicago, Ill. (Central, 536), 1:00 p. m., "Talks Chicago Association of Commerce luncheon at the Hotel La Salle; **4:00,** News of the day; **5:50,** Children's bedtime story; **7:00-7:58,** Musical program, Sherwood School of Music; Harry Geise, pianist; Mary Lee, soprano; **8:05,** Book Reviews, Llewellyn Jones.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Mrs. Pearl Calhoun Davis; **9:30-10:45,** Texas Hotel Orchesta.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., "Serenade," "Wiener Blut," "Entr' Acte Gavotte," "Angel's Serenade," "Men of Sparta," "Blue Bells," Dinner concert by the WBZ Trio; **7:00,** "The Background of Radio," Edward H. Goodrich; **7:30,** Twilight Tales for the Kiddies; **8:00,** Concert, Mrs. Lilla W. Ladd, contralto; Mrs. La Zazzera, accompanist; WBZ Trio; **9:00,** Bedtime story for grown-ups, Orison

WOO, Philadelphia, Pa. (Eastern, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; **12:00-12:55 p. m.,** Luncheon music, Wanamaker Tea Room Orchestra; **4:45-5:00,** Organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program by the WTAM Orchestra and solo numbers.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; **7:00 p. m.,** Detroit News Orchestra; Town Crier; Vocal selections, pupils of George Carr's.

Thursday, October 4

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; **12:30 p. m.,** Victrola and Victor records, S. Hamilton Co.; Piano and player rolls, C. C. Mellor Co.; **6:15** Dinner concert, Grand Symphony Orchestra; **7:45,** Uncle Remus, himself, children's period; **8:05,** Farm program, Frank E. Mullen; **8:45,** Esther C. McGuire, dramatic reader; English Coster Songs, "In the Garden by the Sea," "I Love the Sea," "Lend Me Your Aid," Evan Lloyd, baritone.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m.,

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; **6:30-7:00,** George Albert Bouchard, organist; **7:00,** Digest of the day's news, Boy Scout Radiograms, "The American Boy," Employment Bulletin; **8:45,** Address, Twelfth Annual Congress, American Safety Council.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, "The Object and Meaning of Federation," Mrs. E. P. Pressey; **7:45,** Instrumental selection, "Medley of Popular British War Songs," WGY Instrumental Quartet; Radio drama, "Three Live Ghosts," cast, Mrs. Gubbins, as "Old Sweetheart," Helen Campbell; Peggy Woofer, Lola Sommers; Bolton, the American detective, Harold Sundae; Jimmie Gubbins, Frank Oliver; William Foster, alias Wm. Jones, Edward H. Smith; Spoofy, Edward St. Louis; Rose Gordon, Rose Cohn; Birggs, of Scotland Yard, Jerome Lovelheim; Benson, John Loftus; Lad Leicester, Margaret V. Smith; Act I, the home of "Old Sweetheart," in London, time 1917; Act II, same as act I, the following morning; Act III, same as II, a few minutes later.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., "Just Among Home Folks"; Selections, Strand Theater Orchestra; Harry S. Currie, conductor; **7:30-9:00,** Concert, auspices of The Kentucky Committee on Public Utility Information.

POPULAR STARS ON THIS WEEK'S PROGRAMS WILL DELIGHT LISTENERS IN

The Week's Headliners on the Air

MANY unusual programs are offered this week. Amrad Women's club meeting Tuesday afternoon at WGI is worth while. WJZ broadcasts "Broadway." "Three Live Ghosts," given by the WGY Players promises to be hair raising (not hair restoring), and KSD mysteriously features the carnival, parade and ball of the Veiled Prophet. All this to happen on Tuesday evening.

"Big Smoke" meets the Camp Fire Girls at WGI, Wednesday evening. Llewellyn Jones reviews the latest books at KYW. While Congressman Holton W. Summers is fronting the microphone at WFAA, KSD will broadcast the presentation of trophies to the winners of International Air Races.

Thursday is Spanish night at WLW. KYW announces the return of Rev. C. J. Pernin in his Twenty Minutes of Good Reading, and the broadcasting of the Edison Symphony Orchestra. Two amusing farces will be presented by the Amrad Players of WGI.

"Broken Wing" will be broadcast direct from the theater by KSD Friday evening. WHAS is producing a Columbus Day Pageant.

Football season opens in earnest at KDKA Saturday afternoon and the 103d birthday of Jenny Lind, and Irish Night at WJZ distinguish Saturday night. Chicago presents Mayor Dever at WMAQ.

Sunday evening the Daughters of the American Revolution, Saratoga Springs, N. Y., will present a program at WGY. How about Monday? Easy—let's "go" to the Barnum and Bailey Circus Monday night via WBAP.

Above, Bob Cougle, and right, Fred Agard, of the team of Agard and Cougle, a remarkable pair, heard every Tuesday night at WDAP, the Drake Hotel—Board of Trade, Chicago

George Albert Bouchard (circle in center), organist, who can be heard every day on the Wurlitzer at WGR, Federal Telephone and Telegraph Company, Buffalo

Rose Cohn (left), now leading lady with the WGY Players, Schenectady, who will present, "Three Live Ghosts," Thursday night, October 4. Miss Cohn takes the part of Rose Gordon in this entertaining comedy. Frank Oliver (right), character man of the WGY Players, adds fun to the sketch. Jimmie Gubbins ... in for this

John M. Kuhn (right), heard last week on the Indian program of the Chicago Daily News, WMAQ. Mr. Kuhn is a member of Isham Jones Orchestra, which is broadcast five nights of every week by KYW

Edna Finestone (above), the charming piano soloist who will be heard Tuesday, Wednesday, Friday and Saturday before the microphone of WDAR, Philadelphia. Miss Finestone entertains there regularly

Tuesday, October 2

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music. 12:30 p. m., Victrola and Victor Records, S. Hamilton Company, Piano and player rolls, C. C. Mellor Company, 6:15, Dinner concert, Orchestra at the Pittsburgh Athletic Club, 7:45, "Mother Nature's Wonders," by "Lady from the Deep Woods"; 8:45, Concert, Carlson Brothers' Saxophone Quartet; Laura Statska, soprano, Mrs. M. E. Good, pianist.

KGW, Portland, Ore. (Pacific, 492), 10:00 p. m., Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert features, 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, De Luxe program, courtesy of G. Allison Phelps, of the Suburban Estates Company, assisted by the Powers Film Studio, William F. Alder, lecturer.

KSD, St. Louis, Mo. (Central, 546), 7:00 p. m., Music, Street carnival and parade of Veiled Prophet. 9:30, Music, Veiled Prophet Ball.

KYW, Chicago, Ill. (Central, 536), 1:35 p. m., Studio program, 4:00, News of the day, 5:50, Children's bedtime story, 7:00-7:58, Musical program, Herbie Mintz, pianist, A. W. "Sen" Kaney, specialty act, Alice Cronin, pianist, 8:28, Program, American Farm Bureau Federation.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Fort Worth artists. 9:30-10:45, Broadway Baptist Church.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Twilight Tales for the Kiddies; 8:00, Concert, Harriet Ely, pianist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble, Blackstone String Quintet, 7:00, Drake Concert Ensemble, Blackstone String Quintet; 10:00, Frederick W. Agard, tenor, Bob Cougle, pianist; Jack Chapman and his dance orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Concert and song recital, Arcadia Cafe Concert Orchestra; 4:30-5:55, Piano recital, Edna Finestone; 7:30-7:45, Dream Daddy with boys and girls; 7:45-8:00, Dramatic Review, Walter Greenough.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., "Our Sister, Ain't That Hot," "Mama Going to Cut You Down," Rubey Cowan, soloist, Songs, Bernie Grossman, "Pretty Buddy," "Wonder," Brooks and Ross; "I Want to Call You Mine," Helen C. Willsing, Songs, Mrs. Earl Fully, Piano solos, Willy White.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:30 p. m., Address, DeWitt McMurray, editor Semi-Weekly Farm News. 8:30-9:30, Dramatic program, Council of Jewish Juniors, 11:00-12:00, Harris Brothers' Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Concert; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 7:00, Bedtime stories, Cousin Sue; 8:00, Boy Scouts Radio Corps; 8:30, Dance music, 9:15, song recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick & Chickering-Ampico, 3:00, Amrad Women's Club, "Hospitality Talk," Ida Bailey Allen, Selections on the Chickering-Ampico & Brunswick "Public Health Talks"; 5:00, "Twilight Tales," Eunice L. Randall, 7:00, Evening program to be announced.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist, 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, Topics of scientific interest.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and reading, "The Posy Ring," Mrs. John Day; 7:45, Musical Program, Soprano Solos, with violin obligato, "By the Waters of Minnetonka," "For You Alone," "Birthday," "The Moon Behind the Cottonwood," "Life," "Whisper and I Shall Hear," Grace H. Held, soprano; Regina L. Held, violinist; Mr. Herbert Robinson, accompanist, "Concerto Romantique," "Adoration," "Romance," Regina L. Held, violinist, "La Fileuse," "Autumn," Mrs. Herbert Robinson, pianist, Reading, "Jim's Brothers," "The Fondles," Guinivere Rifenbury.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Mary Anderson Theater Orchestra, Ollie Jones, conductor, "Just Among Home Folks," daily column running in the Courier-Journal, Strand Theater Orchestra, Harry S. Currie, conductor, 7:30-9:00, Concert, Bay Pfaff and his orchestra, Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Artist recital; 6:00, Dinner music, Dick Regan and his WIP Little Symphony Orchestra. 7:00, Bedtime stories and roll call, Uncle WIP; 8:00, Short talk; 8:15, Concert; 9:00, Song recital.

WJAX, Cleveland, Ohio (Eastern, 390), 7:30 p. m., Program, Cleveland News-Leader; Bedtime story, E. O. Johnson; Concert, Cleveland Grotto Band.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra, "The Road," "Mother of Mine," "In the Dark and the Dew," James Funk, baritone, Cello solos, Geryl Allen, "Love and Music, These I Live For," "The Young Beauty," Jennie M. Navigato, soprano; "The Gondoliers," "Serenade," Amanda Clausius Burhop, pianist, "Mandalay," "Invictus," "The Last Hour," James Funk; "My Heart at Thy Sweet Voice," "Violets," Jennie Navigato; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Wanamaker Auditorium Concert, 4:05, Concert, Music Students' League; 5:00, "The Home Beautiful," Dorothy Ethel Walsh; 5:15, Recital, Bertha Butler, soprano, 6:05, Bedtime story, MacMillan Company; 7:35, The Belgenland Orchestra, courtesy of the Red Star Line, 7:45, A University of the Air talk, A. Withington Taylor, 8:00, "Broadcasting Broadway," review of current plays and players, 8:15, Concert, Belgenland Orchestra, 8:50, "Etiquette," Doubleday Page talk; 9:00, Musical program; 10:00, Dance program, Hotel Astor Roof Orchestra.

WLW, Cincinnati, Ohio (Eastern, 309), 10:00 p. m., Selections, Circle Orchestra, "The Lord Is My Light," Josephine Smith, soloist; Marian Heintz, accompanist; Piano solo, Claire Harkness; "Life and Happiness," May C. Stolber, "A Cute Little Love Nest," "The Sunshine of Virginia," Harry Burkhart, baritone, "There Is a Garden," Josephine Smith, soloist; "She's Got That, Too," "Sun Kist Rose," "Fo-lu San," "The Electric Girl," "I'm Drifting Back to Dreamland," I'm Steerin' for Erin," Circle Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Gunn School of Music, 8:00, Program, University of Chicago; 9:00, Dance Music, Blue Fountain Room, Hotel La Salle, E. E. Sheetz, Jr., and his "Californians", 9:15, Weekly program, Lyon & Healy.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational Program, A. G. Hinrichs, Music, 5:45, Chimes concert.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt, 12:00-12:55 p. m., Luncheon music, Wannamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 9:45 a. m., "Ironing Day," program, Fred Shaw, pianist; Margery Richmond, pianist, 12:00 m., The Detroit News Orchestra; 7:00, Detroit News Orchestra; Town Crier; Vocal selections, pupils of Madame Home Dubard's.

Wednesday, October 3

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music, 12:30 p. m., Victrola and Victor Records, S. Hamilton Company, Piano and player rolls, C. C. Motor Company, 6:15, Dinner concert, KDKA Little Symphony Orchestra, 7:30, Literary program, Marjory Stewart; 7:45, "Fables for the Little Folks," Dreamtime Lady; 8:45, March and procession from "The Queen of Sheba," "Serenade," "Dragon Fly," "Butterfly," "Swan," "Bee," "Berceuse," Excerpts from "Lucia de Lammermoor," "Down South," "Sari," KDKA Little Symphony Orchestra, "She Has Flown," "My Pretty Turtle Dove," "Margaret at the Spinning Wheel," "Prayer from Freishutz," "Still as the Night," "Songs My Mother Taught Me," Marie Keller Kennedy, soprano; Mrs. Arthur Brandt, accompanist.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Musical program for children, Laura Van Houton, child pianist; Franconia stories, Aunt Nell; 8:00, Concert, Rybka String orchestra, 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert, 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John", 8:00-10:00, Program, Woman's Club and Oak Glen Lodge of Yucaipa, Old Time Dance.

KSD, St. Louis, Mo. (Central, 546), 6:30 p. m., Music and speeches, presentation of trophies to winners of International Air Races, 9:30, Vocal and instrumental specialties, orchestra and organ music, Grand Central Theater.

KYW, Chicago, Ill. (Central, 536), 1:00 p. m., "Talks Chicago Association of Commerce luncheon at the Hotel La Salle, 4:00, News of the day, 5:50, Children's bedtime story, 7:00-7:56, Musical program, Sherwood School of Music, Harry Geise, pianist; Mary Lee, soprano; 8:05, Book Reviews, Llewellyn Jones.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Mrs. Pearl Calhoun Davis, 9:30-10:45, Texas Hotel Orchestra.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., "Serenade," "Wiener Blut," "Entr' Acte Gavotte," "Angel's Serenade," "Men of Sparta," "Blue Bells," Dinner concert by the WBZ Trio; 7:00, "The Background of Radio," Edward H. Goodrich, 7:30, Twilight Tales for the Kiddies; 8:00, Concert, Mrs. Lilla W. Ladd, contralto, Mrs. La Zazzera, accompanist; WBZ Trio, 9:00, Bedtime story for grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble, Blackstone String Quintet; 7:00, Drake Concert Ensemble, Blackstone String Quintet; 10:00, John Stamford, tenor, Joan Young, soprano; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital from Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Concert and piano solos, Arcadia Cafe Concert Orchestra; Edna Finestone; 4:30-5:55, Short talks and song recital; 7:30-8:00, Dream Daddy with boys and girls; 8:00, Talk on Philadelphia's Industries; song recital; Features from Stanley Theater; Dance music, Howard Lanin and his Arcadia Cafe Dance Orchestra.

WDT, New York, N. Y. (Estern, 405), 12:00-12:50 p. m., "Not Here, Not There," "Who's Sorry Now," Tommy Maille, soloist; Frank Bessenger, soloist; "It's Not the First Time You Left Me," "Waiting for the Evening Mail," Harry Hock, "My Sweetie Went Away," "Where the Sacramento River Flows," Sam Lory; "Hawaiian Nightingale," "Susan," Tommy Maille; "Indiana Moon," "Beale Street Mamma," Frank Bessenger.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "How to Study Political Problems," Congressman Hatton W. Sumners.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Orchestra, 3:00, Concert, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 5:00, "Twilight Tales," Eunice L. Randall; 6:45, "Camp Fire Girls," by "Big Smoke"; 7:30, "Science Up to Date," "This Week's Judge," Program of vocal and instrumental numbers.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news; 9:00, Concert, City Mission, Direction of E. C. Clark.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections Strand Theater Orchestra; Harry S. Currie, conductor; "Just Among Home Folks"; Selections, Rialto Theater Organ, 7:30-9:00, Concert Jane Webster Murrel Studio; Strand Theater Orchestra; Harry S. Currie, conductor; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Program of popular songs, Remick Trio; 6:02, Dinner dance music, Jordan-Lewis Dance Orchestra, Bob Lewis, director; 7:00-7:30, Bedtime stories, Uncle Wip.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Exaltation," "She Rested by the Broken Brook," Louise Le Moine, soprano; Clarinet solos, E. E. Harder, "Teach Me to Pray," "An Old Fashioned Town," Sylvester Muldowney, baritone, "Baby," "At Dawning," Louise Le Moine; "Waltz in C Sharp Minor," "March of the Dwarfs," Dean Remick, pianist; "Inclusion," "Evening," "Thou Art Me," Sylvester Muldowney; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Italian modern recital, Edouard Dino Anghinelli, Italian pianist; 4:05, Tea music, Hotel Commodore Orchestra; 6:05, "The Adventures of Peter," Florence S. Vincent; 7:35, Joint recital, F. Gehlert, tenor, O. A. Karcher, baritone, 7:45, "The Progress of the World," Review of Reviews talk; 8:00, F. Gehlert, tenor; O. A. Karcher, baritone; 8:15, "What Engineering Is and What It Is Not," E. J. Mehren; 8:30, Musical score, "Little Jessie James," Nan Halpern and the James' Boys Orchestra.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Crosley Forum; Piano solos, William Schmitt; 8:00, Program, Cincinnati College of Music; Elmer Aichele Novelty Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Cosmopolitan School of Music; 7:00, Children's stories, Georgene Faulkner, the Story Lady; 7:30, First of a series of speakers from Northwestern University; 8:00, Chicago Women's Club, Congress of Women; 9:00, Dance music, Blue Fountain room, Hotel La Salle; 9:15, Musical program, Mr. and Mrs. W. A. Fricke, Marion Roberts; Stella Roberts.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert, 3:30 p. m., Educational program, Clyde G. Kern; Music; 6:30, Sandman's visit, 8:00, Pipe organ recital, Erwin Swindell; May Chambers, soprano; 10:00, Artist Musical Program, Erwin Swindell, director; Concert, Franklin Grove Band.

WOO, Philadelphia, Pa. (Eastern, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt, 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program by the WTAM Orchestra and solo numbers.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier, Vocal selections, pupils of George Carr's.

Thursday, October 4

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor records, S. Hamilton Co; Piano and player rolls, C. C. Mellor Co, 6:15, Dinner concert, Grand Symphony Orchestra, 7:45, Uncle Remus, himself, children's period, 8:05, Farm program, Frank E. Mullen, 8:45, Esther C. McGuire, dramatic reader; English Coster Songs, "In the Garden by the Sea," "I Love the Sea," "Lend Me Your Aid," Evan Lloyd, baritone.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Woman's program, child training, 8:45, Dramatic program, "Within the Law," Mrs. Herbert Garr Reed; 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert program, 2:30-3:30 p. m., matinee musicale; 6:45-7:30, Children's Hour, "Uncle John"; 8:00-10:00, Program, Clifford Lott, basso; Rev. Thomas Lutman, lecturer.

KYW, Chicago, Ill. (Central, 536), 1:35 p. m., Studio program; 4:00, News of the day; 5:50, Children's bedtime story, 7:00-7:58, Herbie Mintz, pianist; A. W. "Sen" Kaney, specialty act, "The Diplomat," "The Swinging Lanterns," Edison Symphony Orchestra; "Columbia," A. N. Brabrook, cornetist; "Finlandia," "Caravan," "To a Mummy," "Katebel," "Waltz from Serenade," Edison Symphony Orchestra; "Kashmiri Song," "Sweet Little Woman o' Mine," John Stamford, tenor; "The Red Mill," Edison Symphony Orchestra; 8:05, Twenty Minutes of Good Reading, Rev. C. J. Pernin.

WBAP, Fort Worth, Tex. (Central, 476), 7:30-8:30 p. m., Fort Worth artists; 9:30-10:45, The Euterpean Club.

WBZ, Springfield, Mass. (Eastern, 337), 7:30 p. m., Twilight Tales for the Kiddies; "How Plots Are Built," Dr. J. Berg Esenwein; 8:00, Concert, James Morton, tenor, Grayce Bradley O'Connell, soprano; Eleanor McCormick, pianist; 9:00, Bedtime story for Grown-ups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble, Blackstone String Quintet; 7:00, Drake Concert Ensemble; Blackstone String Quintet, 10:00, Program, Lyceum Arts Conservatory; Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Program of popular selections, Arcadia Cafe Concert Orchestra. 4:30-5:55, Song recital and piano solos; 7:30-8:00, Dream Daddy with boys and girls.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Piano solos, Jack Stanley; Solos, Fred Whitehouse; 7:00, Stage and Screen, Charles R. Jones; Vaughn De Leath Orchestra; Violin solos, Elise de Grode; Madame Lundow.

WFAA, Dallas, Tex. (Central, 476), 12:30-1:00 p. m., "Books and Their Use," Dr. J. H. McGinnis. 8:30-9:30, Emmett B. Peck, violinist.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Piano solos, Loretta Kerk, Song recital; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories; Cousin Sue; 8:00, Song recital; 8:30, Dance music, Jack Le Roy and his Manhattan Melody Men from Cathay Tea Gardens.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 5:00, "Twilight Tales," Eunice L. Randall, 7:00, "Bits of Wisdom," Geo. Brinton Beal, Musical program, two pianos, Miss Drew and Mr. Emery; "Nonsense School," farce, Amrad Players; "His Wife's Father-in-Law," play by Amrad Players.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist, 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news, Boy Scout Radiograms, "The American Boy," Employment Bulletin; 8:45, Address, Twelfth Annual Congress, American Safety Council.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, "The Object and Meaning of Federation," Mrs. E. P. Pressey; 7:45, Instrumental selection, "Medley of Popular British War Songs," WGY Instrumental Quartet; Radio drama, "Three Live Ghosts," cast, Mrs. Gubbins, as "Old Sweetheart," Helen Campbell; Peggy Woofer, Lola Sommers; Bolton, the American detective, Harold Sundae; Jimmie Gubbins, Frank Oliver; William Foster, alias Wm. Jones, Edward H. Smith; Spoofy, Edward St. Louis, Rose Gordon, Rose Cohn; Briggs, of Scotland Yard, Jerome Lovehelm; Benson, John Loftus; Lad Leicester, Margaret V. Smith, Act I, the home of "Old Sweetheart," in London, time 1917; Act II, same as act I, the following morning; Act III, same as II, a few minutes later.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., "Just Among Home Folks", Selections, Strand Theater Orchestra; Harry S. Currie, conductor; 7:30-9:00, Concert, auspices of The Kentucky Committee on Public Utility Information.

WIP, Philadelphia, Pa. (Eastern, 509), 3:00 p. m., Song recital; 6:02, Dinner music; 7:00-7:30, Bedtime stories, Uncle Wip; 8:00, "Where to Go and How to Get There," Eugene E. Hogle, secretary of the Automobile Club of Philadelphia; 8:15, Dance music, Ace Brigode and His Ten Virginians from Hotel Walton Roof; 9:00, Organ recital, Karl Bonawitz, from Germantown Theater.

WJAX, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Concert program, Madrigal Male Quartette; Roy A. Lewis, pianist; Gyp Gins, violinist, John L. Mainwaring, first tenor; Val Saurwein, second tenor; Roberts, baritone; Lowell W. Dilts, bass.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Song of the Volga Boatman," "Vision Fugative," Mary Withaus Sparrow, soprano; "To You," "When You and I Were Young, Maggie," Bert Graham, tuba player; "A Voice Is in the Wilderness," "My Hope Is in the Everlasting," Mary W. Sparrow; Violin solos, Glen Halik; "Love Is the Wind," "Will of the Wisp," Mary W. Sparrow; "Just a Wearying for You," "I Love You Truly," Bert Graham; Selections, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Auditorium Concert; 4:05, Recital, pupils of Harold Land; 5:00, Concert, Norma Gradstein; 6:05, "Jack Rabbit Stories," David Cory; 7:35, World's Work, 7:45, Popular songs, Jimmy Moore, tenor; 8:00, "The Waddington Cipher," a radio detective serial story; William Johnston; 8:15, Organ recital, J. Thurston Noe.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Classical piano selections, Adelaide Apfel; 10:00, Spanish night, Spanish dance, Cincinnati Conservatory of Music Ensemble; A group of Spanish songs, Leah Fred, soloist; Thomie Williams, pianist; "Spanish Dance," Sam Morganstern, pianist, The toreador song from "Carmen," Everett Marshall, baritone; "A Sunny Morning," one-act play, Crosley Radarians, Dona Laura, Helen Schuster Martin; Petra, Emma Helen Haswell; Don Gonzalo, Verne Fitzpatrick; Juanito, Maynard Babbs; Descriptionist, Julia Lee Applegate; Spanish dance, Ensemble; 11:15, Popular entertainment, Eastern Hills Dance Orchestra.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program to be announced; 7:00, Weekly talk, Rockwell R. Stephens; Weekly talk to Boy Scouts; 8:00, Chicago Association of Commerce; 9:00, Dance music, Hotel La Salle; 9:15, Program, Chicago Musical College.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, Karl G. Stephan; Music; 5:45, Chimes concert; 6:30, Sandman's visit; 8:00, Musical program, P. S. C. Orchestra; V. B. Roehte, baritone.

WOO, Philadelphia, Pa. (Eastern, Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier; Antonio, tenor; Albertine Schmidtke, soprano, Mildred L. Williams, contralto.

STORIES FOR LITTLE TOTS

LET ALL the little folks listen in at twilight time and they will hear "Mother Nature's Wonders," by the Lady of the Deep Woods; "The Adventures of Peter," Miss Georgene Faulkner, the Story Lady; Uncle Remus, himself; Tinkerman and the Winged Taxi; and even receive a visit from the Sandman. Stations featuring bedtime stories this week are:

Tuesday, October 2: Stations KDKA, KHJ, KYW, WBZ, WDAR, WFI, WGI, WIP, WJAX, WJZ.

Wednesday, October 3: Stations KDKA, KGW, KHJ, KYW, WBZ, WDAR, WGI, WJZ, WMAQ, WOC.

Thursday, October 4: Stations KDKA, KHJ, KYW, WBZ, WDAR, WFI, WGI, WIP, WJZ, WOC.

Friday, October 5: Stations KDKA, KHJ, KYW, WBZ, WDAR, WFI, WGI, WIP, WJZ, WOC.

Saturday, October 6: Stations KDKA, KGW, KHJ, KYW, WBZ, WDAR, WDT, WIP, WJZ, WOC.

Sunday, October 7: Station WDAR.

Monday, October 8: Station WIP.

Friday, October 5

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music; 12:30 p. m., Victrola and Victor records, S. Hamilton Co.; Piano and player rolls, C. C. Mellor Co.; 6:15, Organ recital, Howard R. Webb; 7:45, "Come Sing With Me," Jane Peckham Alexander, conductor, 8:05, Boy Scouts program, Richard Victor, scout master, 8:45, "Fiddle and I," "My Mother Bids Me Bind My Hair," "Pirate Dreams," "Happy Days," "Deep in a Rose's Glowing Heart," "Il Baccio," "Angel's Serenade," Mrs. F. L. France, soprano; Mrs. Pauline Denny, pianist; Tenor solos, Elmer Ablett; Violin solos, Leo Kruczek.

KGW, Portland, Oregon (Pacific, 492), 3:30 p. m., Woman's program, 8:00, Vocal solos, 8:15, Studio program of dance music, George Olsen, 9:00, "Oregon Resources," lecture by University of Oregon extension division; 10:30, Hoot Owls with Pantages frolic.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Music, 2:30-3:30, Matinee musicale; 6:45-7:30, Children's program, "Uncle John"; 8:00-10:00, Program, Choir of the Memorial Baptist Church.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., "The Broken Wing," direct from Empress Theater.

KYW, Chicago, Ill. (Central, 536), 4:00 p. m., News of the day; 5:50, Children's bedtime story; 9:00-10:30, Musical program, Herbie Mintz, pianist; Harry Geise, pianist; Mary Lee, soprano; A. W. Kaney, specialty act.

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Texas Christian University; 9:30-10:45, Knights of Pythias Girls' Orchestra.

WBZ, Springfield, Mass. (Eastern, 337), 6:00 p. m., Selection, "Aida," "Valse Poudree," March, "Elegie and Consolation," "Scarf Dance," "Marionette," Andante from "La Source," "Zallah," "Flower Song," "Spirit of America," WBZ Trio; 7:30, Twilight tales for the kiddies; Current book review, R. A. McDonald; 8:00, Concert, Demetrius Zades, tenor; Mrs. Francis Regal, accompanist; WBZ Trio; 9:00, Bedtime story for grownups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet, 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, George R. Hill, Jr., baritone; Rosemary Hughes, soprano; Jack Chapman's orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra; 2:00-3:00, Concert and song recital, Arcadia Cafe Concert Orchestra; 4:30-5:55, Short talk and dance music; 7:30-8:00, Dream Daddy with boys and girls; 8:00, Book review, Doris Hyde; Piano solos, Edna Finestone, Radio drama by Walter Greenough's players, Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra, Special for the "Morning Glory Club."

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Talk on astrology, Dr. Arthur Brooks, Songs, Dorothy Adrian; Anne Greenleaf; "In a Tent," "Where the Sacramento River Flows," "Maggie," Vaughan De Leath's Orchestra; Songs, Ross Fowler; Selections, Orchestra; Saxophone selections, Mr. Kenster; Songs, Ross Fowler; Selections, Vaughn De Leath's Orchestra.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., "Abraham, a Blessing to the Whole World," Dr. Robert Stewart Hyer; 8:30-9:30, Mrs. Albert Smith, soloist.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra; 3:00, Recital, John Owens, tenor; John Vandersloot, bass; Caroline Hoffman, pianist; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra; 7:00, Bedtime stories, Cousin Sue.

WGI, Medford Hillside, Mass. (Eastern, 360), 12:00 p. m., Selections on Edison, Brunswick and Chickering-Ampico; 3:00, Amrad Women's Club, "Talks," Mrs. D. H. Goodwin; Selections on Chickering-Ampico and Brunswick; "Public Health Talks"; 7:30, Musical, Rupert Edward Blatchford, vocal instructor, Harry Norton, organist, Washington Theater, Boston, "Girl of My Heart," "Old Fashion Songs," sung by Mr. Blatchford; Talk on "The Art of Singing," Mr. Blatchford; Old time songs, Blatchford and Norton.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist, 2:30, Piano selections; Olive Roetling (11 years old), 6:30-7:00, George Albert Bouchard, organist; 7:00, Digest of the day's news, 9:00, Concert, direction of J. P. Quinn.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, "Money, Early Barter and Exchange," Mrs. Katherine V. Steers; 7:45, Songs of the South, WGY Orchestra; Sure cure for the blues, Georgia Minstrel Boys; "Who Built de Ark?," "Way Up Yonder," Radio Four, Male Quartet; "Rocked in the Cradle of the Deep," Rollin Thunder, bass, assisted by the Georgia Minstrel Boys; "Laughing Gas," Georgia Minstrel Boys; "Twilight in Alabama," WGY Orchestra; "Smoky Sam," orchestra; Darky-isms, Georgia Minstrel Boys; "Cornfield Medley," "Swanee River," "Old Black Joe," Radio Four; "A Handful of Burnt Cork," Georgia Minstrel Boys; "Jonah," comedy duet, Bones and Tambo, 10:30, The Flag of Victory, Dolgeville High School Orchestra, Carl Dannhauser, director; Overture, "Fra Diavolo," "Soldier's Life," "Mill in the Black Forest," "Tannhauser," "Zampa," "Here They Come," "Under the Double Eagle," orchestra; "It was the Time of Lilacs," "Just Like Your Eyes," Mrs. Albert Van Denburg, soprano; "Legende," Mrs. Ethel Getman-Doxtader, violinist; "Valse de Concert," pianist; "The Enchanted Glade," Mildred Hayward, soprano.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Selections, Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks," selections, Rialto Theater Organ; 7:30-9:00, Columbus Day Pageant, auspices of the Knights of Columbus; Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern, Standard, 509), 3:00 p. m., Program of popular dance music, 6:45, "Radio Baseball Dope," Monte Cross, old time player; 7:00, Bedtime stories and roll call by Uncle Wip.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra; "Ave Maria," "Sweet Little Woman of Mine," Hugh B. Marshall, baritone, "Caprice," "To a Wild Rose," Florence Demming, violinist; Selections, Oriole Orchestra; "Chante Paroles," "Serenade in D," Florence Demming; "Duna," "Until," Hugh B. Marshall, "Etude in F Major," Gale Hubbell, pianist; "Orchestra," "Guitarre," "Hejr Kati," Florence Demming, Estelle Sargent, soprano; Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Organ recital, Leo Riggs; 4:05, Fashion developments, women's wear, 4:10, Piano recital, Adaline Fisher; 6:05, Bedtime story for the kiddies; 7:35, "Putting Thought in the Children's Lunch-Box," Anne Lewis Pierce; 7:45, Looseleaf current topics; 8:00, Popular songs, Jack Oliver, 8:15, "The Cheerful Philosopher," Burr McIntosh; Recital, Mabel Ash, soprano.

WMAQ, Chicago, Ill. (Central, 447), 4:30 p. m., Program, Bush Conservatory of Music, 7:00, Weekly "Wide Awake Club," Mrs. Frances Ford, director; 7:30, Weekly musical lecture, Mrs. Marx E. Oberndorfer; 8:00, Music and choral work, William L. Tomlins, 9:00, Dance music, Hotel La Salle, 9:15, Program, Cosmopolitan School of Music.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert; 3:30 p. m., Educational program, C. C. Flannigan; Music; 5:45, Chimes concert; 6:30, Sandman's visit, 8:00, Musical program, Erwin Swindell, director, Arthur McNeil, baritone, Lois McDermand, pianist, Lillian O'Mara, reader, Hugo Schroeder, tenor.

WOO, Philadelphia, Pa. (Eastern Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt, 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra; 4:45-5:00, Organ recital, Mary E. Vogt, 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra; 8:30, Piano and song recital, 8:45, Dance music, Hotel Adelphia Roof Garden Orchestra, 11:10, A continuation of dance music, Hotel Adelphia Roof Garden Orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra; 7:00 p. m., Detroit News Orchestra; Town Crier; Anne Campbell, News Poet; Mrs. Ivy Sweet, soprano; Herbert C. Lamb, baritone; Frederick J. Homberger, tenor.

Saturday, October 6

KDKA, E. Pittsburgh, Pa. (Eastern, 326), 10:00 a. m., Music, 12:30 p. m., Victrola and Victor records, S. Hamilton Co., Piano and player rolls, C. C. Mellor Co., 3:00, Concert, Grand Symphony Orchestra; 3:15, Football game, University of Pittsburgh vs Lafayette College, 6:15, Dinner concert, Westinghouse Band, 7:45, "Let's Make Something," Dreamtime Lady; 8:05, Humor from "Judge"; 8:15, Tribute to George Westinghouse, his 77th Anniversary, 8:30, "Stradella," "Babillage," "Silver Threads Among the Gold," Peer Gynt Suite, "Flower Song," "Adoration," "Jolly Robbers," "The Dance of the Serpent," Westinghouse Band.

KGW, Portland, Ore. (Pacific, 492), 3:30 p. m., Children's program; 10:00, Dance music by George Olsen and his orchestra.

KHJ, Los Angeles, Calif. (Pacific, 395), 12:30-1:15 p. m., Concert, 2:30-3:30, Program, Maurice Keltz, violinist, Helen Nagin, pianist, Carl Nordbloom, cellist; 6:45-7:30, Children's program, "Uncle John", 8:00-10:00, Program, Isabel Block.

KSD, St. Louis, Mo. (Central, 546), 8:00 p. m., Orchestra concert, organ recital, vocal and instrumental specialties, direct from Missouri Theater.

KYW, Chicago, Ill. (Central, 536), 4:00 p. m., News of the day; 5:50, Children's bedtime story, 7:00-7:58, Musical program, W. W. Kimball Co.; 8:05, Under the Evening Lamp, by the Youth's Companion.

WBZ, Springfield, Mass. (Eastern, 337), 7:00, Dinner concert, Hotel Kimball Trio; 7:30, Twilight tales for the kiddies; "This Week's Judge"; 8:00, Concert, Paul Clark, violinist, Russell Day, pianist, 9:00, Bedtime story for the grownups, Orison S. Marden.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble; Blackstone String Quintet, 7:00, Drake Concert Ensemble; Blackstone String Quintet; 10:00, Harmony Girls, Betty Holmes, soprano, Melodians Quartette, Fred Rose, pianist composer, Bob Brown and his ukelele, Jack Chapman's Orchestra.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater; Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Song recital, Popular program, Arcadia Cafe Concert Orchestra; 4:30-5:55, Dance music, 7:30-8:00, Dream Daddy with the boys and girls.

WDT, New York, N. Y. (Eastern, 405), 12:00-12:50 p. m., Tinkerman and the Winged Taxi, Edith J. Craine, Selections, Fletcher Henderson's Happy Harmonists, Songs, Billy Newsome, Songs, Maude Mills; "That Old Gang of Mine," "Indiana Moon," Jackie Harroll; "Play It," "Taint Nobody's Business," Rosa Henderson; Selections, Fletcher Henderson's Happy Harmonists.

WFAA, Dallas, Texas (Central, 476), 12:30-1:00 p. m., Address, Prof. J. Preston Comer; 8:30-9:30, Leland Johnston, pianist; 11:00-12:00, Paul Ashley's Texas Cowboy's Orchestra.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Piano solos, Loretta Kerk; 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 8:00, Short talks and song recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 7:30 p. m., Concert of popular and college songs, Brown and Blue Orchestra of Tufts College.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., "Just Among Home Folks," column of the Courier-Journal, Selections, Strand Theater Orchestra, Harry S. Currie, conductor, 7:30-9:00, Concert, auspices of Mrs. Harriet Kuersteiner, pianist, Karl O. Kuersteiner, first violinist, Dorothy Kuersteiner, second violinist, Theodore Kuersteiner, cellist, Emil Kuersteiner, saxophonist; Walter Kuersteiner, flutist, Reading, "An Interesting Historical Episode."

WIP, Philadelphia, Pa. (Eastern Standard, 509), 3:00 p. m., Dance music, Jordan Lewis Dance Orchestra, direction of Bob Lewis, 7:00, Bedtime stories, Uncle Wip; 8:15, Artist recital and Dick Regan's Concert Orchestra in popular selections.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., "An April Day," "In Memorium," Helen Louise Scheffer, soprano; "Cortege," "Ballet," Maurine Clapp, pianist; "Minuet," "Peer Gynt Suite," Louise Mather, violinist; "Paddy," "Baby," Helen Scheffer, Cello solos, Hugo Sansone; "Largo," "Bouree," Louise Mather, Bessie H. Sonnen, contralto, William Bathatchet, tenor, Oriole Orchestra.

WJZ, New York, N. Y. (Eastern, 455), 3:00 p. m., Fashion developments, Women's wear, 3:05, Recital, Edith Ebert, soprano, 3:15, Dance program, Mel-O-Dy Eight Dance Orchestra, 4:05, Piano recital, Madalaine Miller, Jeanette Tisnee, Hedwig Schacht, pupils of Mary Wiederman, 5:00, Dance program, Mel-O-Dy Eight Dance Orchestra, 5:15, Concert, Blanche Winogram, pianist, 6:05, "Uncle Wiggily Stories," Howard Garis, 7:30, "Jenny Lind Evening," 103rd Anniversary of her birthday, Mr. Fichenberg, director; 8:15, "The Larger Aspects of World Affairs," Frederick Dixon, 8:30, Recital, Elsie DeVoe, pianist, 9:00, Concert, Carl Albert, violinist, 9:30, "Irish Night," Thomas Hannon.

WMAQ, Chicago, Ill. (Central, 447), 8:00-10:00 p. m., Mayor William E. Dever, Music, Blue Fountain Room, Hotel La Salle, Ted Brown Musical Company, Bryant String Quartet, Chicago Theater.

WOC, Davenport, Iowa (Central, 484), 12:00 m., Chimes concert, 3:30 p. m., Educational program, C. C. Hall, Music, 5:45, Chimes concert, 6:30, Sandman's visit, 9:00-10:00, Dance program, P. S. C. Orchestra, V. B. Roehte, baritone.

WOO, Philadelphia, Pa. (Eastern Standard, 509), 11:00-11:30 a. m., Organ recital, Mary E. Vogt; 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra, 4:45-5:00, Band concert and organ recital, Mary E. Vogt.

WTAM, Cleveland, Ohio (Eastern, 390), 8:00 p. m., Program of popular dance music, WTAM six-piece orchestra.

WWJ, Detroit, Mich. (Eastern, 517), 12:00 m., Detroit News Orchestra.

Sunday, October 7

KHJ, Los Angeles, Calif. (Pacific, 395), 10:00 a. m., Sacred service, 10:30, Organ recital from First Methodist Episcopal Church, Prof. Arthur Blakely, organist, 7:00-7:30 p. m., organ recital from First Methodist Episcopal Church, Prof. Arthur Blakely, organist.

KYW, Chicago, Ill. (Central, 536), 10:00 a. m., Church services, Orchestra Hall, Dr. F. F. Shannon, pastor, 6:00 p. m., Chicago Sunday Evening Club services; Choir, Edgar Nelson, conductor.

WBZ, Springfield, Mass. (Eastern, 337), 6:45 p. m., Sunday vespers, Springfield Municipal Chimes, Ernest Newton Bagg, chime ringer.

WDAP, Chicago, Ill. (Central, 360), 9:15 p. m., Drake Concert Ensemble, Other artists furnished by Alexander Nakutin.

WDAR, Philadelphia, Pa. (Eastern, 395), 12:00-12:54 p. m., Organ recital, Stanley Theater, Dinner music, Arcadia Cafe Concert Orchestra, 2:00-3:00, Concert, Arcadia Cafe Concert Orchestra, 4:30-5:55, Piano solos, Edna Finestone, 7:30-7:45, Dream Daddy with boys and girls, 7:45-8:00, Moving picture review, James A. Nassen, 8:00-10:00, Talk on Philadelphia's Industries; Song recital, WDAR Trio, Dance music, Howard Lanin's Arcadia Cafe Dance Orchestra.

WFAA, Dallas, Texas (Central, 476), 2:30-3:30 p. m., Radio Chapel Bible Class, Dr. William M. Anderson, Jr., pastor First Presbyterian Church, 4:00-5:00, Grand concert of the Palace Theater, Don Albert, conductor; Emil Velasco, organist, 9:30-10:00, Choir singers, Central Presbyterian Church, J. Wesley Hubbell, director, 10:00-11:00, Jimmy Allen's Orchestra, Southern Methodist University boys.

WFI, Philadelphia, Pa. (Eastern, 395), 10:45 a. m., Church service from Arch Street Presbyterian Church; Sermon, organ recital.

WGI, Medford Hillside, Mass. (Eastern, 360), 4:00 p. m., Twilight program; "Adventure Hour," conducted by Youth's Companion, Concert program, Edison Laboratory Phonograph, Stories, Arturo, 8:30, "World Unity," under auspices of American Federation of Churches; Evening concert program to be announced.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 3:00 p. m., Vesper service.

WGY, Schenectady, N. Y. (Eastern, 380), 10:30 a. m., Church service, First Reformed Church, Schenectady, N. Y., Rev. Clayton J. Potter, pastor, 8:00 p. m., Orchestra selection, "Largo," "Martha," vocal selection, Bethesda Male Quartet, Perry Gaylor, Howard Balch, James Long, "America, the Beautiful," "Our God, Our Country and Our Flag," "Unfurling the Flag," "Star Spangled Banner," Bethesda Male Quartet, Scripture reading, Judges 7:1-21, Rev. Irving G. Rouillard, Address, "The Battle That Made Us a Nation," Rev. Alfred H. Hootwell, "Traumerei," "The Flight of the Ages," "Airs of Our Country," "Evening Chimes," Orchestra, Rice Quartet.

WHAS, Louisville, Ky. (Central, 400), 9:57 a. m., Organ music, 10:00, Church services, Fourth Avenue Presbyterian Church; Rev. Dr. Charles W. Welch, pastor, 4:00-5:00 p. m., Sacred concert, auspices of The Crescent Hill Presbyterian Church Choir, Farris A. Wilson, director, Melva Hosack, soprano, Lavenna Connell, contralto, George K. Harmon, tenor; Arthur Findling, baritone.

WHK, Cleveland, Ohio (Eastern, 360), 8:00 p. m., Concert program, the WHK Trio.

WJAZ, Chicago, Ill. (Central, 448), 10:00 p. m.-2:00 a. m., Selections, Oriole Orchestra, "Melody in G Flat," "Dance of the Reed Pipes," "Valse in A Flat," Clarence Loomis, pianist, "La Partida," "Inclusions," Ethel Heide, contralto, "Hungarian Dance," "La Paloma," Rena G. Caftow, violinist, "To Show That I Was True," "I'll Have You Love," James Fiske, baritone, "Polonaise in A Major," "Nocturne in A Flat Major," "The Flatterer," Helen Raub, pianist; "Emmet," "You," Ethel Heide, contralto; Selections, Oriole Orchestra.

Monday, October 8

WBAP, Fort Worth, Texas (Central, 476), 7:30-8:30 p. m., Guy Pitner & Brooks Morris; 9:30-10:45, Barnum and Bailey Circus.

WDAP, Chicago, Ill. (Central, 360), 1:35 p. m., Drake Concert Ensemble, Blackstone String Quintet.

WFI, Philadelphia, Pa. (Eastern, 395), 1:00 p. m., Dinner music, Meyer Davis Bellevue Stratford Concert Orchestra, 3:00, Song recital, piano solos, Loretta Kerk, pianist, 6:30, Dinner music, Meyer Davis Bellevue Stratford Orchestra, 7:00, Bedtime stories, Cousin Sue.

WGR, Buffalo, N. Y. (Eastern, Daylight Saving, 360), 12:30-1:00 p. m., George Albert Bouchard, organist; 6:30-7:00, George Albert Bouchard, organist, 7:00, Digest of the day's news, 9:00, Mixed program, Wheat Ice Cream Co., direction of P. Arlow Mathews.

WGY, Schenectady, N. Y. (Eastern, 380), 2:00 p. m., Music and address, Dr. Florence A. Shuman, 7:45, Musical program, "Gone," "Panama," "Twilight," "Jonah," "Marcheta," "Aloha," "Medley of Old Time Songs," Elias Brody, pianist, "Forgotten," "My Virginia Home," "Maris," Kenrat Morris, tenor; Address, Steel Mills, J. E. N. Hume.

WHAS, Louisville, Ky. (Central, 400), 4:00-5:00 p. m., Strand Theater Orchestra, Harry S. Currie, conductor; "Just Among Home Folks," Selections, Rialto Theater organ.

WHAZ, Troy, N. Y. (Eastern, 380), 9:00 p. m., Concert, Christ Episcopal Church Choir, Jared H. Horton, director, 12:00, midnight, R. P. I. Radio Owls.

WIP, Philadelphia, Pa. (Eastern Standard, 509), 3:00 p. m., Artist recital, 6:45, Radio Baseball Dope," by Monte Cross, old time player, 7:00-7:30, Bedtime stories by Uncle Wip.

WLW, Cincinnati, Ohio (Eastern, 309), 4:00 p. m., Special music, Jennie Kehrt, 8:00, "Rustle of Spring," Adelaide Apfel, "Souvenir," Earl Derbie, violinist; "My Mother's Rosary," "Is There Room for Me," "Give Me the Moonlight," "Good Night, My Love," Price Hill Four, Jack Powers, first tenor, James Powers, second tenor, Norman Nagele, baritone, Mike Powers, bass, Harry Gruber, pianist, "Hungarian," Adelaide Apfel; "Nocturne," Earl Derbie, violinist, "The Master Soul," "The Joy of a Rose," Norma Reim, soloist, William Epperhart, accompanist, Roger Hill Dance Orchestra.

WOO, Philadelphia, Pa. (Eastern Standard, 509), 11:00-11:30, a. m., Organ recital, Mary E. Vogt, 12:00-12:55 p. m., Luncheon music, Wanamaker Tea Room Orchestra, 4:45-5:00, Organ recital, Mary E. Vogt, 7:45, Dinner music, Hotel Adelphia Roof Garden Orchestra, 8:30, Song recital and concert, WOO Orchestra, Robert Golden, director, 9:30, Organ recital, Mary E. Vogt, 11:00, Dance music, Hotel Adelphia Dance Orchestra.

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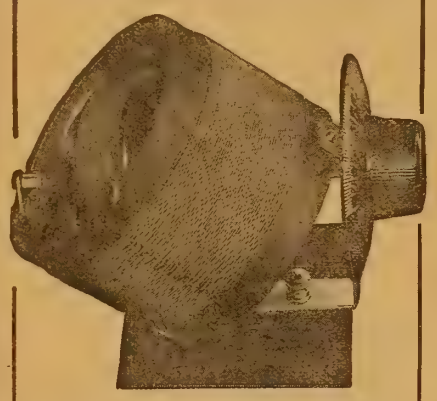

	List	Our Price
Webster Variocoupler with dial, Type 1A	$4.50	$2.19
Moulded Coupler	5.50	4.19
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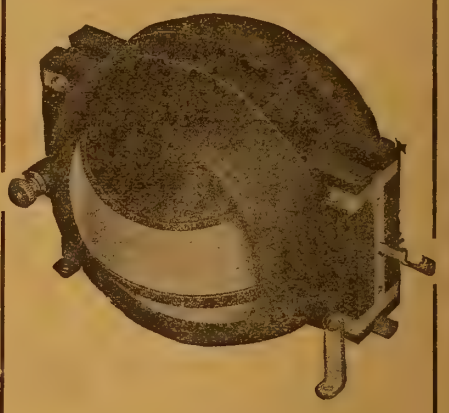

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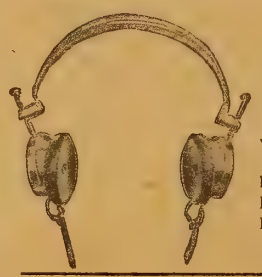

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Double Phone Cord	1.00	.75
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6x18x6—Stained	$3.00
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7x9x6—Stained	2.25
Bakelite, $\frac{3}{16}$, cut any size; per square inch	.01½

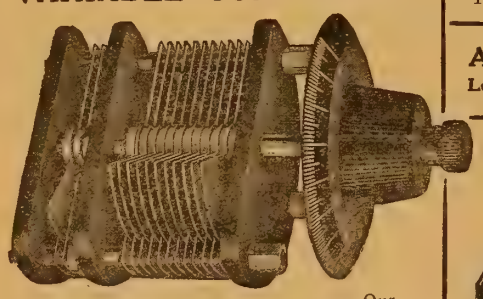
UNITS

All these Units are enclosed in substantial beautiful mahogany cabinets that will grace any home.

	List	Our Price
WEBSTER 1-A Tuner Unit	$35.00	$17.50
WEBSTER 2-A Detector Unit	15.00	7.50
WEBSTER 3-A Audio Frequency Amplifier Unit	17.50	8.50
WEBSTER 4-A Radio Frequency Amplifying Unit	17.00	7.50
WEBSTER 3-B Audio Frequency Amplifier Unit	27.50	17.00

This unit especially designed as an effective amplifier for the 2-A Receiving set. It consists of two stages of audio amplification having 4 to 1 ratio. The two vacuum tubes are controlled by one rheostat which makes for simplicity in operation. The unit is equipped with the following apparatus: 7 1A Binding Posts, 1 1C Socket, 1 1E Rheostat, 2 3B Transformers.

VARIABLE CONDENSER



	List	Our Price
Variable Condenser, .0005 (Same as 23 plate)	$5.50	$3.00
Variable Condenser with Vernier, .0005 (Same as 23 plate)	6.50	4.50
Variable Condenser, .001 (Same as 45 plate)	6.00	3.50
Variable Condenser, with Vernier, .001	7.50	5.00
Walnert Variable Condenser, .00025		1.75

AUDIOPHONE LOUD SPEAKER (Large Size) $22.50

Loud Speaker Cord, 20 feet, 4 tips, list $1.25, our price..... .75

GRID-LEAKS

Freshman Grid-Leak with Condenser	$1.00	$ .79
Freshman Grid-Leak	.75	.59
C. R. L. Variable Grid-Leak with Condenser		1.59

SWITCH LEVER

Switch Lever, 1-A, 1½" Radius, 1⅜ Knob, $\frac{3}{16}$ Shaft.. $ .75 $ .35

	List	Our Price
PRESTO AERIAL SUPER-SEDER ADJUSTABLE, can be attached to electric light socket or telephone.	3.00	2.00
ROGERS RECEIVING RADIOMETER, can be used like Radio Frequency Transformers		3.00
Rheostat, 6 or 25 ohms	.90	.59
Combination Socket and Rheostat with Vernier	3.00	2.29
B Metal Ever-Ready Tube Detector, Type B		1.50
Erla Reflex Crystal		.89
Hydrometer Perfect	.85	.65

H. C. COIL MOUNTING

	List	Our Price
Three Coil Mounting with Dial	$5.00	$3.85
Geared Three Coil Mounting		5.00

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Reflex Circuit Works on Loop or Aerial

Aerial Hook-Up Is Combination of Several Types

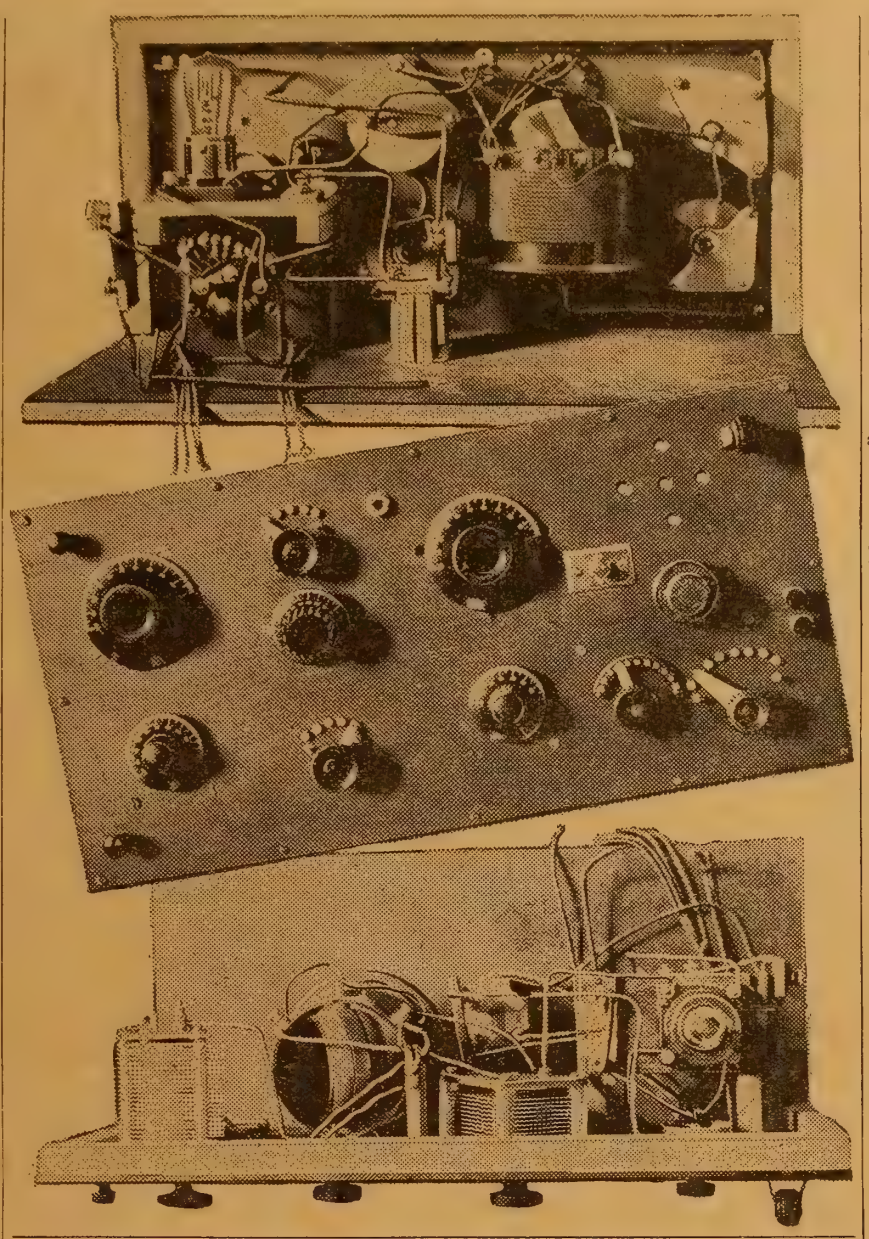
By Dr. S. L. Kalinowski

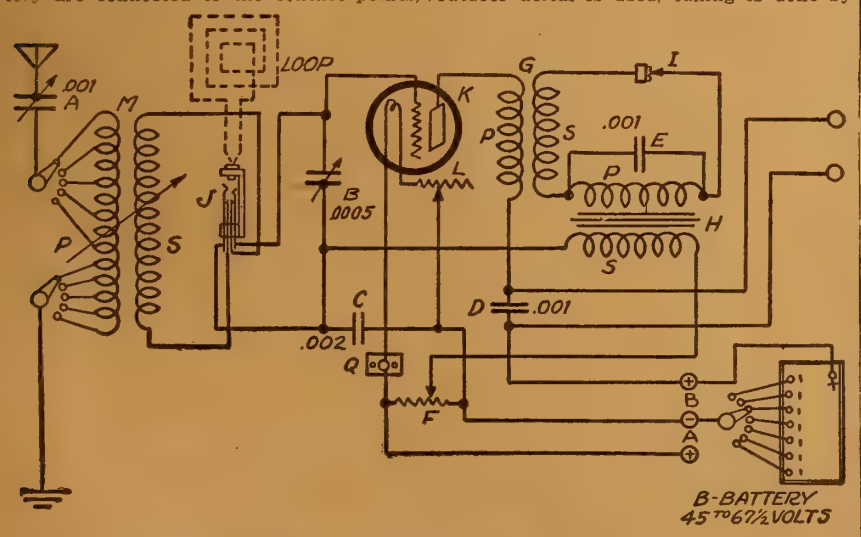
OUT of the many different types of receiving sets the writer selected the reflex circuit for experimentation. After almost a month of this work the following hook-up was found to give best results:

Beginning with the aerial, there is a 43 plate vernier condenser, A, of .001 mfd. capacity in series with the aerial and the primary of the variocoupler, M, the latter being of the ordinary type, having five taps of units to the aerial and five taps of tens to the ground. Across the secondary, or the rotor of the variocoupler, is a 23 plate vernier condenser, B, of .0005 mfd. capacity. Between the secondary of the variocoupler and the 23 plate condenser a double circuit jack, J, is placed for the use of a loop aerial, the plugging in of which cuts out the large or outdoor aerial, the 43 plate condenser, variocoupler and ground. By using the outdoor aerial, the writer has obtained better results than with the loop, which was of the 3 foot square type with 13 turns wound solenoid fashion. The fixed condensers, C, .002 mfd.; D, .001 mfd., and E, .001 mfd., are mica type and must have correctly fixed and tested capacities, as they are very important, being the means of properly balancing the circuit, remembering that both Radio and audio frequencies are present. Also make sure that the 43 plate and 23 plate variable condensers have the proper capacities, as often they do not come up to their rating. The vernier condensers are also used separately. Several transformers were tried in the Radio frequency circuit, and nearly all of them worked well.

Transformer, Amplifier and Wiring

The Radio transformer in the diagram is marked G. Any good transformer will do well, and if the reader has one at hand and intends to build a reflex set, it will be best for him to try the one he has on hand. In the audio frequency, H, a ratio of three to one or four to one works best. Higher ratio transformers were tried, but the lower ratios proved better. The filament rheostat has a vernier, and is of the 6 ohm resistance type, to which a 25 ohm radio resistance unit is attached for the purpose of controlling the ¼ ampere vacuum tubes if used. The filament rheostat, L, and its vernier are very important in the control of the filament current, as proper filament control not only adds to the life of the tube, but also aids greatly in tuning. It is not necessary to do away with the rheostat that one may have of the 6 ohm type if the ¼ ampere tube is to be used, because a 25 ohm resistance unit may be attached to it to increase the resistance to about 30 ohms. The vacuum tube, K, is an amplifier. Any amplifying tube taking a voltage from 45 to 67½ or more on the plate will do. When the set is not in use, the current from the six volt battery is cut off by means of a switch, Q, while the plate voltage is controlled by means of switch points and lever, one of the points being dead and serving to cut off the B battery voltage. The minus binding posts on the B battery are connected to the contact points, while the lever which sweeps over these points is connected to the minus post of the A battery. The plus binding post on the B battery leads to the phones or loud speaker. The A and B batteries and their outputs are also controlled by a potentiometer, F, having a resistance of 200 ohms. Any crystal detector, I, will serve its purpose in this circuit. No advantage is gained by using a vacuum tube as a detector, at least none were noticed. All the wiring is bus bar insulated by tubing and as short as possible. The panel is 10 by 20 by 3/16 inch of hard fiber. (The writer uses all hard fiber panels in his experimental work prior to mounting a definitely decided hook-up on bakelite.)





Tuning In with Loop and Outdoor Aerials

Tuning is not as difficult as some writers say it is. The outfit is critical and very sensitive, as has been found during experimentation and even more so when the set is completed. When the large or outdoor aerial is used, tuning is done by means of the variocoupler and the 43 plate and 23 plate condensers. The crystal detector is adjusted to a very sensitive spot, and when the signal or broadcast comes in, adjust by means of the variocoupler rotor, verniers, rheostat, potentiometer and B battery. When a small loop or indoor aerial is used it is plugged in by means of a plug into the jack, J, thus cutting out the variocoupler, 43 plate condenser and large aerial and ground. Tuning is done by rotating the loop aerial into proper position, and by means of the 23 plate condenser. Clearing up for loudness and clearness is accomplished the same way as before.

Distance, Clearness and Sharpness

There are no claims as to originality or any great improvement for this outfit as it is merely something that other men have done, but I may say that of all the different hook-ups I have tried the reflex circuit is my first choice. For instance, clearness and sharpness is of the first order. On it Atlanta, Davenport, Chicago, Schenectady and other stations have been received.

In combination with a Magnavox and a one tube power amplifier this one tube reflex is heard all over a three story building as clear as a bell, without hums, hisses or knocks. A hook-up of the outfit accompanies this article and anybody wishing to construct one like it will surely feel well paid for his trouble. Try it and judge for yourself.

A beginner should learn the operation of a simple Radio set first before attempting complicated hook-ups.

GENUINE EDISON ELEMENTS (new) for making "B" Batteries, obtained from U. S. Government. A positive and negative element—6c; glass tube—3c; all other parts at reasonable prices. Postage, etc., 50c extra per order. Free instructions. TODD ELECTRIC COMPANY, 109 West 23rd Street, New York.

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Write for a Mu-Rad Franchise

To get complete details of our special Mu-Rad proposition will not obligate you. Write also for a copy of our handbook catalog of other profitable Radio merchandise. Write today before someone else in your neighborhood gets exclusive Mu-Rad privileges.

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General Offices: 407 South Dearborn
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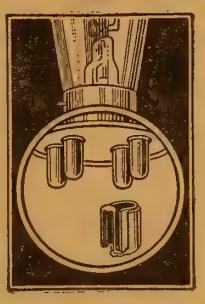
You Don't Need Tubes to get out of town. If you want new stations on your crystal set WRITE ME TODAY. Mine works 400 to 1,000 miles without tubes or batteries! Thousands have bought my plans and now get results like mine. CHANGES OFTEN COST LESS THAN A DOLLAR. Send self-addressed envelope for further information. Leon Lambert, 501 South Volutsia, Wichita, Kansas.

GAMBLING?

YOU ARE IF YOUR RADIO TUBES ARE UNPROTECTED



Your Vacuum Tubes are the most delicate parts of your Radio Set.

They are easily blown out—you have probably already had this exasperating experience—it is apt to happen at any time.

"B" Battery wires accidentally crossed for only an instant with the filament leads or sudden excess current from the "A" Battery will do it.

You can prevent this and save yourself money and inconvenience and relieve your mind at a trifling cost.

INSTALL

RADECO SAFETY FUSES

on all your tubes. Applied in an instant to one of the filament terminals. Will fit any standard tube going in any standard socket.

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Chicago, Illinois

E. C. RAYNER, Publisher

Chas. F. Smisor, Editor Evans E. Plummer, Managing Editor
H. J. Marx, Technical Editor M. W. Thompson, Associate Editor

Eastern Representative, Jacob Miller, Times Bldg., Times Square, New York; Telephone Bryant 4909

Pacific Coast Representatives
E. J. Wood, 251 Kearney St., San Francisco
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Member of the Audit Bureau of Circulations

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PUBLISHED WEEKLY

SUBSCRIPTION RATES
Yearly in U. S. and Possessions and Canada, $5.00.
Foreign postage, $1.00 additional. Single copies, 10 cents.

Vol. VI Chicago, Saturday, October 6, 1923 No. 13

Oratory Before the Microphone

Appearance Accounts for Nothing, Speech Is All.

THE Radio orator need not worry about facing his audience or directing his voice to all parts of the hall. The nervous Radio speaker can rely on no prompter, because the microphone picks up the faintest whisper and sends it out through space. After he has been introduced, he must begin immediately. If he falters or coughs, nervously impatient listeners will tune to another station. The attention of the unseen audience is held by words, and words alone.

Deprived of elocutionary gestures and tricks, Radio speakers must depend upon their speech. There are no friendly smiles or applause to indicate success, nor the shuffle of feet or restless moving about to tell of failure.

The Radio speaker is likely to be embarrassed as his last word strikes the microphone. Silence reigns in the studio. When he turns away and sees the announcer near, he feels like a person caught talking to himself.

The studio is a place of suspense. The broadcasting novice would like to run away after he has finished his first talk. In the reception room adjoining, he sees others scheduled for the program waiting their turn. The scene reminds one of a doctor's anteroom, because a general tension and silence prevail. The atmosphere is of nervous portent.

Underground Communication

Longer Wave Lengths Seem to Penetrate Earth Better

IN CONNECTION with its efforts to keep pace with all safety and rescue developments, the bureau of mines of the department of the interior, is planning to continue its investigations as to Radio communication underground. The development of Radio has been rapid and officials of the bureau feel that any application to mine rescue work must not be neglected.

Some months ago preliminary Radio experiments in sending and receiving underground at a mine in Pennsylvania were conducted with partial success. It was found that signals could be heard distinctly through fifty feet of coal strata but that the audibility fell off rapidly as this distance was increased. In all experiments a vertical antenna was found to give the better results. The horizontal antenna gave practically no reception. A loop of a single turn was used with fair results.

The present preliminary experiments, while unsuccessful in indicating any practicable method of using Radio waves for underground communication, nevertheless indicate clearly that electromagnetic waves may be made to travel through solid strata. The "absorption" or loss of intensity with distance is very great for the short wave lengths used in these experiments. Longer wave lengths are known to suffer less absorption and may possibly be found practically effective under certain conditions.

Results Obtained by Broadcasting

New Wave Lengths Cause Some Changes in Sets

THERE has been rapid progress in broadcasting recently. Instead of the overcrowding of all stations on the two wave lengths of 360 and 400 meters, the stations have now been assigned definite wave lengths covering the wide range of 220 to 545 meters. This has greatly increased the possibilities of broadcast reception, provided the listener can use his receiver in such a way as to pick up any desired station. Difficulty has been experienced by some in receiving the longer waves.

New stations have been established in certain localities producing very powerful signals in the receiving sets of nearby listeners and somewhat interfering with reception at more distant stations while their local station is in operation.

Then, too, a few stations have been shut down or transferred, thereby requiring the listeners to get their programs from more remote stations, which in turn involves some modifications in the receiver or in the way in which it is handled. Fortunately all of the difficulties mentioned can be overcome to a great extent by a little care and a proper attitude.

RADIO INDI-GEST

You a Lawyer? Hope You Blow 'Em All!

WHY DO THEY MAKE TUBES THAT TAKE DIFFERENT VOLTAGES, AND HOW'S A LAWYER TO KNOW THAT A FOUR-VOLT TUBE AND A SIX-VOLT TUBE ARE ENTIRELY DIFFERENT ANIMALS? BUT EXPERIENCE IS THE BEST TEACHER, SO THEY SAY, AND OF COURSE IT HELPS THE TUBE BUSINESS. ANYHOW— I PUT A FOUR-VOLT TUBE ON A SIX-VOLT LIGHTING BATTERY. PING! WENT THE TUBE, AND SO I LEARNED.

GOO GOO.

A-B-C Lessons for Indigest Beginners

Chapter XVI—Refer to Our Back Numbers for Data

BY GOSH

P IS for Patents,
That some folks try to steal,
So they can boss the ether
And make we fans all squeal.

Since Father Has a Radio

Broadcast from WOR by Charles L. H. Wager, Author

Since father has a Radio our home is not the same,
In fact, 'tis all confusion and Radio is to blame,
No longer is the routine of daily tasks gone through,
Nor are those things attempted which we had planned to do.

Since father has a Radio he sits at it all day,
And mother has to do the chores and keep the kids away,
He says he's trying to tune in, he can't have any noise,
We have to tiptoe round the room, 'tis hard on healthy boys.

Since father has a Radio you ought to hear him talk,
"O, Boy! I'm hearing Pittsburgh," "Say Ma! I've got New York,"
And "Darn that measley naval code," "Ye Gods, just hear that band
From 'X-Y-Z' in Boston, Mass.," and "Isn't Newark grand?"

Since father has a Radio even mother has the bug,
To music from some distant place she sweeps the parlor rug,
She irons with the ear-phones attached upon her head,
And while she listens in at night she mixes up the bread.

Since father has a Radio our meals are served on trays,
We masticate in rhythm with some late symphonic craze,
We drink our coffee and our tea by sips arranged in code,
But we've got used to anything since Radio is the mode.

Since father has a Radio he never goes to church,
He used to be a deacon but he's left them in the lurch,
For now, when Sabbath comes around instead of in the pews
He sits at home and listens to some far-off preacher's views.

Since father has a Radio the neighbors now come in,
The Reeds, the Peaks, the Stones, the Pratts, with children all a-grin,
They say, "We just dropped in to call, Hello! what have you here?
I swan!—a Radio—By Gosh! do you mind if we hear?"

Since father has a Radio our home has gone to pot,
And even to the flivver we scarcely give a thought,
But father says that Radio has been a boon to men,
I wonder—will it ever make home sweet home again?

No, He'za Dial "Pointer"

Our Pup, He'ze fan all right,
For he listens in every night.

Looks like a Setter by his tail;
Pop says he must be "Air-dale."

Al Brown.

Heave a deep sigh
For Will Kinard—
The roof was high,
The pavement hard.

Tell It to the Phonograph

MOTHER (Listening to son's new Radio set): John, play that same piece over again. I think it is just wonderful.

H. K. C.

A Few More Bends

Condensed

By DIELECTRIC

A majority of the broadcasting stations have completed their operations intended to improve the quality and range of their transmission. The effect of this work has been noticeable in many instances. It yet remains, however, for Station KYW to put into effect the plans mapped out by Radio engineers whereby that station will overcome certain obstacles due to wave length and location. There are large numbers of grand opera fans who look forward to hearing the Chicago company through the courtesy of KYW, and to these the news will be welcome.

I doubt very much the basis in fact for the contention of some that broadcasting of crop reports (prices) by various stations consumes time not proportionately appreciated. Stop long enough to realize the percentage of this country's inhabitants who secure their living from the soil; consider the price fixing and marketing difficulties confronting them, then revise your conclusion. WBAP is receiving evidence of keen appreciation from cotton and grain men of their broadcasting service along this line. The farmer needs it and values it highly.

Re-broadcasting programs by one or more stations in the United States is not a new story; it is frequently accomplished and with much success. The musical program at the Capitol theater in New York City is broadcast each Sunday evening by Station WEAF and re-broadcast by WCAP, in Washington, D. C., and WMAF, South Dartmouth, Mass. Now turn to the Pacific coast and see what is going on there. Long distance reception during summer months is admittedly poor in the South Pacific region, yet KGU in Honolulu has been re-broadcasting programs from Station KHJ, the Los Angeles Times, and getting it nightly!

One more natal celebration is worthy of notice here, not only because it marks the third birthday of a well-known broadcasting station, but for the fact of that station being the first owned by a newspaper to come on the air. The Detroit News could only count on a radius of a hundred miles of effective transmission when it started, but that has been increased. England, Hawaii and Peru have successfully received its entertaining features, including concerts by a well organized orchestra composed of members of the news staff. Good wishes to Station WWJ.

It is not easy to erase from the mind the picture of horror and destruction which came to us from Japan a few weeks ago. It should not be easy to lose sight of the tremendous importance of Radio to thousands of earthquake sufferers on that island. Had news of the disaster been delayed forty-eight hours (as would have been the case had Yonemura failed), then the suffering and death records would today be much larger. One lone Radio station in sole touch with the outside world provided means of bringing quick aid to the stricken.

I am quite sure that the use of Radio as a means of reaching America's millions of people in behalf of any cause has a distinct advantage. A message delivered orally by Mrs. Wallace Reid from broadcasting stations, urging a more active fight against the drug evil, makes an impress not easily erased from the mind. She hopes to have the active support of broadcasting stations throughout the land, giving time to information on the appalling conditions confronting those interested in suppressing this mostrous evil. Are you with her? Get busy.

First Steps for Beginners in Radio

Chapter XIX—Locating Trouble in the Set

By Thomas W. Benson, A. M. I. R. E.

BEGINNERS will find the accompanying series by Mr. Benson very helpful in learning the rudiments of the popular science of Radiotelephony. The series will be concluded in our next issue with

Chapter XX—Useful Information and Formulas.

IN the last chapter we treated the testing of the individual instruments of the Radio set, and this chapter will take up the effect of defective apparatus in the operation of the set. It is practically impossible to cover every trouble that might develop in the operation of a set, but sufficient data will be given to enable one to eliminate the more common troubles and serve as a guide in more difficult cases.

When a set refuses to function it is advisable to tackle the problem in a systematic manner. First of all make sure the aerial and ground are connected, the phones connected up, the battery wires properly attached and the tubes in their sockets and lighted. By loosening the phone cord and tapping on the phone post a click will be heard which indicates the B batteries are connected up. If after checking the above no signals are received or the set seems dead, it will be necessary to go to the interior of the set to locate the trouble.

Testing Out Telephones

Connect the phones into the plate circuit of the detector tube. If no signals or noise are heard, it may be for any of the following causes: Batteries run down; tube not making contact in the socket properly; polarity of B battery reversed; telephone defective, phone condenser shorted, or primary circuit not tuned.

If good signals are heard in the detector circuit but when switching on the amplifiers the signals are weak, we may look for the following: Tubes not making contact; battery too low to operate amplifiers with detector on; a burned out transformer, or an open transformer or phone condenser shorted. If jacks are used they may be making poor contact or shorting transformer primaries.

Weak signals in the detector circuit may be due to one or more of the causes that will prevent signals entirely, and also to wrong connection on the tickler coil; grid condenser shorted; open circuit in the grid, or improper adjustment of the tube filament brilliancy and plate voltage when a soft tube is used. By checking all the above when a set refuses to work up to its maximum efficiency, the trouble will usually be located. At least the check will in all cases serve as a guide in locating it.

Locating Stray Sounds

We may now turn to the problem of locating stray sounds, such as scratching, scraping or popping. When these occur in the detector circuit with the amplifiers turned off, they are due to one or more of the following: If tuning the set changes the noise it is probably caused by excessive voltage on the plate or filament; too large a tickler inductance; irregular oscillation of the set due to poor connection to aerial or ground, and in some cases when too low a capacity is used for tuning, the aerial circuit may make it unsteady and difficult to handle. In the latter case, swaying of the aerial will often affect the set. It is advisable to use a larger condenser in the aerial circuit to stiffen it and more inductance to again obtain resonance. Popping sounds occur when the grid charge becomes too great and can be remedied by lowering the resistance of the grid leak.

When the noises are not affected by tuning, the trouble may be due to any of the causes listed in the last paragraph or to poor connections in and between instruments. Look for loose connections on the instruments, make sure the rheostat is making good contact; that variable condensers are not shorted by dust or warped plates, and that aerial and ground are tightly connected. We must include under this head static, but one can usually tell this after a little experience. There are many types of static, but if the sounds come and go when the set is not touched and are very irregular in occurrence, the trouble can usually be laid to static.

Occasionally the knocking or ticking sounds are heard when the amplifiers are switched on and not in the detector circuit. Switch off the detector, and if the sounds continue they are in the amplifier units and may be due to poor connections between instruments, poor contact at rheostats or batteries, or to defective transformers.

Howling and Whistling

More general are howling and whistling. When they occur in tuning and encountered in the detector circuit with the amplifiers off, excessive feedback, often

(Continued on page 20)

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WD-11 or WD-12	$3.50
C-300 or UV-200	2.75
C-301 or UV-201	3.00
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24.00	6-110	14.75
28.00	6-130	18.75

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$1.75	22½ Volt Small	$ .75
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4.25	45 Volt Small	2.00
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$6.50	Pioneer Variometer	$4.50
7.00	Pioneer Vario Coupler	4.75
180°	Coupler with spider rotor	3.50

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New Thordarsen
$4.00 Low ratio $3.25
4.50 High ratio 3.75

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High Ratio $3.25
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$1.10 ..... $ .85

HYDROMETERS

Small ..... $0.35 Large ..... .75

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1.00	Bakelite Bell Sockets	.90

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PHONES

Nerco Phones $3.00

MISCELLANEOUS

Switch Arms ..... $ .14

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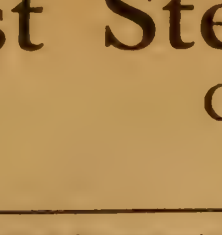

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Crowfoot offset and solder-flux compound on blades simplifies soldering. Nickel-plated base bracket with rounded corners. German-silver blades and sterling silver contact points.

List Prices

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No. 2—Single Circuit, Closed 55c
No. 3—Double Circuit, Closed 75c
No. 4—Single Filament Control 75c
No. 5—Double Filament Control 80c

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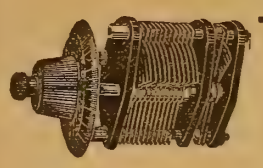

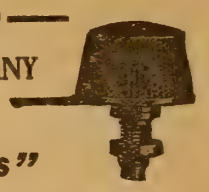

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23 Plate	Variable; value, $3.50	1.35
43 Plate	Variable; value, $4.50	1.95
13 Plate	VERNIER; value, $5.50	$3.75
23 Plate	VERNIER; value, $6.00	4.00
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Honeycomb Coils, 75 turns mounted .. 1.00
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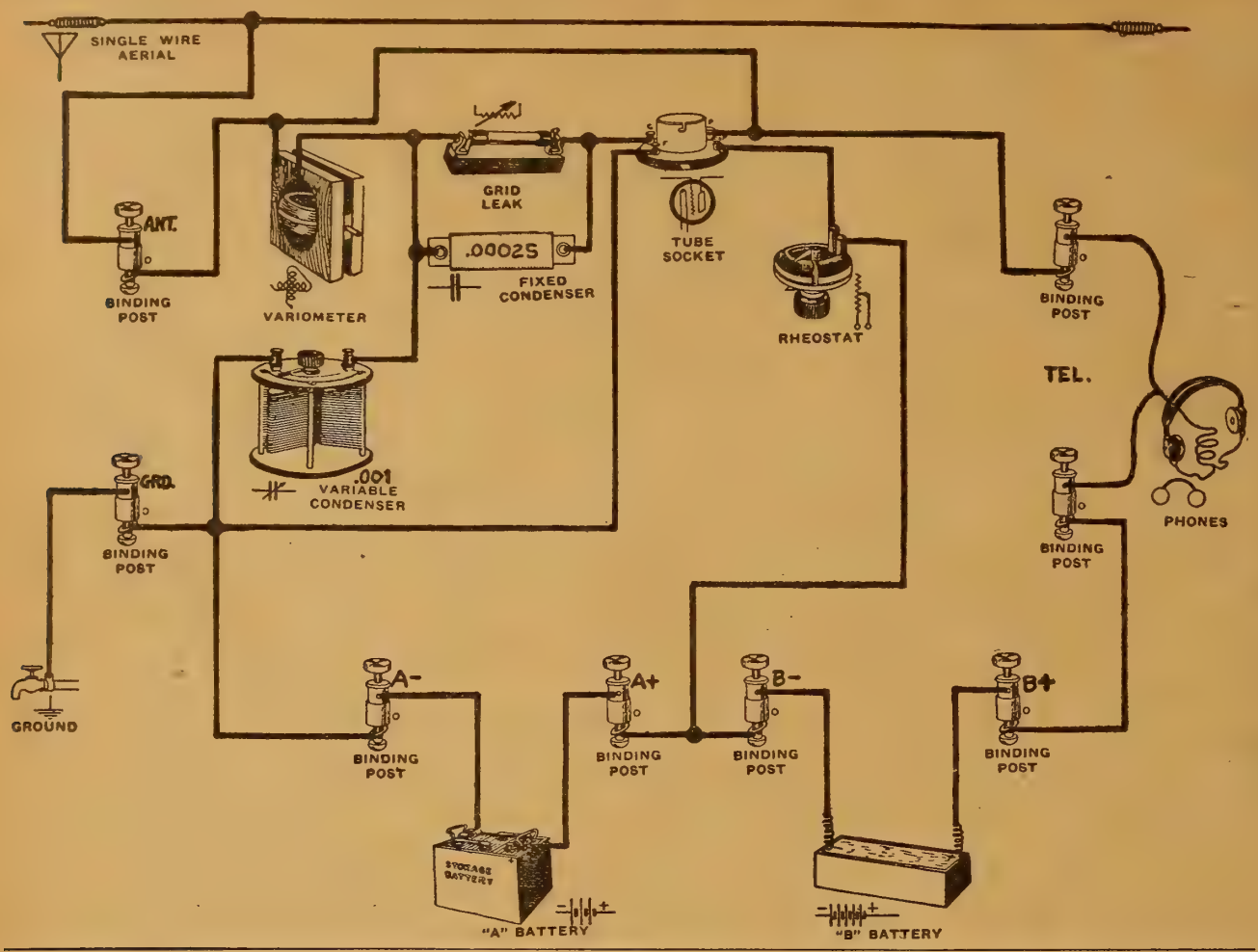
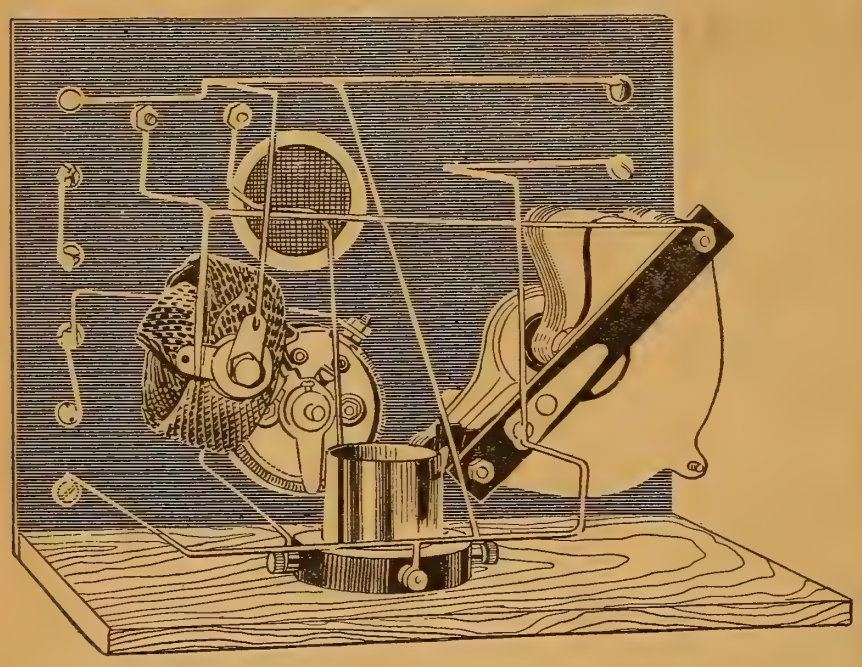


THE circuit shown in the above diagram is by no means a new one but it has numerous good points that make it especially attractive for the new fan. Not only is it an extremely efficient form of circuit, but its simplicity and low cost make it an ideal receiver. A apparatus required is one tube socket, one rheostat, one variable condenser (.001 mfd.) preferably with vernier, a variable grid leak and grid condenser (panel mount unit was used) on variometer, and eight binding posts.

A dry cell tube can be used if desired; as a single wire not over 60 feet long is sufficient. If a longer aerial is used the condenser capacity may have to be reduced to .0005 microfarads.



two stage audio frequency amplifier is easily attached.

The other illustration shows an assembled set, mounted on a 7 by 9 inch panel with a 5 by 7 inch baseboard. The the B battery is 22½ volt recommended, but this can be increased if UV-99 or C-299 tubes are used. As the diagram indicates, the wiring is very simple.

The aerial need not be a very long one

Get Advice Before Purchasing

Anyone having little technical knowledge on the subject of radio should take some experienced friend's advice before buying any piece of apparatus. If this is not possible, he should purchase articles made by companies having a recognized standing in the field and whose engineers are capable of giving the best in design.

Lettering Bakelite Panel

To letter a bakelite panel, clean the surface with wood alcohol to remove any greasy film, then write what you want on the panel with a sharp, stiff steel pen and draftsman's white ink, such as is used on blueprints. When the writing is perfectly dry, cover it with transparent varnish to protect it, using a fine, soft hair brush.

If at any future time you want to remove it, dampen a rag with wood alcohol and wash it off; the wood alcohol dissolves the varnish.—James E. Murray, New York city.

Pour the acid (a few drops at a time) into the water when mixing electrolyte for a lead storage cell. Never pour the water into the acid.

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12.00 Baldwin Type C Phones	9.65
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Determination of Resistance Values for Rheostats

Relations of Resistance, Voltage and Amperage for Various Tubes

By H. J. Marx

THERE has been created a decided confusion in the minds of the Radiophans in regard to the proper resistance in rheostats to be used for the various tubes now on the market.

The immediate result has been the flooding of the market with a series of rheostats of a resistance range running from one ohm for a power rheostat (controlling two or more tubes) to 50 ohms for the UV-199 and C-299 tubes.

Fans are using dry cells connected in series and some in parallel, or storage batteries with single, double and three cells. Each change in current source, and also in tubes used necessitates a consideration of the proper rheostat required. Apparently this has been extremely puzzling to fans but can easily be remedied by an application of Ohm's Law.

Direct Current Circuit

This part of the vacuum tube circuit, which pertains to the filament lighting, is a simple direct current circuit. As such, it follows Ohm's law:

$$I = \frac{E}{R}.$$

The proper application of this formula will solve all problems covering the proper selection of rheostats.

Function of the Rheostat

For example, the familiar UV-200 and C-300 operate at 3 volts' potential and draws approximately 1 ampere. The average source of current supply is the 6 volt storage battery. By introducing a variable resistance, such as a rheostat; the voltage across the filament can be varied from about 3 volts to 6 volts. Then if the tube operates even better at 4.5 volts than at five, this can be taken care of by means of the rheostat. Obviously, by increasing the rheostat resistance, the range of variation also can be increased, from even lower values to the maximum 6 volts of the battery.

Since the tube does not begin functioning until about 4 volts are applied to the filament, there is no gain in the surplus control range. In selecting the rheostat for any combination of tube and battery, the resistance should be such as to furnish a voltage range covering that of the operating range of the tube.

Filament Resistance

Going back to the tube mentioned, if the operating voltage is five and the current consumption at that potential 1 ampere, the filament resistance can be computed by applying Ohm's law.

$$R = \frac{E}{I} = \frac{5}{1} = 5 \text{ ohms.}$$

The tube begins operating at about 3 volts on the filament. In order to find the consumption at this voltage, Ohm's law is again applied.

$$I = \frac{E}{R} = \frac{3 \text{ volts}}{5 \text{ ohms}} = .6 \text{ amperes.}$$

The filament resistance varies slightly as the heat of the filament is changed, but this can be disregarded.

The source of current, however, has a potential of 6 volts. If only .6 amperes is wanted, the required total of resistance, including filament and rheostat will be:

$$R = \frac{E}{I} = \frac{6 \text{ volts}}{.6 \text{ amperes}} = 10 \text{ ohms.}$$

The filament resistance is 5 ohms so only 5 ohms more are required in the rheostat. The average storage battery, when fully charged, is likely to have a slightly higher voltage, so the standard rheostat used was the 6 ohm type.

Power Rheostats

When rheostats are used to operate two or more tubes connected in parallel, conditions are a little less simple. The effective filament resistance is the result of the resistance of one divided by the number of tubes connected in parallel. The current consumption is that of one tube multiplied by the number of tubes. For example, where two tubes are operated by one rheostat, the required resistance becomes:

$$R = \frac{E}{I} = \frac{6 \text{ volts}}{.6 \text{ amperes} \times 2} = 5 \text{ ohms.}$$

The effective filament resistance is only half of one, or 2.5 ohms. The required resistance in the rheostat is therefore 2.5 ohms. The standard two tube power rheostat has a resistance of 3 ohms. The factor to be considered in power rheostats is whether the resistance wire has the carrying capacity for the current required; if not, the resistance wire will fuse. If an ordinary 6 ohm rheostat is used for more than one tube, this usually happens. The safe limit for the standard 6 ohm rheostat is 1.5 amperes.

Dry Cell Tubes

As previously explained, it was the development of the dry cell tube that started most of the trouble in respect to rheostats. In order to make this as clear as possible, it will be advisable to analyze the problem for the two popular types, under different battery conditions.

The UV-201A and C-301A tubes operate on a filament voltage of five, but only consume .25 amperes of current. The filament resistance then will be 20 ohms. Assuming that the tube begins functioning at 3 volts, the current consumption will be .15 amperes.

If a 6 volt storage battery is used, the total resistance required is:

TUBE	Battery Voltage	Operating Voltage	Current Amperes	Filament Resistance Ohms	Total Resistance Necessary	Rheostat Resistance	Detector Plate Voltage	Amplifier Plate Voltage	Grid Bias Voltage	Grid Leak Megohms	Grid Condenser Microfarads
UV-200 C-300	6	5	1	5	10	5 to 6	22.5	.....	.....	1	.0005
C-301A UV-201A	6	5	.25	20	40	20 to 30	22.5	45to80	.....	1 to 5	.00025
WD-11 WD-12	1½	1.1	.25	4.4	10	5 to 6	22.5	45 60 80 100	0 1.5 3 4	2	.00025
UV-199 C-299	4½-6	3	.06	50	90to130	30 to 75	22.5	40 60 80 100	0 3 4.5 6	1 to 5	.00025
UV-201 C-301	6	5	1	5	10	5 to 6	22.5	40 60 80 100	0 3 4.5 6	1	.0005

$$R = \frac{E}{I} = \frac{6}{.15} = 40 \text{ ohms.}$$

The resistance of the filament is 20 ohms, so the rheostat resistance should be 20 ohms. Naturally, a 25 or even 30 ohm rheostat simply increases the range slightly, but can be used. If three dry cells in series are used, the voltage of 4.5 is not sufficient, whereas four cells give 6 volts, making the condition parallel to that of the storage battery.

UV-199 and C-299

These tubes operate at 3 volts and draw .06 amperes, thus giving a filament resistance of 50 ohms. They do not start functioning until a filament voltage of about 2.3 is reached.

At this voltage, the current draw is:

$$I = \frac{E}{R} = \frac{2.3}{50} = .046 \text{ amperes.}$$

Now if three dry cells, connected in series (two cells leave no margin) are used, the potential at the source is 4.5 volts. The required total resistance will then be:

$$R = \frac{E}{I} = \frac{4.5}{.046} = 100 \text{ ohms.}$$

The rheostat resistance required will then be 50 ohms. Sixty ohm rheostats are sometimes used.

If a two cell storage battery (4 volts) is used, the resistance of the rheostat should be about 30 ohms or more.

Suppose, however, that a 6 volt storage battery is used, the required total resistance will be:

$$R = \frac{E}{I} = \frac{6}{.046} = 130 \text{ ohms.}$$

This indicates that the rheostat resistance must be 80 ohms. Under these circumstances it is of particular importance that the voltage should not exceed 4.5 or even 4 volts. It is suggested, in this case, that a permanent resistance of 25 or 30 ohms be inserted in series, the rheostat requiring only 50 ohms. If, then, the rheostat is accidentally turned on full, there will always be the fixed resistance in series with less possibility of burning the tubes.

The use of a fixed resistance is recommended only where the voltage at the source greatly exceeds that required for operation. A small margin over the operating voltage is always necessary in order to compensate for deterioration of battery and variations in tubes.

WD-11 and 12 Tubes

When using WD-11 or 12 tubes with a single dry cell, the required rheostat resistance will be found to equal 6 ohms.

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RADIO FOR EVERYBODY

(Continued from page 11)

coil, also air core, but variable. Such a drawing is used to show either a coil from which short leads are brought out at intervals to switch points or a coil which is varied by moving a metallic slider along a rod, the slider making contact with the wires of every turn, the insulation having been removed for a distance of about $\frac{1}{16}$ inch on every turn. Figure 4c specifies that the coil be varied by taps and a switch. In 4d we have a coil wound on an iron core and non-variable.

Capacity is another property necessary in a circuit in which Radio frequency currents are to travel. Capacity is the result of having close together two metallic surfaces or wires in which alternating or pulsating direct current is flowing. For a better understanding of this let us consider Figure 5a. Here we have a circuit consisting of a coil of wire (X) and a device consisting of two flat plates about 2 inches square and $\frac{1}{8}$ inch apart. In this circuit, Radio frequency current is flowing and we will consider it at a moment when the current is flowing in the direction indicated. The current spreads out over plate A until the plate is full. If the plate is of the correct capacity, it will become full at just the moment when the current reaches its greatest value and begins to weaken. As plate A is full and plate B contains no electricity we have an unbalanced, unstable condition and plate A discharges or unloads its current back through the coil X and into plate B, as shown in Figure 5b. Electrical current has momentum, just as does a swinging pendulum, and the flow does not stop when both plates are equally charged, but the current piles up in plate B and then must

Figure 6—Three methods of showing condensers on diagrams, one variable and two fixed

again flow as in Figure 5a. This action would continue indefinitely and we would have a perpetually oscillating circuit were it not for small losses which occur and the resistance of the circuit.

The symbols used for showing capacity in the form of an instrument known as a condenser, are shown in Figure 6; 6a designates a variable condenser, that is, a condenser whose capacity may be varied from maximum to very nearly zero. The unit of measurement of capacity is the farad and its subdivision, the microfarad (.000001 farad). Condensers used in Radio work have very small capacities and are usually measured in fractions of a microfarad; 6b is the usual designation of a fixed capacity, while 6c is another less used method of showing it.

As the capacity of condensers is usually written and spoken of in decimals such as .001, .0005 and .00025, Radio men have developed the following way of speaking of them. The Radio experimenter would say "double O one," "triple O five" or "triple O two five," meaning condensers of .001 of a microfarad, .0005 of a microfarad or .00025 microfarad.

Resistance

Resistance is, as was stated before, measured in ohms. Since we frequently use resistances of from 1,000,000 to 12,000,000 ohms, the Radio fraternity has come to use the word megohm for 1,000,000 ohms and to mention 8,000,000 ohms we would say "eight megohms."

Resistances are shown on diagrams by the symbols shown in Figure 7. A resistance which cannot be varied is shown as in 7a, while a resistance that is variable (such as a rheostat) may be specified by 7b; 7c shows a particular form of resistance known as a potentiometer, which is usually connected across the filament battery of a vacuum tube. The sliding

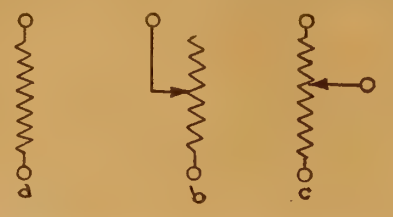

Figure 7—Resistances are shown in these drawings, one fixed, one variable, one of a special unit

contact is connected to one of the other elements of the tube (grid or plate), and moving this contact varies the difference in pressure between the filament and the second element.

(TO BE CONTINUED)

FIRST STEPS IN RADIO

(Continued from page 17)

caused by too large a tickler coil, is responsible. Also, the grid leak resistance may be too high, causing the tube to block, or the trouble may be due to a too high plate voltage or undesired feedback, caused by the closeness of the plate circuit to the grid circuit leads. Often a steady whistle is heard when a nearby regenerative set emits waves, or if two broadcasting stations are heterodyning each other. Interference of this nature will be recognized by the inability to change the note by tuning, whereas feedback effects are altered by adjusting the tuning controls.

Squealing usually is experienced when the amplifiers are switched on and is due to reaction between the plate and grid circuits of the tubes. The most common cause is the reversal of a transformer winding, in which case it is necessary to reverse the connections to the transformers until the noise is eliminated. When transformers are close together, the squealing often is caused by the magnetic field of one reacting on the other. They should either be completely shielded, or the cores set at right angles. The wiring of amplifier units, when run too close, also will cause squealing and howling.

At times a buzzing or humming sound is encountered that is difficult to locate. Often it is due to induction from nearby power lines. It may be caused by a grid condenser made of tinfoil or paraffin paper. In one case, the panel of the set picked up the vibrations from the loud talker through the table, and the vibration was transmitted to the tubes and caused a ringing sound. A plate lead brought close to the ground lead or high voltage leaking into the aerial circuit is a frequent cause of buzzing or humming.

Unsteady and Wavering Signals

Unsteady and wavering signals are due to the unsteady operation of some part of the set. Poor contacts in the filament circuit or an aerial circuit with too low capacity in series with the primary inductance will cause them. Loose inductances will result in unsteady signals, and a leaky aerial or lightning arrester due to rain or moisture will affect the signals.

In locating trouble one should bear in mind that the broadcaster is sometimes at fault. The set can only reproduce what it receives, and before blaming the set the operator should tune in another station and see if that acts the same way. In homemade apparatus many factors enter into the operation. For instance, the shielding on the panel may result in feedback effects that cause whistling and squealing. Homemade inductances are often coated with shellac that is unfit for the purpose, sometimes containing water that causes leaks between the turns and poor tuning.

Fiber is considered a good insulator as a rule, but it should not be used as an insulator in Radio apparatus. A fiber panel will make any regenerative set noisy, if not worthless for long distance work. Fiber washers should never be used to insulate the binding posts from the shielding on your set. Scrape the shielding away for a quarter inch around the posts or use bakelite washers.

(TO BE CONTINUED)

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Thanks to your course and help it gave me, I have had another boost in pay. This is the third one in less than a year. Today I am getting three times as much as I got before I began your course.
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Your course was worth $5,000 to me, but I wouldn't take ten times that for the value I've gained from it. I signed up with a company for $300 a month and expenses paid. I owe this to your course.
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Peculiar, Mo.

Prepares for All Radio Jobs

It will interest you to know that since completing your course I was 1st operator on Steamship Lake Giltedge. Last summer I had charge of Broadcasting Station WIAI, and in December connected with the Colin B. Kennedy Radio Corp. as sales correspondent handling all technical inquiries which I enjoy immensely. All due to N.R.I.
WILLIAM WEST,
St. Louis, Mo.

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Learn more about this wonderful field of radio and what it can mean to you. Read about the opportunities open—their pay—how our method quickly trains you—what our graduates say—what they are doing and what you can do. There's no obligation in sending for this free book. You have everything to gain—and nothing to lose. Send for this book today—the book that has meant more money to hundreds of our graduates. Mail the coupon NOW! NATIONAL RADIO INSTITUTE, Dept. 55-K, WASHINGTON, D. C.

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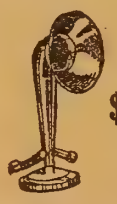
DIETZEN Midget Tube

1½ Volt, Operates on one dry cell, either with or without B battery. Wiring diagram Free with each tube.

$1.00
Socket 40c

AMPLETONE Horn—Nickeled



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Set up in 5 minutes. All parts complete $1.00

Variable condenser, 43 pl. (bakelite end)	$1.95	Rheostat, 6 ohm	$ .45
7 Strand aerial wire, 100 feet	.65	Test Rite battery hydrometer	.49
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Building Up Fixed Condenser Values

Five Different Series and Shunt Combination

For the experimenter who wishes to use the larger size variable condenser in the circuits now popular requiring small condensers, the following stunt will prove valuable. The capacity curve of the large variable may be reduced all along the scale by using a small fixed condenser in series with it. Thus a .001 mfd. variable may be made into a .0005 by using in series with a .001 fixed condenser; or it may be changed to .0002 by using a .00025 fixed condenser.

This method of reducing the capacity of a variable somewhat distorts the capacity curve; i. e. reduces the upper part of the scale in greater proportion than the lower part, but this is especially desirable with condensers of the type of the Connecticut variable.

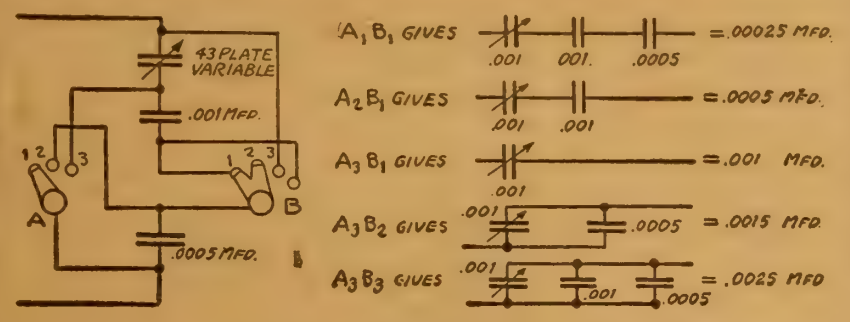
In the diagram two fixed condensers of .001 mfd. and .0005 mfd. are used with a 43-plate variable so that five different series and shunt combinations are possible, varying from a maximum capacity of .00025 mfd. when all are in series, to a maximum of .0025 mfd. when all are in shunt. Switch A is used to obtain the series combinations, switch B being left in the first position (to the left). With A in the third position, the variable only is in the circuit. The fixed condensers are shunted across it to increase its capacity by moving switch B to the second and third positions, switch B being left in the third position (to the right). It will be noted that switch B has two blades. The condensers used should be mica insulated and of guaranteed capacity.—Russell Skeeters, Des Moines, Ia.

WORKSHOP KINKS? EARN A DOLLAR—

THERE are many little kinks worked out at home that would aid your fellow Radio worker if only he knew about them. There are new hook-ups, new ways of making parts and various unique ways of operating sets that are discovered every day. Radio Digest is very much interested in obtaining such material. Send them in with full details, including stamped envelope, so rejected copy may be returned. The work must be entirely original, not copied.

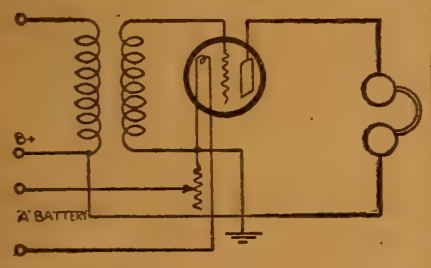
RADIO KINKS DEPARTMENT,
Radio Digest,
123 W. Madison St., Chicago

SWITCH CONTROLS THE CAPACITY

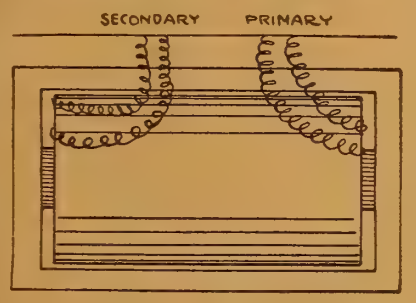


Audio Frequency Transformer

Pick up from your neighboring garage a few Ford coils. These coils are divided into two small coils each about 1½ inches long which constitute the secondary. These two coils and the cores are used in the transformer. If the case, binding posts, vibrator and the various equipment are still in place, save them. Many things not needed at first will become of value later.



Separate the coils to make two independent coils. Take the primary winding—the larger wire around the core—out of both and keep the core—the bunch of annealed wire—in the center. If you want to know how many layers are on a coil count them. It's good practice. On most coils there are 35 and 37 layers. If we have a 35-layer coil and desire a 10 to 1 ratio it is necessary to have a 30 to 3 coil.



First, five layers of the coil are pulled out of the inside and the ends are brought out free. Remove 30 layers from the outside of the remaining coil and bring the ends out free. It will now be easy to place the smaller coil into the larger one. Wind enough tape around the smaller coil to make it fit snugly into the larger coil. Bring the ends from the large coil out at one end and the ends from the small coil out at the other end and keep in mind which is which. The larger coil is the secondary and the smaller the primary. Wind the core with enough tape to fit well into the inside of the small coil.

If you want a closed core transformer, the usual kind, bend back the ends of the core as shown in the illustration; it will serve the purpose admirably. If you want an open core type leave the core as it is shown.—Edwin Rust, Phoebus, Va.

Keep Rust Out of Receivers

The diaphragms of certain types of telephone receivers sometimes become rusted after long use and even the pole pieces themselves become slightly covered with rust which will interfere with the vibration of the diaphragm. When this is noticed, remove the cap and wipe the magnets and diaphragm with a soft cloth dampened with sewing machine oil. Care should be used not to bend the circular disc.

Testing Crystals

The more ambitious of experimenters will find it an interesting and instructive pastime to test out crystals of different kinds of sensitiveness. While thousands of crystals and combinations of crystals have been tried out, a new combination may accidentally be discovered that will bring results well worth the trouble.

Connecting Testing Sets That Use Vacuum Tubes

When the construction of a receiving set empolying vacuum tubes either as detectors or amplifiers is complete, the filament or A battery should first be connected up to be certain that all the connections to the tubes and control rheostats are correct for filament lighting. The plate or B battery should always be connected last so as to eliminate the possibility of having the tubes burnt out through improper connection of the B battery to the filament terminals.—Peter J. M. Clute. Schenectady, N. Y.

A single circuit set will pick up almost as many stations as a more complicated one, but it may happen that it does not pick up one station at a time.

MISSING WHAT YOU GET

YOUR set is probably bringing in DX stations you never hear because your rheostat cannot control your filament action. The Fil-Ko-Stat gives infinite adjustment and enables you to magnify the weak stations and bring them in strong and clear.

Full resistance 30 Ohms, adjusted to ALL TUBES. "Avoid the use of inferior powdered carbon rheostats." $2 At All Dealers in High Grade RADIO SUPPLIES

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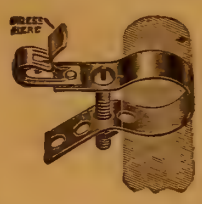

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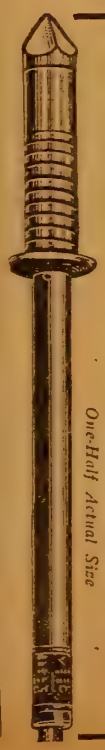

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A Solution to the Small Soldering Problem of the Discriminating Assembler. Unbreakable Construction — Economical Operation on any Electrical Circuit—Interchangeable Tip.

$5.50

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Do you wonder how we can do it?

A great many radio men have wondered how for example we can offer a genuine Automatic Electric $10 head set for $3.65. The reason's simple enough. When we buy we don't merely place an order for a dozen or so. We buy big! We buy out a complete stock or the entire output of a factory. We bought 40,000 of these Automatic Electric head sets. We got a special price by paying spot cash for the lot—and that's how we can offer these $10 head sets for

The Automatic Electric head set embodies a style and design proved by use and experiment to be the best. Coil wound with about 6500 turns of No. 40 enamel coated copper wire. Direct current resistance approximately 1600 ohms. Impedance and average music and voice frequency (800 cycles) is 21,000 ohms.

$3.65

WATCH FOR OUR BIG SALE ON WESTERN ELECTRIC V.T.-2's
We Just Bought 10,000 of Them from the Navy

HONEYCOMB COILS

1,500 Turns	$1.50
1,250 Turns	1.50
1,000 Turns	1.25
750 Turns	1.00
250 Turns	.75
150 Turns	.60
100 Turns	.50
75 Turns	.40
50 Turns	.40
35 and 25 Turns	.40

CAPT. SCHOONHOVEN REINARTZ COILS $1.95

COCKADAY COILS $1.95

U. S. A. SIGNAL CORPS, AVIATION TYPE 194-W WESTERN ELECTRIC PHONES

Each Phone Cap is covered with large, soft rubber ear cushions, and an aviation leather helmet goes with each set! These are the only phones to pass the Government specifications for sensitiveness and loudness, the requirements called for in aircraft reception.

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SINGLE CORDS SUPERSENSITIVE MICROPHONE TRANSMITTER $2.45

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$7.00 val., 43-pl. Vernier	$3.95
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FRESHMAN VARIABLE GRID LEAK AND CONDENSER
$1.00 Value 65c

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Questions and Answers

Two Tube Super

(4816) AW, Evanston, Ill.

I have noted the two tube super-regenerative circuit shown in Mr. Benson's article in Radio Digest July 28. If it is possible for you to do so please print additional information about this circuit. Could a variocoupler or a variometer with stator and rotor winding separated be used in place of the honeycomb coils in the circuit of detector tube?

To a variable coupling between the D. L. coils, are 1250-250-1500, turns necessary? If so, can they be mounted as shown in the description of the single tube circuit of August 4?

Should the D. L. coil, 250 turns, be mounted between the large coils in this case?

A.—A standard variocoupler can be substituted for the honeycomb coils indicated.

A variable coupling is necessary until the point of best operation is found. Coils can be mounted as suggested.

The 250 turn coil is not in inductive relation to the 1250 and 1500 turn coils.

Body Capacity

(4723) JLR, Allegan, Mich.

I am a reader of your publication and would like to ask a question relative to my single tube variometer coupler regenerative set. My entire tuning panel is shielded with tinfoil; this shield is connected directly to the ground binding post. I get satisfactory results excepting that after tuning in a station it is necessary to keep my hand on the variometer dial or the set will howl and the station tuned in will be lost. I do not use a variable condenser with this set.

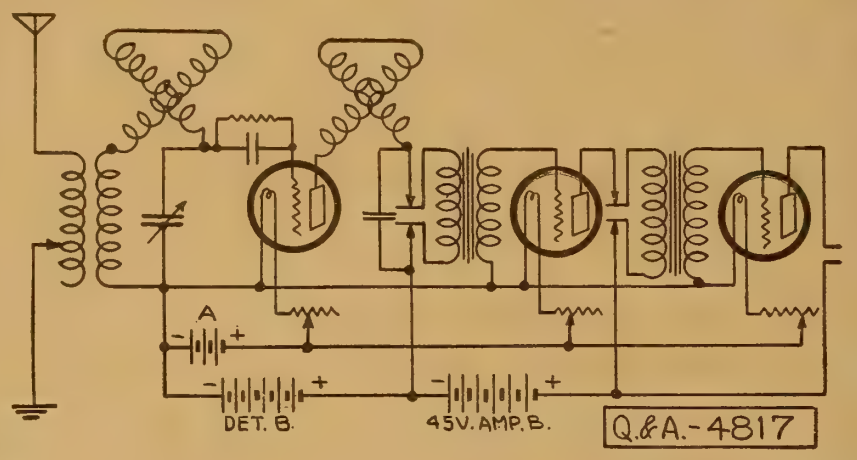
I will be very appreciative of any help you can give me in regard to eliminating this trouble.

A.—The action cited is characteristic of a variometer set. It will be overcome by placing a 3 or 5 plate variable condenser across the secondary of the variocoupler. After the circuit has been tuned use the condenser to compensate for the difference in the wave length caused by the hand capacity. Rotary plates of the condenser should be connected to the filament side of the secondary to eliminate body capacity effect.

Regenerative Circuit with Amplifier

(4817) WG, Roanoke, Va.

Will you send me a hook-up consisting of the following parts .001 condenser, 180-degree variocoupler, variometer and a two-stage audiofrequency with jacks, not filament lighting jacks?



A.—Complying with your request, we are giving a diagram of a circuit conforming with your specifications. Either the variometer or variable condenser shown in the secondary circuit may be eliminated (not both, however). If both instruments are employed as indicated the circuit will be capable of twice the wave length possible with only one of these units.

Allen Regenerative Circuit

(4712) CHN, Paoli, Pa.

Referring to your circuit 01321, Radio Digest, November 4, 1922, please note the following:

I have been using this circuit for some time very successfully, finding it especially good during the summer months, being able to work as far west as Omaha, in the middle of July. However, I am handicapped in one way—it does not work very well on the new short wave lengths. From 392 meters to 509 meters it works very well. I have been able to get as low as 309 meters and as high as 517 but in both instances the reception has been very thin and mushy. I have added to this circuit a wave trap in the aerial lead. Can you tell me what to do to enable me to get 360 meters and less in a satisfactory way? Across the variometer leading to the audio transformer I have a vernier but even this does not split certain waves on the short or high lengths.

Will you please give me a hook-up and indicate the switch to use so that I can put the wave trap in shunt with the aerial and ground, in series with the aerial, in series with the ground, or cut it out entirely? I worked for two hours trying to figure out this problem on a series parallel switch but could not solve it.

Can you tell me the right size loop to use on this circuit? I have a loop which I bought; it brings in the wave but I find I cannot split it; so I have not as yet been able to use the loop. Of all the circuits I have tried, I find this to be the best for all around work. Its selectivity is remarkable and the range is fine.

A.—Noting limitations encountered in the operation of Circuit 01321, Radio Digest, we advise that it should be capable of tuning to lower wave lengths as constructed. However, in experimentation you might eliminate the variometer shown between the audio frequency transformer and the rotor of coupler for low wave length work.

For accomplishment of higher wave lengths place a .00025 mfd. fixed condenser between the grid variometer, grid condenser connection and the filament side of the variocoupler or ground.

A wave trap is most effective in the antenna circuit; we recommend it in that position only. It is doubtful if your proposed arrangement could be effected.

A loop may be constructed of 10 turns of wire spaced at ½ inch on a 3-foot square frame.

TWO SUPERSENSITIVE CIRCUITS
(Both Copyrighted)

My Highly Improved Reinartz brings in all important stations on both coasts and Mexican border, loud, clear and without distortion. We dance to music from Atlanta received on one loud Baldwin unit. Build one of these wonderful sets from my blueprints and specifications, price 50c, or with a perfect and complete double wound spiderweb coil, $3.00 by mail. No other windings used. Photo of my set on a glass panel with every order.

This copyrighted circuit is the most successful of any Reinartz modification yet produced, and is imitated the most. Thousands are in use.

My W. D. 11 Circuit is especially designed for use with the "Pickle" tube and brings out the full value of that little tube as no other circuit can. Stations 1000 miles away come in clearly on one tube. This set is small, complete, portable. For the man who wishes the highest efficiency, this is the set to build. Price of blueprint and specifications, 50c, or with complete and perfect windings, $3.00. Photo of set with every order.

Sets built from these plans will receive all broadcasting stations operating under the new laws. Their wave length range is from 170 to 800 meters.

AUXILIARY TUNER

This new instrument connected to your present receiving set with one wire enables you to easily bring in both the long and short wave stations which you cannot get with your present equipment. It also enables you to eliminate that local interference so you may listen to distant stations.

Copyrighted diagram and complete instructions for building and operating this instrument, 50c, or with all parts, including Condenser, Coils, Switches, and Panel, $8.50. Complete instrument, $15. All goods prepaid.

These instruments are easy to build, easy to operate. Everything clearly shown.

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$3.50 Workrite 180° $2.95
3.00 Rhason 180° 1.95
3.50 Fisher, Large, 180° 2.25
3.50 Fisher, Large, 90° 2.25
2.75 Fisher, Small, 180° 1.75
2.75 Fisher, Small, 90° 1.75

VARIOMETERS
$3.50 Workrite $2.95
8.50 Remler, Molded 4.45
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$2.00 R. C. 11 plate $1.05
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ALL PARTS FOR THE
Acmedyne Circuit

as described by Mr. Lawrence Cockaday in the August issue of "Popular Radio," employed in the wonderful Melco-Supreme Receiver.

Tuned Radio-Frequency at Its Best

Telos Vario-Transformer $8.50
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AMSCO Compensating Condenser $3.00

Complete knock-down parts for Melco-Supreme, including drilled engraved Bakelite panel, solid mahogany cabinet, and three No. 201-A Radiotrons $80

All goods absolutely guaranteed by manufacturer and ourselves. Shipped immediately, prepaid, on receipt of purchase price. Write for price list on our complete line of quality apparatus.

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MICROMETER ADJUSTING
CRYSTAL DETECTOR

The every-purpose detector—fixed or changeable adjustment, just as you wish. Tune with the YELLOWTIP. No hunting or looking for a sensitive spot. Just "A Twist of the Wrist—It's Set." Micrometer adjustment in a moment, fixed indefinitely. Ideal for reflex and other circuits. $2

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Exclusive Factory Representatives
35 WILLIAM ST., NEWARK, N. J.
Dealers and Jobbers write for attractive proposition.

B-METAL

The Crystal That Brought Joy to 100,000 Radio Users Last Season.

Sent on approval. Pay us 50 cents when you are satisfied. That's how sure we are that it will please you. Just pass the good news on to a dealer so others may enjoy B-Metals too. Just send us the name of dealer who hasn't heard of B-Metal when remitting.

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The B-Metal Type C Fixed Detector for Your Reflex Set—Try One and Know

The price is reasonable when you see what it does. Thousands in use. Read one of the many reports.

$2.50

B-Metal Refining Co. Pittsburgh, Pa., June 4th, 1923.
Gentlemen:—I enclose check for $3.00 in payment for the Reflex and B-Metal crystals recently sent me on trial. The Reflex detector is entirely satisfactory in every respect, in fact, much better than I expected. I am using it in a three-tube circuit. Very truly yours,
G. HALDEMAN, 5532 Howe Street.

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LOUD TALKING REFLEX DETECTOR

"MAKE Perfection YOUR Selection"

Neutrodyne
5 TUBE SET

The Neutrodyne Circuit is the last word in Radio and is the best set that can be made today.

Formica Panel 7x24
5 Bakelite Sockets
3 Neutroformers
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2 Franco Audio Transformers
1 "A" Battery Switch
3 Dials, 4 inch
1 Klosner Rheostat
1 Amsco Power Rheostat
8 Binding Posts with Names
3 Jacks
27 Feet Spaghetti
28 Feet No. 14 Tinned Copper Wire
2 Condensers, .006 Dubilier
1 Grid Leak and Condenser, Freshman
1 Dubilier Condenser, .002

Special price for complete parts for 5 tube set
$27.75

Cockaday
Circuit Complete

1 Eastern Cockaday Coil
2 Amsco 23 Plate Vernier Condensers
1 Panel 7x14x3/16
2 Dials, 3 inch
1 Bakelite Socket
1 Tubular Leak, 2 meg.
1 Dubilier Condenser, .00025
1 Klosner Rheostat
8 Name Binding Posts
12 Feet Tinned Copper Wire No. 14
6 Feet Cambric Spaghetti
1 Switch Lever
7 Contact Points and Nuts
2 Contact Stops and Nuts
1 Diagram

Our special price for complete Cockaday Set
$13.95

Erla Reflex
Circuit Complete

Operate a loud speaker on one tube with this wonderful set.

1 Formica Panel 7x14x3/16. Panel is drilled, engraved and polished.
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Tucson, KFDH

Arkansas:
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Fort Smith, WGAR
Little Rock, WCAV
Pine Bluff, WOK

California:
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Berkeley, KQI, KRE
Del Monte, KLN
El Monte, KUY
Fresno, KMJ
Hollywood, KFAR
Long Beach, KSS
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Los Gatos, KFHQ
Modesto, KND
Oakland, KLS, KLX, KZM
Richmond, KFCM
Sacramento, KFBK
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San Francisco, KPO, KUO
San Jose, KFAQ, KQW
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Santa Ana, KFAW
Santa Barbara, KFHJ
Selma, KFJH
Stanford Univ., KFGH
Stockton, KJQ, KWG
Venice, KFAV

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Colorado Springs, KFFQ, KFCK
Denver, AAS, KDZQ, KFAF, KFEL, KFLE, KLZ
Greeley, KFJD, KFKA
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Trinidad, KFBS, KFHY

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Hartford, WDAK
New Haven, WPAJ
Storrs, WABL
Waterbury, WQAD

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Wilmington, WHAV, WOAT

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Miami, WQAM
Pensacola, WGAN, WLAV
St. Petersburgh, WSAG
Tampa, WDAE

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College Park, WDAJ
Gainesville, WKAT
Macon, WMAZ
Savannah, WRAB

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Kellogg, KFEV
Moscow, KFAN

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Tuscola, WDZ
Urbana, WRM
Zion, WCBD

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Huntington, WHAY
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Muncie, WJAF
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West Lafayette, WBAA

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Cedar Falls, KFJX
Cedar Rapids, WJAM, WKAA
Centerville, WDAX
Council Bluffs, WPAF
Davenport, WHAI, WOC
Des Moines, KFDJ, WGF
Fort Dodge, KFEB, WEAB
Gladbrook, KFIK
Iowa City, WHAA
Lamoni, KFFY
Le Mars, KFCY, WIAU
Marshalltown, KFJB
Newton, WJAH
Oskaloosa, KFHL
Ottumwa, KFJL
Sigourney, WOAD
Sioux City, WEAU
Waterloo, WHAC

Kansas:
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Beloit, WPAR
Cheney, KFGP
Emporia, WAAZ
Hutchinson, KFHX
Independence, KFIX
Iola, KFID
Lindsborg, WDAD
Louisburg, KFIL
Manhattan, WTG
Marion, WRAD
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Wichita, KFHI, WAAP, WEAH

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Lexington, WQAH
Louisville, WHAS, WLAP
Paducah, WIAR

Louisiana:
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New Orleans, WAAB, WAAC, WCAG, WGV, WIAF, WTAF, WWL
Shreveport, KFDX, KFHF, WGAQ

Maine:
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Houlton, WLAN
Portland, WTAJ

Maryland:
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Frostburg, WPAQ

Massachusetts:
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Dartmouth, WMAF
Fall River, WSAR, WTAB
Lowell, WQAS
Medford Hillside, WGI
New Bedford, WDAU
Springfield, WBZ
Worcester, WABK, WDAS

Michigan:
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Dearborn, WWJ
Detroit, KOP, WCX, WWJ
East Lansing, WKAR
Flint, WEAA
Kalamazoo, WOAP, WLAQ
Lansing, WHAL
Rodgers, WCAF
Saginaw, WABM

Minnesota:
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Duluth, WMAT
Hutchinson, WFAN
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St. Cloud, WFAM
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Cape Girardeau, WSAB
Carrollton, KFJJ
Columbia, WAAN
Independence, WPAG
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University Place, WCAJ
Utica, KFGV
York, KFDB

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Sparks, KFFR

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Laconia, WKAV

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Gloucester City, WRAX
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Paterson, WBAN
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State College, KOB

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Ridgewood, WHN
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Tarrytown, WRW
Troy, WHAZ
Utica, WSL

North Carolina:
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Charlotte, WBT
Greensboro, WQAZ
Raleigh, WLAC

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Grand Forks, KFJM, KFJQ, WOAB
Mayville, KFHU

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Portland, KDYQ, KFEC, KFIF, KGG, KGN, KGW
Salem, KFCD

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Erie, WOAV
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Johnstown, WTAC
Lancaster, WDBC, WGAL
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Salt Lake City, KDYL, KZN

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Springfield, WQAE

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Yakima, KFIQ

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La Crosse, WABN
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Neenah, WIAJ
St. Croix Falls, WRAL
Waupaca, WPAH

Wyoming:
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Laramie, KFBU

Alaska:
Juneau, KFIU

Hawaii:
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Lihue, KFHS

Porto Rico:
San Juan, WKAQ

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Calgary, CHBC, CFAC, CFCN
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Hamilton, CKOC
Iroquois Falls, CFCH
London, CFCW, CJGC
Montreal, CFCF, CFUC, CHYC
CKAC
Olds, CJCX
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Radio Illustrated

Mary Lee, a young lady of Oak Park, Ill.—a suburb of Chicago—who recently starred in a screen picture to promote the "Own Your Home" idea in that village, is now featuring in the KYW broadcasting program of the Westinghouse Electric Co. Miss Lee is a Radiophan and is here shown listening in on her own set. Radio played a prominent part in the film in which she appeared Photo by Atlas Film Co.

Heap Big Chief John Snow, a Passamaquoddy and recent Radiophan, waxed wroth after listening all day, hearing only a lecture on cooking. So he appealed to a nearby U. S. Radio station, asking Uncle Sam to "fix 'um plenty"—meaning the broadcasters
© Pictorial Press

This interesting Radio receiving set is made in book form with the title, "My Set," impressed on the front cover, and was expressly made for little Miss Stella Pogany of Philadelphia, who is probably one of the youngest Radio enthusiasts to have her own set. A picture of the young lady appears on page three of this issue

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